A Gravity Model Estimation of India's Export Potential to the GCC States

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Abstract

India and the GCC states have long shared cordial relations both in the economic as well as political front. The paper estimates India's export potential to 83 trading partners of India (spread across 10 Regional Trading Agreements). The first part of the paper discusses the origin and geo-economic strength of the Gulf Cooperation Council (GCC) and its relation with India. GCC comprises of six states including Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. The second part of the paper presents the gravity model predictors and makes a literature review of the usage of this model. The augmented form of this model as used in this study along with the findings of this paper as per the model estimates have been presented in the third part of this paper. The focus of the analysis is on ascertaining India's export potential to the GCC states.

Keywords: GCC, Gravity Model, India's export potential

Introduction

The regional integration agreements (RTAs) have been increasing manifold and have been shaping both the geo-economic as well as the geo-political orientation of the globe. In the Arab world the Gulf Cooperation Council (GCC). formed on 21 Rajab 1401 AH (corresponding to 21 May 1981) is playing a remarkable role in global trade and diplomacy. The Arab Gulf states during the early twentieth century were heavily dependent on income from several traditional trading commodities like the trade in gold and dates. The oil boom in the 1970s has helped the GCC countries generate petrodollars thereby transforming their society and economy into a fast developing landscape.

GCC and its relation with India

There had been several industrial organizational efforts that took place during 1970s including the formation of Arab Industries Organization in 1975 by KSA, Kuwait, UAE and Qatar. It was a joint effort to establish the Arab-run armaments and ammunition factories in Egypt though it had to be declared void owing to the Arab reaction to Camp David. Moreover, the Gulf organization for Industrial Consultancy was set up with Iraq as one of the members. In the year 1977, this organization proposed the setting up of a Gulf Common

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Market but owing to the war between Iran and Iraq and the changing regional dynamics, the six Gulf states including the KSA, UAE, Bahrain, Oman, Qatar and Kuwait started having the threat perception and regional insecurity because of the turmoil in Iran and Iran's geopolitical ambition. This became one of the reasons rather than an immediate cause of the formation of the GCC in 1981. It was on February 4-5, 1981 that the Gulf foreign ministers discussed the establishment of a cooperation council of the Arab Gulf states that would provide a framework of cooperation and integration in all the desired domains. The GCC has headquarter in Riyadh, Saudi Arabia as given in Article 2 of the GCC Charter. The economic indicators of the GCC countries (Table 1) reveals that Saudi Arabia has the highest GDP (at current price), whereas Qatar has the highest GDP (per capita). Moreover, Saudi Arabia has the largest amount of trade participation among all GCC countries. The Kingdom of Saudi Arabia has the highest foreign currency reserves followed by the United Arab Emirates (UAE).

The GCC states command the world's largest reserve of proven oil reserves and one of the world's largest reserves of natural gas reserves. Even the integration within them has been largely identified by the world on the basis of their rich hydrocarbon endowments. This also helped the GCC to be in strong position geo-economically with a strong resource endowment, which is scarcely available in most countries of the world. Among all GCC countries, Bahrain is the largest producer of Natural Gas. The world demand for oil and natural gas is increasing and the GCC countries have enough reserves to meet both the rising domestic demand and the demand in the international export markets. It may be mentioned here that Article 9 of the Economic Agreement between the GCC countries also aims to enhance the competitive positions of the member countries by focusing on oil, gas and natural resources. It advocates for an integrated policy in all phases of oil, gas and minerals industry to achieve optimal utilization of the natural resources; and also calls for a unified oil and gas policy for the member countries.

As far as relation between India and individual GCC states are concerned, they have been good and improving. The major concern is to trace the relation between India and GCC as a unit. The details of India-GCC interactions which started in the year 1984 have been compiled from the web sites of MEA (Gulf Region), Department of Commerce, Govt. of India and MENAFN. In the year 1984, a Round Table conference between India and GCC was organized by ICRIER (New Delhi) to discuss bilateral issues. Further in the year 1992, GCC Secretary General visited India and held talks with the Prime Minister and other dignitaries including FICCI officials and academicians. Moreover, there have been three India-GCC Industrial Conferences. The First India-GCC Industrial Conference was held in Mumbai in the year 2004 in which India and GCC entered into an agreement in the month of August to explore the possibility of Free Trade Agreement (FTA) between them. The Second India-GCC Industrial Conference hosted by the Government of the Oman at Muscat on March 25-26, 2006. This is known as the Muscat Declaration which recommended initiation of JVs and private investments in the fields of industry, energy, petrochemicals, biotechnology and tourism. The Third India-GCC Business Conference was held at Mumbai on May 29-30, 2007 under the theme "India-GCC Investment Opportunities". It concluded with adoption of 'Mumbai Declaration', which called for strengthening bilateral ties in the fields of food security, real estate, energy, petrochemicals and infrastructure.

The gravity model of trade

There has been lot of empirical researches in the area of international trade to explain the trade flows between two countries or entities or regions and also to ascertain the export potential of one country to another country or region. The Gravity Model of Trade has found to be an unique and arguable having most successful place in estimations and research. Gravity Model is based on the law of gravity given by Newton, which is known as the Universal Law of Gravitation. The gravity model of trade like the other gravity models used in social science researches predicts bilateral trade flows and/ or export potential of/ between countries/ entities based on their economic sizes of and the geographical distance between two units. The model was first used by Jan Tinbergen in 1962. The linear form of the basic gravity model is mentioned in equation 1.

$$\text{Log}(E_{ij}) = \acute{a} + \hat{a}_1 \text{Log}(GDP_j) + \hat{a}_2 \text{Log}(\text{Distance}_j) + \mathring{a} \quad \ldots 1$$

Where, E_{ij} is the Export Potential to be estimated
GDP_j is the Gross Domestic Product of Country j

Distance is the distance between capital cities of two countries
$\hat{a}_1$ and $\hat{a}_2$ are coefficients to be estimated
å is the error term

Generally, some more variable including the price levels, language relationships, contiguity and colonial history, etc. are also taken as dummy variable, which makes the gravity model an 'augmented' gravity model. This model has also been used in the area of international trade and diplomacy to assess the impact of pacts and agreement on trade and to test the effectiveness of such agreements. The application of gravity model to the social science research was first proposed by James Stewart in the 1940s (Fitzsimons *et al.*, 1999). However, this model was first applied to international trade by Tinbergen (1962). Several of the contemporary studies adopt the gravity models developed by Linnemann (1966). Anderson (1979) showed that the gravity framework is consistent with a model of world trade in which products are differentiated by the country of origin The demand and supply mechanism as anticipated by the traders are substituted by using the GDP or GDP per capita of a country; where as, the geographical distance between countries can be used to ascertain the transportation and transaction costs (Fidrmuc, 1999). Frankel and Wei (1993) have examined bilateral trade patterns across the world and made an extensive analysis of the impact of currency blocs and exchange rate stability on trade. Baldwin (1994) made an extensive literature review on the use and vitality of gravity model. Many studies have used the gravity model to ascertain the direction of trade flows and also to predict the export potential. Frankel (1997) used the gravity model to research several issues like the estimates of trade within blocs and the role of currency links. Brülhart and Kelly (1999) estimated the magnitude of potential trade flows between Ireland and the five CEEC countries. The econometric issues pertaining to the use of cross-sectional, time series, or panel data have also been discussed. Dhar and Panagariya (1999) have researched on the value of adjustments including the choice of dependent variables. Winters and Soloaga (1999) discussed on the issue of including fixed effects in the gravity model. Mehta and Bhattacharya (2000) have used the gravity model to estimate the future trade flows in the South Asian region in the wake of the existing South Asian Preferential Trade Agreement (SAPTA) turning into South Asian Free Trade Area (SAFTA). The gravity model has also been widely used to ascertain the direction of trade flows in the Middle East. The intra-Arab trade has been estimated by Al-Atrash and Yousef, (2000) by using this model. Hassan (2000) has also used the gravity model to know about the direction of intra-Islamic trade. Christie (2002) estimated the trade potential for Southeast Europe using ordinary least square estimation on cross section data. Lamotte (2002) has used the gravity model to estimate the trade possibilities of Yugoslavia with the EU. The research gave an account of Yugoslavia's trade competitiveness. Ghosh (2003) has estimated gravity model to capture the nature of India's trade with different regions of the world such as EU, ASEAN, SAARC, etc. Rahman (2003) has estimated trade potential for Bangladesh with economic factors rather than natural factors. Anderson and van Wincoop (2003) showed that the estimation of the gravity model can be greatly improved by incorporating what they refer to as multilateral resistance measures. Also, Hirantha (2003) has used the gravity model analysis to evaluate the progress of SAPTA and the prospects for SAFTA using trade data for the years from 1996 to 2002. Wall (2003) and Egger and Pfaffermayr (2003) have also discussed about the inclusion of fixed effects in the gravity model to ascertain the trade flow between entities. These researches were however based on strengthening the direction of econometric research. Batra (2004) has also extensively used the gravity model to predict India's global export potential. Boris and Vedran (2004) have also used the gravity model to get more insight into the export potential of Croatia. This study was with reference to EU and CEFTA in determining the direction of trade flows of Croatia. Kalbasi (2004) has explained the volume and direction of Iran's trade with 76 countries using this model. Noland (2005) in his work examines the impact of American public attitudes toward foreign countries on the volume of trade. The basic idea of the gravity approach is to ignore comparative advantage and concentrate on location factors instead.

Findings and Analysis

In this paper, gravity model as in equation 1 has been augmented by using four other dummy variables, namely Contig, Comlang and Comcol and HC_{im}. The augmented gravity model has been used to analyze India's world export flows and the coefficients thus obtained are have been used to predict India's

export potential to each of the GCC countries. The estimations have been done using OLS regression technique. The dependent variable is India's total *merchandise* exports taken in log (ln) form between India and its other 83 trading partners selected across ten Regional Trading Agreement (RTAs) including North American Free Trade Agreement (NAFTA), Association of Southeast Asian Nations (ASEAN), European Free Trade Agreement (EFTA), European Union (EU), Organization of Petroleum Exporting Countries (OPEC), South Asian Association for Regional Cooperation (SAARC), (Economic Community for West African States (ECOWAS), Asia-Pacific Economic Cooperation (APEC), Andean Community of Nations (CAN) and the Gulf Cooperation council (GCC). The augmented equation thus obtained is given as equation 2.

$$\ln (E_{ij}) = \acute{a} + \hat{a}_1 \ln (GDP) + \hat{a}_2 \ln (Distance) + \hat{a}_3 (Contig) + \hat{a}_4 (Comlang) + \hat{a}_5 (Comcol) + \hat{a}_6 (HC_{im}) + \mathring{a} \quad \ldots 2$$

Where, E_{ij} = Exports from India (country i to Country j)

M = the economic mass of each country (GDP is considered).

D = the actual geographical distance between the capital cities of the two countries.

Contig. = a dummy variable to identify a pair of countries that are contiguous or share a border.

Comlang: Comlang is a dummy variable which includes both ethnic and official language. If two countries share a common ethnic or official language, assign 1, otherwise 0.

Comcol = this is a dummy variable. If the two countries have been colony of the same colonizer assign 1, otherwise 0.

HC_{im} = this is a dummy variable. If India imports Hydrocarbon (HC) from the other country, than assign 1, otherwise 0. HC_{im} includes commodities with HS Code 2709 and 2711. This is based on data from Export-Import Databank, Govt. of India.

$\hat{a}_{1 \text{ to } 6}$ are coefficients to be estimated.

$\mathring{a}$ is the error term

The gravity model analysis in this paper is based on the data from 1997-98 to 2007-08. The data for exports has been taken from Export Import Data Base, Department of Commerce, Govt. of India (www.commerce.nic.in). The data for GDP (measured in constant US$ 2000) has been taken from World Development Indicator (WDI, World Bank), 2008. Data for distance and all dummy variables taken in this study (except HC_{im}) have been taken from CEPII, France.

The descriptive statistics (Table 2) and the Pearson correlation (Table 3) reveals the basics as well as the interrelations between the variables used in the model respectively. Table 4 shows the model summary where the value of R is 0.871 and R square is 0.759. In Table 5, the t-statistics reveal that three variables including contig, comlang, and HC_{im} are not statistically significant. Yet they have been incorporated because contiguity supports the distance variable; common language helps in business facilitation; and, hydrocarbon imports is India's major import commodity in terms of value which influences India's bilateral trade with any petroleum-exporting trading partner. The coefficients obtained (Table 5) have been used to calculate India's export potential to 83 countries of the world spread across 10 regional trading blocks and only the estimations of the GCC countries have been shown in Table 6. The ratio of India's export potential (P) to India's actual export of 2007-08 (A), i.e., P/A is calculated to know as to how many times does India has a export potential with the given countries across the trading blocks. The value of P has been calculated using the gravity model co-efficients. A P/A value less than 1 means overtraded and more than 1 shows the how many times does India has the trade potential with that particular country as compared to its present export in 2007-08. Among the GCC countries (Table 6), India has the highest export potential to Kuwait, meaning thereby that it can increase its export to Kuwait by almost close to 17 times. India has good export potential to Qatar (9.08 times) and Bahrain (7.54 times) also. With Oman and Saudi Arabia, India can increase its exports by at least 2 times. The estimations also reveal that UAE is on the verge of being overtraded with India with P/A ratio being just 1.01.

Conclusion and future research

It is, therefore, evident that India has a huge trade potential with each of the GCC countries. With the UAE, India can still develop good bilateral trade trade ties because of the high-potential services sectors and both these countries can derive the benefits from it. Future researches may be carried out in this direction. Moreover, India and the Gulf also need to

diversify their portfolio in non-oil trade and explore opportunities for forming a mutually beneficial food cartel in order to develop a geopolitical equilibrium among them.

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Table 1: Economic Indicator of GCC Countries (2007)

Indicators (in US$ Million)	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
GDP (at current prices)	16,900	127,400	40,520	67,000	374,500	190,000
Population (million)	0.8	3.4	3.2	1.0	24.0	6
Population growth (%)	2.5	6.3	3.2	2.7	2.1	7
GDP per capita ($)	22,000	37,470	12,622	65,000	15,000	31,666
Nominal GDP growth 2007 (%)	16.2	25.7	14.8	12.5	7.7	16.5
Real GDP growth 2007 (%)	6.8	5.3	6.0	8.5	4.7	7.4
Forecast nominal GDP growth 2008 (%)	na	19.0	na	15.4	23.5	13
Forecast nominal GDP growth 2009 (%)	na	na	na	14.1	11.4	15
Forecast real GDP growth 2008 (%)	5.3	4.8	6.3	8.0	3.1	na
Forecast real GDP growth 2009 (%)	4.7	3.0	4.2	8.3	2.9	na
Imports	5,437	20,707	11,000	26,700	82,000	133
Exports	2,206	66,474	22,680	50,300	225,500	173
Trade balance	156	45,776	11,680	23,600	144	40
Current account balance	2,163	51,490	na	22,300	102,613	na
Current account balance 2007 (% GDP)	12.8	40.4	na	33.3	27.4	na
Forecast current account balance 2008	13	na	na	27,500	28	na
Budget surplus/ deficit	-514	43,020	10,393	1,850	48,000	0
Budget surplus/ deficit (% GDP)	8.7	33.0	25.6	0.0	13.0	0
Forecast budget deficit/ surplus 2008 (% GDP)	-3.0	20.0	na	0.0	23.0	0
Inflation (%)	3.2	6.7	5.9	12.8	4.2	15
External debt end-2007	7,000	33,610	3,483	3,040	65,100	na
External debt (% GDP)	na	26.4	8.6	0.0	17.3	na
Foreign currency reserves	1,740	16,457	2,239	10,200	32,310	32,000

na=not available

Source: Middle East Economic Digest (MEED)

Table 2: Descriptive Statistics

	Mean	Std. Deviation	N
Export	21.175	2.065	83
GDP	26.737	2.306	83
Distance	8.643	.646	83
Contig	.06	.239	83
Comlang	.23	.423	83
Comcol	.18	.387	83
HC_{im}	.28	.450	83

Table 3: Pearson Correlation

	Export	GDP	Dist.	Contig	Comlang	Comcol	HC_{im}
Export	1						
GDP	.781	1					
Distance	-.244	.051	1				
Contig	.080	-.099	-.582	1			
Comlang	.204	.074	.033	.103	1		
Comcol	.198	-.160	-.366	.144	.415	1	
HC_{im}	.228	.151	.063	-.157	.047	.129	1

Table 4: Model Summary

Predictors*	R	R Square
GDP, Dist., Contig, Comlang, Comcol, HC_{im}	0.871	0.759

** Dependant Variable: Export*

Table 5: Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t-stat
	B	Std. Error	Beta	
(Constant)	6.932	2.755		2.516
GDP	.726	.053	.810	13.667
Distance	-.643	.250	-.201	-2.571
Contig	.182	.625	.021	.291
Comlang	.270	.324	.055	.834
Comcol	1.153	.386	.216	2.986
HC_{im}	.415	.269	.091	1.544

Note: Dependent Variable is Export

Table 6: India's Export Potential to GCC

S.No.	GCC	Actual Export (A) 2007-08 (in US$ million)	Potential Export (P) (in US$ million)	P/A
1	Bahrain	251.82	1900.14	7.54
2	Kuwait	682.12	11430.61	16.75
3	Oman	937.75	2108.25	2.24
4	Qatar	538.13	4891.49	9.08
5	Saudi Arabia	3708.3	7769.08	2.09
6	UAE	15634.56	15823.90	1.01