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FINANCIAL ECONOMICS | RESEARCH ARTICLE

A gravity model analysis for trade between the GCC and developed countries

Sahar Hassan Khayat*

Abstract: The study aimed to empirically analyse GCC's trade patterns based on the gravity model. Gravity model is derived from physics and is used to explain the bilateral flow of trade determined by GDP per capita, population, and distance. It is assumed that trade flow between the two countries is positively related to their economic size and population. The gravity model has been analysed in six developed countries concerning trade with GCC countries from 2001 to 2012. The study concluded that GDP per capita and population for GCC and destination countries was significant. It also suggests that the trade barriers among the countries must be eradicated for better trade flow.

Subjects: Developmental Studies; Economies; GCC Studies; Trade Analysis

Keywords: Developed countries; GCC countries; gravity model analysis; trade
JEL classification: F1; F3; F5; O2; O5

1. Introduction

Over the years, the achievement of sustainable development is directly linked to international trade and free trade agreements (Abidin & Haseeb, 2018). The internationalization of the trade is being adapted as an effective strategy for the achievement of sustainable development. The

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Sahar Hassan Khayat is an Assistant Professor of Economics at the University of King Abdulaziz University and holds a PhD of Economics specializing in International Economics and Foreign Direct Investment (FDI) from University of Leicester. Sahar current research interests are in the areas of Financial Economics, FDI, Portfolio Investment, Macroeconomic Policies, Energy Economics, Environmental Economic, International Trade and International Economics.

This research paper empirically analyzes GCC's trade patterns based on the gravity model and suggests ways to expand trade by identifying vital determinants of GCC's bilateral trade flows. The research aims to discuss the issues that faces trade between the GCC and a group of developed countries who hold importance for the GCC in the field of trade. Especially, since the analyzed GCC countries group includes the KSA, which is now leading the G20 summit because due to its sovereign and economic status in light of global trade.

PUBLIC INTEREST STATEMENT

This paper assesses the trade patterns between GCC and developed countries using Gravity Model. It shows that the strong trade integration of the GCC and developed countries is likely to open new avenues for economic development. This is particularly useful for the GCC countries, as their economic performance continues to stay stagnant. Also, this trade relationship helps GCC countries to diversify their economy and shift their reliance from the oil industry. This is particularly useful considering the frequent fluctuations in oil prices. Similarly, developed countries are provided with new investment ground for strengthening and expanding their economy.

instigation of General Agreement on Tariffs and Trade (GATT) and its successors have led to the alteration in the international trade (Alam & Ahmed, 2018). A significant share of trade is found to be linked with GCC countries which are widely recognized in the international trade market.

Trade between the Gulf Cooperation Council Countries (GCC) countries mainly includes the oil-rich Saudi Arabia, Kuwait, UAE, Qatar, Bahrain, and Oman of the Persian Gulf. According to Waheed and Abbas (2015), the GCC countries are highly dependent upon each other, comprising an export to GDP ratio ranging from 74 percent to 40 percent in Bahrain and Saudi Arabia respectively. In the general perspective, the whole region has an annual export of about US \$155 billion, where the oil contribution estimates are 83 percent. The developed countries highly dependent on oil and gas in these countries, but there are several factors, which are affecting the trade between these countries.

The integration of the developed countries and the GCC countries in terms of trade provides great benefit to both. These benefits go beyond the economic implications for the country based on the fact that the developed and GCC nations hold a common motto concerning the regional security and issues related to environmental, political as well culture aspects (Hashmi, Al-Eatani, & Shaikh, 2014). The formation of the GCC and developed region trade agreements hold substantial worth as it is deemed necessary for progressing the cooperation on the non-monetary aspects.

Generally, the Gravity model is used for understanding the bilateral trade among the countries (Choudhri, Marasco, & Nabi, 2017; Magrini, Montalbano, & Nenci, 2017). However, with respect to GCC, only a few studies are found which have used gravity model. Even though the economic cooperation among the GCC countries is promoted through bilateral trade and the multilateral trade agreements, various custom union and free trade plans are also used. However, these are found insufficient for improving the trade performance of the countries given their potential and estimate performance. Such as the International Monetary Fund (2016) report reveals that GCC trade volume continues to remain stagnant, and fails to exceed a figure of 6 percent. Hashmi et al. (2014) suggested that the trade relationship between the GCC and European countries can help overcome this scenario. However, the lack of information concerning the economic impact of the relationship between the developed and GCC countries remains a scarcely explored area in literature. In fact, none of the researches attempted to explore and quantify the impact of the trade patterns between European Union and GCC countries. Also, the successful EU-GCC partnership is likely to assist in significant economic implication, integral for the changing landscape of the Middle East. Thereby, the present study has analysed the relationship between GCC countries and developed countries in terms of trade through the Gravity Model Analysis.

2. Theoretical structure

Various studies have acknowledged the Gravity model as a prime tool for empirical analysis of the bilateral trade flows (Choudhri et al., 2017; Magrini et al., 2017). Traditionally, Gravity model was perceived to explain the bilateral trade flows between the countries and the positive impact on the GDP of the country as well as the negative influence of the distance between the two countries, typically expressed as:

$$X_{ij,t} = A_t Y_{i,t}^{a_1} Y_{j,t}^{a_2} D_{ij}^{a_3}, \quad a_1 > 0, a_2 > 0, a_3 > 0 \quad (1)$$

Where, $X_{ij,t}$ represents the export value of country, $Y_{i,t}^{a_1} Y_{j,t}^{a_2}$ represent the GDP of the trading countries where t is the time. A_t is the constant while the distance measure of two regions for the bilateral trade is D_{ij} . The measure of the distance between the two regions is inclusive of the transportation cost index of the two countries. The equation can be included with other indexes for each region along with the trade cost index. The Gravity model demonstrated information related to the flow of import and export in the region. Though the model lacks the theoretical underpinning as the current practices have altered the model which can be adopted for the structural analysis of the international trade among the regions.

Such as, Anderson and Van Wincoop (2003) devised the structural model for the international trade concerning the perfect competition as well as assumption that good and products differ based on the origin or homogenous organization producing a variety of products or with the monopolistic competition. Melitz (2003) extended the trade model concerning the monopolistic competition, which enables heterogeneous trade and exporting fixed cost. The model forwarded by Melitz is widely used for the analysis of trade policy.

3. Literature review

The study is dedicated to analyse the bilateral trade between the GGC regions and developed economies using the gravity model. Several studies have examined the trade potential using the gravity model integration i.e., both cross-sectional as well as panel data (Cinar, Johnson, & Geusz, 2016; Sultan & Munir, 2015). For instance, Irshad, Xin, Shahriar, and Ali (2018) used the application of a gravity model to evaluate the trade patterns in China with the member countries of OPEC from the period 1990–2016. In China and the members of WTO in OPEC, the income (GDP per capita), GDP, and trade openness is substantially influenced by the bilateral trade and have a negative impact on the distance.

Magrini et al. (2017) estimated that the EU trade preferences causal influence on the granted Southern Mediterranean Countries (SMCs) in the fishery and agricultural products from the period of 2004–2014 with the use of increasingly disaggregated data based on the sectoral levels. This study applied the matching estimation techniques, which are not based on the parameters of statistics for the continuous treatment—particularly, a generalized tendency which matches with the methods to assess the preferential treatment. The outcomes represent that the influence of the EU preferences is effective and remarkable for the trade of fishery and agriculture in SMCs.

In the same context, Cinar et al. (2016) used the gravity model to explore whether the countries are reaching or failing in the former Silk Road Region to meet the possible trade with China. It evaluated the possible trade possibilities with the help of counterfactual methods, out sample and in-sample. The findings show that trade partners of China's former Silk Road need to recognize the possible interests of growth in China from the period of 1990 to 2013. Bialynicka-Birula (2015) presented the gravity approach to the international trade in European Community countries and found the negative and significant impact of distance.

Sultan and Munir (2015) used the gravity model to individually analyse Pakistan's global export, import, and trade potential. Using the panel data from 2001 to 2013, it showed the export, import, and bilateral reports are different across regions. It also depicted that an optimum trade prospect prevails for Pakistan and Norway as well as Hungary. Whereas, the export potential was found for Norway and the Philippines. Likewise, using the gravity model for the eight South Asian countries, Kumar and Ahmed (2015) showed that trade is determined with the variables such as population, GDP, distance, and tariff. It also depicted that positive outcomes were achieved through the South Asia Free Trade Agreement (SAFTA), which are effective for improving the intra-regional trade for the SAARC countries.

Also, various GCC countries have also signed negotiable Free or Preferential Trade Area agreements external to the region. Such as various free trade area agreements have been signed with the US by the GCC countries, i.e., Oman and Bahrain (Boughanmi, Al-Shammakhi, & Antimiani, 2016). It has considered factors that deteriorated trade between these countries. The import and export between countries are highly reduced if both the States do not stand on the same ground. For instance, relations between Iran and the USA or Iran and Saudi Arabia, and others. Among other factors that affect the interaction between the two countries is the influence of one country onto another. For example, the United States, as a superpower, creates a major impact on the world economy (Efthymiou, 2013); therefore, other countries often try to maintain good ties with that country, which in return affects their relations with other countries.

Empirical researches have demonstrated the trade association between the Arab countries. Waheed and Abbas (2015) have investigated the trade association among the GCC countries within the intra-Arab

region as well as the countries outside it. For the trade analysis, the gravity model was utilized in this study. However, the study made changes in the conventional gravity model and integrated it with the region dummy, language, shared borders, openness for trade, and the Arab countries. Using the panel least square test, this study revealed a relatively fair explanation of the Arab trade. Such as, it showed that GDP was positively linked with the intra trade among the Arab regions, whereas the bilateral distance among the countries imposes a negative impact on its GDP. The results of the study further revealed that the actual intra Arab trade is substantially lower than the projected trade, highlighting the expansion of the multilateral economic integration, notably at the regional level.

Similarly, Salim, Kabir, and Mawali (2011) conducted a study for determining the trade impact of a GCC country on its members. The study also adopted the gravity model along with the stochastic frontier from the year 1980 to 2008. The results of the study showed that there was a substantial impact of GCC block on the enhancement of the trade. The actual potential of the member states is not fully utilized, stressing towards further investigation and proper usage of their economic potential. Smarzynska (2001) examined a new method of describing the location of two trading partners, relative to all other countries. The new measure was based on the concept of the world trade gravity center and was very close to the gravity theory.

The study revealed that GDP per capita is positive and significant, but distance has a negative effect as expected (Smarzynska, 2001). The present study has mainly focused on identifying the loss in GDP and the effect of distance on the trade between countries. The study will identify the causes which affect the GDP per capita and the reasons which affect the trade between GCC and developed countries using the Gravity Model Analysis, which study the interaction between countries. It is assumed that the study results will be beneficial for the enhancement of the trade among external regions as well as potential barriers and impeding block, assisting to strengthen the GCC regional integration among developed countries in many fronts. It will also help stakeholders and policymakers to revamp the policies based on the needs and requirements of the GCC countries toward the trade patterns.

4. Methodology

4.1. Sample description and data

The study has utilized panel data, consisting of 6 GCC investing and six receiving countries throughout 2001–2012. The developed countries chosen for the study include the USA, Japan, Russia, Germany, Spain, and Italy (Figure 1).

The selection of these countries was based on their similarity in the area that all these regions are heavily reliant on the oil sector, and which contribute significantly to the sectors in terms of their GDP and market exchange rates. Using total bilateral trade, bilateral exports, and bilateral imports in natural logarithm form as dependent variables. The data was obtained from the International Monetary Fund and Direction of Trade Statistics (Table 1).

Figure 1. Selected Developed Countries.

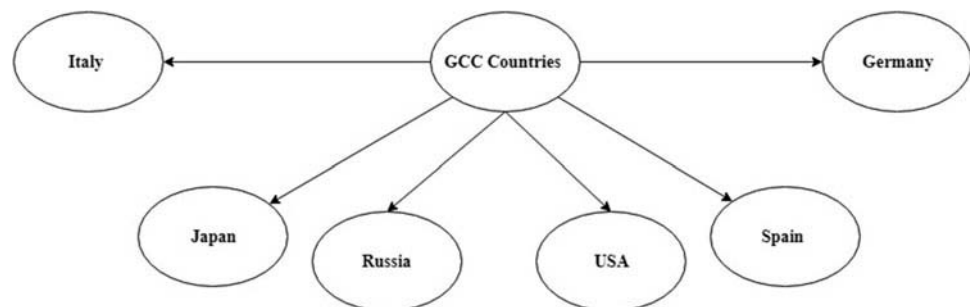


Table 1. Variables, Definitions, and Data Sources

Variables	Definitions
Trade _{ij}	Total ratio of bilateral trade (exports + imports) between the source and destination countries.
Ln Trade _{ij}	Total ratio of bilateral trade (exports + imports) between the source and destination countries, in natural logarithm form.
Exports _{ij}	Total exports from source to destination countries.
Ln Exports _{ij}	Total exports from source to destination countries, in natural logarithm form.
Imports _{ij}	Total imports from destination to source countries.
Ln Imports _{ij}	Total imports from destination to source countries, in natural logarithm form.
GDPpc _i	Real GDP per capita (constant 2005US) in sources country i.
Ln GDPpc _i	Real GDP per capita (constant 2005US) in sources country i, in natural logarithm form.
GDPpc _j	Real GDP per capita (constant 2005US) in host country j.
Ln GDPpc _j	Real GDP per capita (constant 2005US) in host country j, in natural logarithm form.
POP _i	Population in sources country i.
Ln POP _i	Population in sources country i, in natural logarithm form.
POP _j	Population in host country j.
Ln POP	Population in host country j, in natural logarithm form.
DIST _{ij}	The geographical distances (miles) between the source and host countries.
Ln DIST _{ij}	The geographical distances (miles) between the source and host countries in natural logarithm form.

4.2. Variables

The study has incorporated traditional gravity model and regressed three dependent variables; bilateral trade flows, exports, and imports on a set of standard explanatory variables. These variables denoted relative market size and wealth, population, and distance. Table 1 shows the variables, definitions, and data sources. These variables are selected because they are used as the measuring parameters for weighing the economic stance of the country as well as their market size. These variables are also used for measuring the level of income in the country, population, area size, and the GDP per capita of the country. The best among the three measures is the trade (import and export combined) as endorsed by various studies. It is because it directly indicates the characteristics of demand and supply in the country (Kepaptsoglou, Tsamboulas, Karlaftis, & Marzano, 2009; Park & Park, 2008).

4.3. Gross domestic product per capita constant

GDP per capita indicated the relative wealth and market size of the source and host countries in natural logarithm form (Felipe & Kumar, 2010). It suggested that richer economies were major sources and recipients of foreign investment. It was obtained from the World Bank and the WDI database. It is expected to have a positive effect on bilateral trade flows.

4.4. Population

The variable of the population in natural logarithm form indicated that larger economies are mainly sources and recipients of foreign investment, and it is positively related to bilateral trade. The data was obtained from the World Bank WDI database.

4.5. Distance

Distance is measured as the natural logarithmic form to capture the circle of distance (in kilometers) from capital cities of host and source countries. The data were obtained from Centre d' Etudes Prospective et d' Information's Internationals (CEPII)'s. Shipping cost was the main reason why distance enters the gravity model. Proximity decreases the transportation costs, time lags, and the magnitude of spoilage, the cost of gathering information about the partners' legal, and administrative procedures. It is expected to have a negative effect on bilateral trade flows. On the other hand, it is expected to have a positive effect on bilateral trade flows, reflecting that countries located close to each other are more likely to have a long history of bilateral trade. It provides a better understanding of each other's tastes and customs.

4.6. Gravity model

The study has examined the gravity model for trade flows. In this specification, the natural logarithm form of home and destination country GDP per capita, the natural logarithm form of home and destination country population, and the natural logarithm of the distance between home and destination countries are used as elementary variables. $Tijt$ represents three dependent variables; the natural logarithm form of bilateral trade or bilateral exports or bilateral imports between the home countries i (i.e., a G-6 country) and the destination country j (i.e., 6 Developed countries) over the period (2001–2012). GDP per capita of the home country i and of the destination country j in year t has been denoted by GDP_{pcit} and GDP_{pcjt} , respectively. The population of home country i and of the destination country j in year t has been denoted by Pop_{it} and Pop_{jt} , respectively; while the distance between countries i and j have been denoted by $DIST_{ij}$, ε_{ijt} is error term. The baseline gravity model (Equation (1)) is formulated as:

$$\ln_{\pi} Tijt = \alpha_0 + \beta_1 \ln GDP_{pcit} + \beta_2 \ln GDP_{pcjt} + \beta_3 \ln pop_{pit} + \beta_4 \ln pop_{pjt} + \beta_5 \ln Distance_{ij} + \varepsilon_{ijt} \quad (2)$$

The estimated gravity model using random effects (GLS) and pooled OLS estimations have been applied to the models, following the evidence from the different studies (Felipe & Kumar, 2010; Smarzynska, 2001). These estimations were conducted to check the robustness of the result and to be compared with the existing literature. OLS is selected as it is best suited for panel data. The rationale for selecting Random effect is based on its efficient estimates which help overcome the lacking in OLS. The fixed effect (FE) model is not used as it is based on the assumption of homogeneity, which deviates in the study based on its inclusion of different developed and developing countries. Moreover, the RE model is applicable in this case, as it needs group-level effects where the explanatory variables are uncorrelated. In it, the achieved RE estimates are observed to be consistent, unbiased as well as efficient as it considers both variations, i.e., between and within groups.

5. Results

5.1. Empirical results

The summary statistics of the data are presented in Table 2. It has depicted the means for all dependent variables and the independent variables for the entire sample.

Tables 3–5 have shown a correlation matrix between the variables and all three dependents variables. According to the explanatory variables, there is no evidence of multicollinearity. The main results of random effects RE (GLS) and pooled OLS (ordinary least squares) are presented in Tables 5–8.

5.2. Results of the gravity equations and bilateral trade

The results of the estimation from the regression of random effect RE (GLS) and OLS estimations for the bilateral trade as the dependent variable are shown in Table 6. All variables were entered with the expected signs, which were statistically positive and significant. The estimated coefficients for GDP per capita were highly significant. While comparing the sizes of the coefficients, it was revealed that the partner country GDP per capita coefficient is larger than the home country GDP per capita coefficient. It was similar to the finding of Kimura and Lee (2006). Population and GDP per capita of both the home and partner countries have positive and highly significant

Table 2. Summary Statistics on the bilateral trade, bilateral exports, bilateral imports, and the Gravity Model

Variables	Mean	Std. Dev	Min	Max
Trade _{ij}	6.86e+09	1.18e+10	1.13e+07	7.04e+10
Ln Trade _{ij}	21.34	1.82	16.24	24.97
Exports _{ij}	4.33e+09	9.53e+09	193,006	5.18e+10
Ln Exports _{ij}	19.74	2.77	12.17	24.67
Imports _{ij}	2.53e+09	3.85e+09	8,194,220	2.48e+10
Ln Imports _{ij}	20.73	1.52	15.91	23.93
GDPpc _i	36,056.3	19,181.83	14,232.22	74,448.88
Ln GDPpc _i	10.35	0.53	9.56	11.21
GDPpc _j	42,660.85	4717.50	30,440.63	53,421.2
Ln GDPpc _j	10.65	0.11	10.32	10.88
POP _i	6,509,853	8,857,762	613,720	2.95e+07
Ln POP _i	14.96	1.13	13.32	17.19
POP _j	1.17e+09	9.84e+07	3,880,500	3.14e+08
Ln POP _j	18.10	1.17	15.17	19.56
DIST _{ij}	6600.87	3656.35	2756.08	14,890.02
Ln DIST _{ij}	8.65	0.51	7.92	9.60

Table 3. Correlation Coefficient Matrix, dependent variable is bilateral trade

	Trade _{ij}	GDPpc _i	GDPpc _j	POP _i	POP _j	DIST _{ij}
Trade _{ij}	1					
GDPpc _i	-0.03	1				
GDPpc _j	0.18	0.05	1			
POP _i	0.49	-0.42	-0.10	1		
POP _j	0.30	0.02	0.52	-0.01	1	
DIST _{ij}	-0.09	-0.11	0.10	0.13	0.30	1

Table 4. Correlation Coefficient Matrix, dependent variable is bilateral exports

	Exports _{ij}	GDPpc _i	GDPpc _j	POP _i	POP _j	DIST _{ij}
Exports _{ij}	1					
GDPpc _i	-0.03	1				
GDPpc _j	0.14	0.05	1			
POP _i	0.43	-0.42	-0.10	1		
POP _j	0.24	0.02	0.52	-0.01	1	
DIST _{ij}	-0.14	-0.11	0.10	0.13	0.30	1

coefficients. Thus, rich countries not only export more goods and services but also import more goods and services. The distance variable has an estimated coefficient, whose sign is negative and significant. It has represented any transport costs or trade barriers that could inhibit trade flows, which is similar to the finding of Herrera (Gómez-Herrera, 2013).

Table 5. Correlation Coefficient Matrix, dependent variable is bilateral imports

	Imports _{ij}	GDPpc _i	GDPpc _j	POP _i	POP _j	DIST _{ij}
Imports _{ij}	1					
GDPpc _i	−0.02	1				
GDPpc _j	0.23	0.05	1			
POP _i	0.47	−0.42	−0.10	1		
POP _j	0.34	0.02	0.52	−0.01	1	
DIST _{ij}	0.05	−0.11	0.10	0.13	0.30	1

Table 6. Gravity Equations, dependent variable is bilateral trade, Panel Analysis 2001–2012

Regressor	RE (GLS)	OLS
Ln GDPpc _i	1.194*** (0.000)	1.230*** (0.000)
Ln GDPpc _j	3.280*** (0.000)	−0.281 (0.546)
Ln POP _i	1.471*** (0.000)	1.181*** (0.000)
Ln POP _j	0.852*** (0.000)	0.926*** (0.000)
Ln DIST _{ij}	−0.725** (0.036)	−0.556*** (0.000)
CONSTANT	−57.147*** (0.000)	−18.024*** (0.000)
N. Observations	360	360
N. groups	30	30
F test		419.80*** (0.0000)
Wald Chi2	509.03*** (0.0000)	
R ² (within)	0.7526	0.8447
R ² (between)	0.8149	
R ² (overall)	0.8051	

p-value in parentheses, *significant at 10%, **significant at 5%, ***significant at 1%

5.3. Results of the gravity equations and bilateral exports

The results in Table 7 have shown that the GDP per capita of source economies is significant and positive in RE and OLS estimations, which is consistent with the empirical evidence. It has a negative effect while estimating OLS for destination countries (Hutchinson, 2002; Prasai, 2014). The negative effect emerges because of its associated cost in terms of trade and transport, which impact the trade at an international level as compared to the cost of production. Similarly, the variation in oil prices also affects the cost of trade and transport. For instance, the changes in the oil prices in the year 1973 and again in 1980, impacted the oil cost, which also increases the distance cost (Schiff & Carrere, 2003). Populations of both home and partner countries have positive and highly significant coefficients. It is worth noting that the coefficients for the population in the home and destination countries were similar in size and highly significant. The trade rise with population, which indicated that large and wealthy countries tend to trade more with each other based on given GDP per capita (Fitzsimons, Hogan, & Neary, 1999).

5.4. Results of the gravity equations and bilateral imports

Table 8 depicts the primary outcomes, obtained using bilateral imports as the dependent variable. The coefficients of GDP per capita for home economies and population for home and destination

Table 7. Gravity Equations, dependent variable is bilateral exports, Panel Analysis 2001–2012

Regressor	RE (GLS)	OLS
Ln GDP _{pc_i}	2.180*** (0.000)	1.111*** (0.000)
Ln GDP _{pc_j}	−1.700 (0.445)	−0.4285*** (0.000)
Ln POP _i	2.206*** (0.000)	1.487*** (0.000)
Ln POP _j	1.379*** (0.000)	1.510*** (0.000)
Ln DIST _{ij}	−0.416 (0.549)	−0.269 (0.115)
CONSTANT	−39.091*** (0.002)	6.628 (0.507)
N. Observations	360	360
N. groups	30	30
F test		153.74*** (0.0000)
Wald Chi2	88.19*** (0.0000)	
R ² (within) R ² (between) R ² (overall)	0.4717 0.6221 0.6046	0.6478

p-value in parentheses, *significant at 10%, **significant at 5%, ***significant at 1%

Table 8. Gravity Equations, dependent variable is bilateral imports, Panel Analysis 2001–2012

Regressor	RE (GLS)	OLS
Ln GDP _{pc_i}	0.832*** (0.000)	1.069*** (0.000)
Ln GDP _{pc_j}	4.190*** (0.000)	0.289 (0.468)
Ln POP _i	1.180*** (0.000)	1.017*** (0.000)
Ln POP _j	0.651*** (0.000)	0.752*** (0.000)
Ln DIST _{ij}	−0.408* (0.096)	−0.231*** (0.000)
CONSTANT	−58.453*** (0.000)	−20.266*** (0.000)
N. Observations	360	360
N. groups	30	30
F test		499.35*** (0.0000)
Wald Chi2	579.85*** (0.0000)	
R ² (within) R ² (between) R ² (overall)	0.6913 0.8095 0.7876	0.8498

p-value in parentheses, *significant at 10%, **significant at 5%, ***significant at 1%

countries were positive in RE and OLS regressions. The distance was negative and significant in both the estimations. The increase in the physical distance between countries resulted in a fall in the trade between those countries.

6. Discussion

The findings of the study highlight that the GDP per capita for source and population for source and destination countries were significant while the distance between countries harms bilateral trade flows. In consistent with the present study, Ramaswamy, Choutagunta, and Sahu (2016) conducted a study using the Gravity model to analyse the performance of free trade agreements by evaluating the constraints of trade flows of Asian economies from 2007–2014. Pradhan (2009) assessment of the trade relations between GCC countries and India also corroborate the findings, showing that trade flow has a significant impact.

Gómez-Herrera (2013) used a gravity model to predict bilateral trade across 80 countries over the period 1980–2008 and concluded that GDP is positive and significant; while, distance has a negative effect as expected. Patuelli, Linders, Metulini, and Griffith (2016) contributions to the modeling of bilateral trade found that GDP per capita and distance are negative and significant. Abidin & Sahlan (2013) conducted a study to identify the determinants of export between Malaysia and OIC member countries. The researchers used a Gravity Model Approach in analyzing the effect of several variables on the export of Malaysia. The results estimated from the study and the country's GDP was found highly significant with a positive sign; however, the study showed that the size of the economy evaluates the country's GDP. Due to the increase in GDP, the country produced more goods, but the goods were not exported as required. Therefore, the results were found out from the study were both conflicting and consistent with the present study.

The fundamental reasons behind the trade negotiations from both sides were geopolitical interests; however, the future negotiation in the trade is determined to emphasize the political, cultural, environmental, and security issues. Furthermore, trade relationship in the energy security sector and the environmental protection provide the area for the cooperation between GCC member countries and the developed countries. There is a comprehensive agreement on the requirements to move forward for a regime of post-Kyoto 2012 climate and attain the complete agreement for the climate talks in the future. On the other hand, there is a chance to create closer networks in the sectors of clean energy, the use of solar energy, and the chances of development in the carbon capture sequestration by improved utilization of experts' network from both the sides.

The statement from Abu Dhabi for the International Renewable Energy Agency (IRENA)'s new headquarter allows certain chances to indulge with the GCC member countries for the coordination measures and the techniques whenever there is a critical debate on the climate change. The dialogues on the creation of jointly developed countries with GCC energy technology center to tackle the collaborative projects should be further investigated. In addition, extra attempts must be made when there is study or research conducted regarding carbon capture and sequestration. The domain of public diplomacy and the culture is equally important, which serves as the basis for the improved understanding and the exchange of views from the people of both sides.

More tactile plans need to be made in the areas of students and exchange of academics where the small direct association exists. Out of the social and economic aspects, the recent political climate around the globe and in both regions strengthen the needs to refreshed commitment in the GCC relations and the developed countries. In the Gulf countries, security issues always remain turbulent. Therefore, it is needed to emphasize further on the pressing issues to develop the policies and the techniques, while at the same time the fresh look is needed from both the sides to conclude trade for not only focusing on the economic interests but expanding to other collaborative areas as well.

The findings of the study highlight that policies at the state level should be introduced for maximizing the trade. Such as the government of the GCC countries should invest in its industrial development to promote the supply of the producer in the domestic market. The state should focus on introducing supply side for the industrial development to promote investment in the country's infrastructure for improving the transportation system, technical education for improving

the research and development, and technical progression for improving the productivity level. The increase in the production sector for the GCC countries is promoted due to its significant oil export and low productions. The diversification of the economy helps in optimizing its trade pattern and implementing various economic projects. Moreover, the quality of the export should also be improved along with technical education which helps present new innovative trading patterns as well as the expansion of trade relations. Similarly, understanding the exchange of views among the people of both countries as it helps develop a better understanding. Plans for direct contact among the people such as exchange student plan must be encouraged for better understanding and relationship between GCC and European countries.

7. Conclusion

The study has focused on the basic version of the gravity model for three dependents variables; bilateral trade, bilateral exports, and bilateral imports between 6 GCC countries and 8 developed countries employing panel data analysis approach over the period 2001–2012. The two methodologies were applied in this study include Random effects (RE) and ordinary least squares (OLS). The study concluded that GDP per capita for source and population for source and destination countries were significant and signed correctly. Moreover, the study has also revealed that distance between countries has a negative effect on bilateral trade flows. The study has several applicable policy recommendations for the nexuses of trade.

Though free trade is effective in the advancements of the global products and the global value chains, there is a necessity of being cautious while agreeing on the settlements of free trade, as it contributes importantly to the bilateral CO2 emissions/pollution. Thus, for the developing countries, it is needed to clearly formulate the guidance on the requirements of trade development. The rules and regulations must be revised for the agreements of the free trade in order to keep up with the standards and protections of the environment in the countries with low income. The findings also suggest that the trade policies from both countries address trade barriers and instigate efforts for its eradication in order to improve the trade openness variable, which improves bilateral trade.

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