American International Journal of Social Science
June 2024, Volume 13, pp. 1-9
ISSN 2325-4149 (Print), ISSN 2325-4165 (Online)

Published by The Brooklyn Research and Publishing Institute.
DOI: 10.15640/aijss.v13a1
URL: https://doi.org/10.15640/aijss.v13a1

Nexus between the Logistics Performance and Foreign Direct Investment: Evidence from GCC Countries

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Abstract

This study examined the role of logistics performance in attracting FDI in Gulf Cooperation Council (GCC) states. This study used a panel dataset over the period 2007-2018 by employing a static panel regression model. The logistic performance was evaluated through six distinct dimensions of the logistic performance index. The study findings revealed that none of the six dimensions of the logistic performance index has a significant impact on attracting FDI inflows, in the context of GCC states, which indicates that logistics operations do not give opportunities for GCC countries to attract foreign investment during the study time. On contrary, FDI inflows significantly foster economic growth and trade openness while FDI negatively but significantly affects CO2 emissions. It is recommended that policymakers should focus more on holistic insights rather than concentrate on a particular set of indicators to procure high-performance levels to maintain inward foreign investment based on state characteristics.

Keywords: Economic Growth, Foreign Direct Investment, Logistic Performance, POLS, Trade Openness

1. Introduction

In a rapidly globalized world, investment opportunities are indispensable for investors in every sector and facilitate them with the potential to boost their effectiveness and market share. Developed and developing economies integrate different economic policies to attract the sheer amount of investment. Dynamics have completely changed from the 50s and 60s era when underdeveloped nations were dubious of foreign investment and considered foreign direct investment (FDI) as a risk to their autonomy when international corporation built their manufacturing zone domestically. Conversely, confrontation with the globalization of markets and monetary policies changed the perspective infused in developing countries and propelled them to welcome FDI. Foreign direct investment is now perceived as reliable, insusceptible to financial catastrophe, and stimulating funding possibilities without procuring external financial burden and also contributing towards the economic development of the host country. Thus, FDI is required to bolster the economic diversification, industrialization, and structural development of the host nation (Soh et al., 2021).

The logistics sector is among the rapidly evolving sectors across the globe and become a prime priority in international trade considering the continuously growing regional economic development. The logistics industry has been recognized as the leading industry to support the agenda of diversification and emerged as the driving factor for FDI in GCC economies (Hajri, 2021). This is because of the centric location of this region, access to the occupied seaways, inexpensive raw materials, and financial capability to spend capital in supporting technologies and infrastructures (Goussouset al., 2020). In the Middle East region, more than 60 percent of total costs are accounted for ports in GCC countries by constructing new mega ports and expanding already existing ports, with modernized and intensively automated ports planned to lodge the biggest cargo containers in the globe. These strategic plans of ports are also intrinsically related to the progress of broader logistics channels such as airports, passenger and freight railway projects, and special economic zones. Consequently, the National Industrial Development and Logistics Program (NIDLP), in Saudi Arabia was initiated with a strategy to modify the Kingdom into a dominant industrial powerhouse and logistics core in the world by focalizing energy, logistics, mining, and industrial sectors. In the region of the Red Sea, King Abdullah Economic City had the biggest port, industrial, and logistics zone. Further, the New Mubarak Port in Kuwait is established to foster its place as the hub of regional trade. Similarly, the vision of 2030 of both Qatar and Bahrain projects them as the hub of regional

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logistics, manufacturing, and top-notch infrastructures. Oman also delves to develop a linked logistics space that combines seaports, railways, airports, and roads (Lasrado, 2022).Therefore, the logistics sector provides opportunities for development through investment.

Over the years, continuous increases in international trade and investment flow have incurred a substantial challenge in the logistics sector. Since efficient logistic operations ease the transportation of products, are cost-effective, and provide a guarantee of product safety and on-time delivery, when tradeoffoccurs between the countries, nations with inefficient logistics operations will become expensive in terms of time and money and thereby this will affectcountry's position in international markets. Consequently, Arvis et al., (2018) discussed logistics performance as a significant factor in measuring the competitiveness of a country thereby the logistic performance of the country functions with location advantage and attracts FDI from the foreign world. A previous study investigated the role of logistics performance on economic development and found a positive association between them (Li and Chen, 2021: Saidi et al., 2020). However, existing literature didn't pay much attention to exploring the logistics operations in illustrating the attractiveness of a nation as an investment destination. Therefore, this study aims to investigate the impact of logistic performance on foreign direct investment in GCC countries. In other words, this study contributes to the literature by exploring the nexus between FDI inflows and logistic performance in the GCC countries. Thus, the member countries of the GCC region support the agenda of diversification, and the logistic sector is identified as the core pillar of this agenda.

2. Literature Review

Previous studies extensively examined and investigated potential drivers of foreign direct investment by applying different econometric approaches. These drivers include population growth, energy consumption, environmental sustainability, market openness, economic growth, and institutional quality (Nguyen, 2021; Khushnood et al., 2020; Osmanovic and Alvi, 2022; Simionescu, 2021; Alharthi et al.,2024). However, few researchers have made an effort to examine the influence of logistic performance in attracting FDI (Soh et al., 2021; An et al., 2021; Saidi et al, 2020). Therefore, this study would provide brief insights about logistic performance, and foreign direct investment.

The logistics performance term is used at the national level to denote national logistic performance. Mostly, logistics activities are carried out by private firms and have a great influence the administrative and policy concerns at the country level. The study by Katipet al., (2011) discussed national logistic performance as the crucial indicator in evaluating the competitiveness of a nation. Consequently, the World Bank created the LP index in 2007 to evaluate each nation's logistics performance. This index is extracted from the survey, conducted among the carriers, haulers as well as freight forwarders working in the countries. The logistics actors have an impact on the national logistics performance. Ghani (2017) discovered a significant and positive correlation between the overall efficiency of logistics and imports and exports.

Since the logistics sector directly affects the expansion of domestic industries and trade, it is regarded as the lifeline of businesses in any economy (Khan et al., 2020). To facilitate the efficient and effective flow of products, services, and information to meet the customers' needs, the management of logistics is to create and bolster the connection between point-of-consumption and point-of-origin s (Zijm et al., 2019). These connections need integration. Naway and Rahmat (2019) found the significant mediating role of logistics integration among supply chain capability and operational performance of the supply chain. Regarding the performance of the logistic supply chain, Arvis et al (2016) proposed six measures to be employed to evaluate the national logistics performance, i.e (1) the effectiveness of border and customs clearance, (2) the quality of transport and trade infrastructure, (3) the ease of organizing consignments at competitive prices, (4) the quality and competence of the logistics services, (5) capability to track and trace the shipments, and (6) the frequency at which the consignment delivered within the anticipated delivery time. These indicators serve as the efficacy and efficiency of logistics performance in an economy. To measure trade facilitation, these six indicators of World Bank logistics performance have been regularly employed every two years since 2007.

Developing economies desire development and it could transpire by domestic and inward foreign investment. Aside from domestic investment, emerging countries are focused on attracting foreign direct investment. FDI by default mandates that international companies build production and manufacturing facilities in the host countries. FDI has manifold effects on the host countries since it helps in job creation in the host country, possibly increasing the gross domestic product in the host country and increasing the standard of living of the residents. On the other hand, improving wages and financial capital supply, raising industrial standards, encouraging local labor mobility and inputs, sharing knowledge and skills with local partners, bridging the gaps between the saving-investment capital, and strengthening the balance of payment are among the other advantages for host countries ((Khadaroo&Seetanah, 2010). An et al., 2021 revealed that FDI significantly enhances the

quality of green logistics performance in the BRICS region. Contrary to this, Lutterman et al., (2017) advocated a significant association between logistics operations and trade while having no significant relationship with FDI.

Other factors such as market size, trade openness, and greenhouse gas (GHG) emissions also affect FDI inflows and logistics performance. The study by Khan et al., (2021) found that higher logistics performance and inward foreign investment significantly contribute to trade and economic growth.

2. Methodology

2.1 Data Sources and Model Specifications

This study investigated the impact of logistics operations in attracting inward FDI in GCC states. Nevertheless, to follow the practice of development of the empirical model, this study considered control variables to extricate the genuine impact on the dependent variable. Therefore, to explore the interplay between FDI inflows and logistics performance, we incorporated six distinct dimensions of the logistics performance index including, custom clearance score, international shipment score, logistic quality and competence score, tracking and tracing score, infrastructure score, and timeliness score. The econometric model can be developed by considering logistic performance and other control variables concerning the previous studies (Soh et al.,2021; An et al., 2021) are demonstrated as follows,

$$lnFDI_{it} = \beta_0 + \beta_1 CS_{it} + \beta_2 IF_{it} + \beta_3 IS_{it} + \beta_4 LC_{it} + \beta_5 TT_{it} + \beta_6 TL_{it} + \beta 7 \ln GDPit + \beta 8 \ln CO2it + \beta 9 \ln TRAit + \mu_t + \lambda_i + \varepsilon_{it} \quad (1)$$

Equation (1) depicts the FDI as the foreign direct investment (log of net inflows of FDI), CS as the customs clearance score, IF as the infrastructure score, IS as the logistic competence core, TT as the tracking and tracing score, TL as the timeliness score, GDP as the gross domestic products, CO2 as the carbon-di-oxide emission (tons per metric), TRA as the trade openness (ratio of imports and exports/ GDP) (Appendix I). While μ_t and λ_i represent the time-specific and country-specific unobserved fixed effect and ε_{it} infers the stochastic term.

This study used balanced panel data sets over the period 2007-2018 to investigate the nexus between logistics performance and FDI inflows in GCC countries, based on the availability of the data. The time frame encompasses the years 2007, 2010, 2012, 2014, 2016, and 2018 with uneven data gaps as the data for LPI is available only for the mentioned years. The data for the research has been gathered from the World Bank database, World Development Indicators, and World Bank Logistics Performance Report.

2.2 Panel Data Estimation Strategies

The model of the study is examined through the static panel data technique due to the dataset is relatively small in terms of cross-sectional units (N=6) as well as in time series. Three static panel data approaches are commonly used in the econometric literature such as Pooled Ordinary Least Square estimator (POLS), Fixed Effect estimator (FE), and Random Effect estimator (RE). the estimator is chosen considering the characteristics of the country-specific(λi) and time-specific (μ_t) effects observed in equations (1). When both effects are absent ($\lambda i = 0$, $\mu_t = 0$), then the estimated findings of POLS are considered unbiased and superior. Nevertheless, in the existence of a country-specific effect ($\lambda i \neq 0$), the findings of POLS estimators are possibly biased. Consequently, the issue of country-specific effect can be resolved by using two prevalent statistical approaches i.e. Fixed effect and Random Effect models. The fixed effect used demeaned technique to eliminate the country-specific from the model whereas the random effect relied on the quasi-demeaned technique to avoid the country-specific effect. The selection of the model relies highly on the efficiency of the estimation. This study proposes Breusch-Pagan LM test and Hausman test be employed to choose between the (I) POLS & RE and (ii) RE& FE respectively, in performing the analysis.

3. Empirical Results

In the previous section, we discussed data sources, the specification of the model, and econometric techniques employed to explore the role of logistics performance in FDI inflows in GCC countries. Before the empirical findings, Table 1 represents the descriptive statistics of the observed variables. The table demonstrates the mean (std. deviation) of the FDI, GDP, CO2, and TO are 2.45 (2.66), 4.17(4.61), 22.6 (7.04), and 113(33.09) respectively. Moreover, the mean (standard deviation)of the six dimensions of logistics performance including, CS, IF, IS, LC, TT, and TL are 2.99(0.38), 3.23(0.36), 3.14(0.39), 3.11(0.37), 3.24(0.35), and 3.61(0.40) respectively.

Table 1. Descriptive Statistics

Variables	Mean	Standard Deviation	Minimum	Maximum
FDI	2.445765	2.665483	-2.760018	11.45597
GDP	4.169237	4.616409	-7.076056	19.59233
CO2	22.57704	7.046628	13.43244	40.60945
TO	113.0967	33.09583	59.90546	191.8726
CS	2.997056	.3850508	2.251701	3.835051
IF	3.234374	.3697267	2.625	4.069324
IS	3.141119	.3932502	2.3125	3.893777
LC	3.118641	.3764002	2.369792	3.919378
TT	3.247745	.3563966	2.369792	3.960279
TL	3.616732	.4099309	2.369792	4.376292

3.1 Diagnostic Tests

To effectively perform the empirical estimation of the study, the diagnostic examination was conducted to avoid unbiased and spurious results.

3.2 Multi-collinearity

The findings of the Pair wise Correlation considering the influential impact of FDI inflows and logistic performance in GCC states over the period 2007-2018 is represented in Table 2 as a correlation matrix established for the variables. The finding demonstrates that there is a lack of highly significant correlation between the exploratory variables. Thus, in the analysis of the correlation coefficient, the problem of considerable collinearity exists when a high statistical coefficient of the correlation matrix was found at 0.9 or above (Hair et al, 2010; Al-Matari 2023). Therefore, it is evident (refer to Table 2)that there is no multicollinearity problem in the research model as no significant correlation (over 0.9) between the variables.

Table 2. Pairwise Correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
lnFDI	1.0000									
CS	0.1442	1.0000								
IF	0.1567	0.8342	1.0000							
IS	0.0718	0.5560	0.6795	1.0000						
LC	0.0009	0.6734	0.8430	0.7424	1.0000					
TT	-0.0901	0.5171	0.7265	0.6780	0.8870	1.0000				
TL	0.0410	0.1990	0.5042	0.5001	0.6896	0.7098	1.0000			
lnGDP	0.2410	-0.1881	-0.2515	-0.1947	-0.1751	-0.0674	0.0522	1.0000		
lnCO2	-0.2526	0.0059	-0.0571	0.1434	0.1717	0.3207	0.2315	0.3153	1.0000	
lnTRA	0.2164	0.5558	0.3656	0.2749	0.3871	0.4034	0.1180	-0.0733	0.0676	1.0000

3.3 Heteroscedasticity and Autocorrelation

The analysis of regression has experienced various violations when the data is cross-sectional as heteroscedasticity and autocorrelation are among them, as these issues cause higher values of t and F-statistics and ultimately lead to a higher probability to discard the null hypothesis, which would acceptable otherwise (Hair et al.,

2010). Thus, represents the inconsistent elucidation of variation in outcome variables in the effect of explanatory variables, restricting the interpretation of the regressors's impact. To detect the problem of heteroscedasticity and autocorrelation, we employed Breusch and Pagan (1979)/ Cook and Weisberg (1983) and Breusch-Godfrey LM tests. These tests show the level of heteroscedasticity and autocorrelation, where variance is unstable and consequently, both of these problems were handled by using standard errors as advocated by previous research (Huber, 1967; White, 1980). Table 3 represents the outcomes acquired from heteroscedasticity tests and it reveals that Prob > chi2 remains less than the 5% threshold value, providing evidence for the existence of a heteroscedasticity problem in the study model. moreover, Table 4 demonstrates the findings of the autocorrelation test and indicates that there is autocorrelation present in the model as Prob > chi2is less than 5% (rejecting the null hypothesis of no serial correlation). Therefore, robust standard errors are applied to resolve the problem of heteroscedasticity and autocorrelation.

Table 3. Breusch and Pagan/ Cook and Weisberg tests

chi2(1)	5.13
Prob > chi2	0.0236

Table 4. Breusch-Godfrey LM test for Autocorrelation

chi2(1)	9.665
Prob > chi2	0.0019

3.4 Cross Dependence Tests

Cross-dependence in panels may also lead to inefficient outcomes of the model. To check the cross-dependence among the variables, this study employed the Pesaran CD (2004) and Fress (1995) test, and the outcome of the tests was presented in Table 5. The null hypothesis of both tests indicates that there is no cross-sectional dependence in the model. The findings reveal that p-values exceed the 5% threshold level, which indicates that the model is cross-sectionally independent.

Table 5. Cross Dependence Tests

Tests	Statistics	Prob
Pesaran CD	-0.433	0.6651
Frees	0.208	0.8391

3.5 Selection between Random and Fixed Effect Model

The Hausman test is employed to analyze whether a correlation exists or not between the disturbance term and independent variables. Table 6 reveals that the null hypothesis failed to be rejected, indicating random effect is the appropriate model. Based on the outcomes of Table 6 random effect can be run for the analysis.

Table 6. Hausman Test

chi2(9)	4.06
Prob>chi2	0.9076

3.6 Selection between Random Effect and POLS Regression

The Breusch-Pagan LM test facilitates choosing between the Random effect model and the Pooled OLS model (constant coefficient approach). Table 7 demonstrates the insignificant results of the LM test. Thus, the null hypothesis fails to be rejected, indicating insignificant variation across years. Therefore, based on the results of Table 7, the random effect is not appropriate for the study model and POLS regression can be performed to estimate the finding(Breusch & Pagan, 1980; Gujarati, 2014).

Table 7.Breusch and Pagan Lagrangian Multiplier Test

chibar2(01)	0.03
Prob > chibar2	0.4357

3.7 OLS Regression Model

Based on the above findings, the Hausman test chooses the random effect model between the fixed and random effect model whereas, the LM test chooses POLS regression between the Random effect and POLS regression. Thus, the empirical estimation of OLS regression is presented in Table 8.Based on the estimated goodness-of-fit test such as R-square, it was found that the data of the current research are appropriately fitted by the model as 47% of the variations in GCC states' inward foreign investment are potentially anticipated by the independent variables described in the model. Considering the regression findings, we found that GDP and trade openness have significant and positive impacts on the inward FDI in GCC countries. In magnitude terms, a 1-unit rise in GDP and trade openness leads to an increase of 0.7 and 2.22 unitsin FDI inflows attributed respectively. Contrary, CO2 negatively but significantly affects the FDI inflows with robust standard errors, indicating that a 1-unit increase in CO2 causes a decrease of 1.4 units of FDI inflows. This states that inefficient logistic performance is substantially contributing to environmental deprivation like emissions and global warming. Surprisingly, none of the six dimensions of logistic performance has a significant impact on the inward foreign direct investment in GCC countries, indicating that logistic performance does not appear to contribute to the capability of GCC states to attract inward FDI.

Table 8. Findings of OLS Regression

Variables	OLS Regression (without robustness)	OLS Regression (with robust)
CS	-1.150699 (-0.91)	-1.150699 (-1.19)
IF	2.323399 (1.50)	2.323399 (1.58)
IS	.3425689 (0.49)	.3425689 (0.47)
LC	-.1344908 (-0.09)	-.1344908 (-0.09)
TT	-2.563657 (-1.70)	-2.563657 (-1.63)
TL	.7010604 (0.96)	.7010604 (1.07)
lnGDP	.7095986** (2.51)	.7095986** (2.68)
lnCO2	-1.454738 (-1.68)	-1.454738* (-1.89)
lnTRA	2.228107** (2.54)	2.228107** (3.17)
_cons	-5.350976 (-1.33)	-1.67 (0.108)
R-squared	0.4710	0.4710
Adj R-squared	0.2639	--
Prob > F	0.0540	0.0006
Root MSE	1.0203	1.0203
Number of obs	33	33

Note: Bracket values indicating t-statistics, * and ** denote significance levels at 10% and 5%.

4. Discussion

The findings of empirical analysis provide insights regarding FDI inflows logistics performance and other determinants of foreign investment. This research was confined to the member states of the GCC region as logistics is high on the agenda all over the GCC region and this region appeared as the prosperous hub of logistics by linking continents and encouraging international trade. Therefore, this research employed OLS regression to evaluate the nexus between the FDI inflows and logistic operations by using six distinct dimensions of the logistic performance index (LPI), including, custom clearance score, international shipment score, logistic quality and competence score, tracking and tracing score, infrastructure score and timeliness score.

The results of this study reveal that transport infrastructure (IF), international shipment (IS), and on-time delivery (TL) have positively influenced the FDI inflows while, custom clearance, tracking and tracing, and logistic competence affecting negatively FDI inflows. However, none of the six dimensions of LPI is statistically insignificant in the specified period in the GCC region, indicating that logistic operations do not contribute to the region's competencies in attracting FDI. Our results did not support the outcomes of An et al., (2021), suggesting a positive linkage between the logistic sector and foreign investment among the BRICS countries. On the other hand, the results of the current study were consistent with the findings of Luttermann et al., (2020). They also found four dimensions of the logistic performance index including, customs clearance, infrastructure, ease of organizing consignments and logistic competence have insignificant influence on inward FDI. Similarly, another study by Lutterman et al., (2017) did not support the hypothesis that logistic performance provides opportunities for nations and facilitates them in attracting foreign investment. Consequently, Soh et al., (2021) discovered that the association between logistic performance and FDI is possible on the considerate level of institutional quality. However, GCC countries have made a significant investment in the development of infrastructure such as marine ports, airports, and railway paths but still require attention to support seamless logistic operation, i.e. warehousing facilities, intermodal transportation systems, and last-mile connectivity. Furthermore, complex regulatory frameworks cause delays in customs clearance, export/import processes, and varying regulations across distinct members of the GCC region can increase the cost hamper the efficiency of logistic operations, and pose a challenge for logistic operating companies in GCC states. Furthermore, our findings demonstrated a positive and significant influence of FDI inflows on economic growth and trade openness, supported by past studies (Shah and Afridi, 2015; Khan et al., 2021). While CO2 negatively and significantly affects the FDI inflows. Such negative impacts on CO2 were consistent with the findings of Alharthi et al., (2024). Generally, high emissions of CO2 are because of the lack of regulatory carbon emission policy discouraging foreign investment. Thus, a negative impact of FDI on CO2 emission is probably an outcome.

5. Conclusion

The logistics sector has emerged as the dominant sector across the world and due to rapidly growing regional economic development made this sector a prime priority in international trade. Since the member countries of the GCC region support the agenda of diversification, the logistic sector is identified as the core pillar of this agenda. Therefore, it is imperative to investigate the nexus between the logistic performance and FDI inflows in the member states of GCC regions. To evaluate the role of FDI inflows on logistic performance, a static panel regression model has been used over the period 2007-2018. It is noteworthy that, our study doesn't support the hypothesis that logistic performance has a significant influence on FDI inflows. This indicates that logistic performance in the state members of GCC does not contribute to attracting foreign investors may be because of a complex regulatory framework (delay in customs clearance), political instability, and competition from around established logistic hubs. On the other hand, economic growth, and trade openness have a positive influence on FDI, while CO2 hurts FDI inflows.

It is recommended that policymakers should not only concentrate on the achievement of the high level of infrastructural and macroeconomic advancement in attracting foreign investors but should also pay attention to other internal indicators such as variation in the cost of doing business among GCC countries, delays in customs clearance, and political instability. Therefore, policymakers should focus more on holistic insights rather than concentrate on a particular set of indicators to procure high-performance levels to maintain inward foreign investment based on state characteristics.

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Appendix I

Variables	Definition	Sources
FDI	Net inflows of foreign direct investment	International Monetary fund
GDP	Gross domestic product in percentage	World Bank database (WDI)
CO2	Carbon-di oxide metric per tons	World Bank database (WDI)
TO	Ratio of import and exports to the GDP	World Bank database (WDI)
CS	This refers to customs clearance process efficiency	World Bank Performance Index Report
IF	This refers the quality of transport infrastructure	
IS	this refers the arranging consignments at competitive prices	
LC	This refers the Supply chain reliability and service quality	
TT	This refers to the ability to monitor the passage of items during transport.	
TL	It refers the duration of time between order placements and receipts	