
Intra-Regional Trade, Evidence from the UAE: A Gravity Model Approach

Souad SHERIF, PhD

College of Business Administration, University of Sharjah, Sharjah, UAE. PO Box 27272, University of Sharjah, UAE. Tel: +971 6 5053565, e-mail: souad@sharjah.ac.ae.



ABSTRACT

This paper presents an empirical analysis of UAE bilateral trade flow with Bahrain and Qatar as group A and Oman and Kuwait as group B over the period of 1991-2009. The standard gravity model of trade in conjunction with a pooled cross sectional (PCS) statistical method is utilized in the analysis. This study concludes that the coefficients of the GDP variables of the importers and exporters are positive, indicating trade increases less than proportionately with the GDP of the importing country (Groups A & B) and more than proportionately with the GDP of the exporting country (UAE). In addition, the results showed an increase in trade cost as the distance between the two trading partners increase; and countries that share a border trade more with each other than countries that do not share a border.

JEL Classification: C21; F10; F15; G28.

Keywords: Bilateral trade; economic integration; gravity model; GCC; regional integration.

1. INTRODUCTION

The Gulf Cooperation Council (GCC) was created on May 25, 1981 and comprises the Kingdom of Saudi Arabia (KSA), United Arab Emirates (UAE), State of Kuwait, State of Qatar, Kingdom of Bahrain, and Sultanate of Oman. The GCC's unified economic agreement has allowed them to establish a roughly common tariff schedule; implemented a migration agreement to ease GCC members travel within the GCC, and they were successful in establishing a customs union in 2003. On the other hand, the GCC integration process has fallen short in reaching many of its goals; one of which is its failure to form a true free trade zone which has delayed other aspects of integration, such as the planned creation of a monetary union. In spite of this, Bahrain and Oman are the most integrated countries within the GCC region (Table 1). The integration increased the influence of the member countries in their own areas as well as outside it (Zineldin, 1998). Moreover, economic integration can substantially enlarge domestic markets by attracting Foreign Direct Investments (FDI).

Table 1. Intra-GCC Trade-Integration (Trade Integration Ratios).

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bahrain	48.40	43.60	43.70	36.30	33.20	35.40	38.40	37.90	12.60	10.60
Kuwait	0.70	0.10	0.40	2.50	3.10	3.70	3.40	3.30	3.90	3.00
Oman	28.40	8.80	10.00	15.20	14.70	14.00	13.10	14.70	17.90	16.10
Qatar	4.30	4.80	5.10	6.60	6.50	6.40	6.30	5.10	5.70	5.00
Saudi Arabia	3.20	3.10	2.90	2.90	2.90	3.40	3.70	3.70	3.40	3.10
UAE	4.50	4.50	5.90	6.40	6.50	6.30	5.80	5.90	7.00	7.90

Sources: Data compiled from International Monetary Fund.

The GCC countries are heavily dependent on trade with an export to GDP ratio varying from 74% in Bahrain to 40% in Saudi Arabia. The region as a whole exports annually the equivalent of \$155 billions, out of which 83% is oil. The GCC is aware of the need to adjust their tactics to reach their full potential as a trading bloc that can contend with the globalizing world economy; therefore, they are implementing policy reforms to accelerate non-oil growth and create employment opportunities for a rapidly increasing labour force in a sustained fashion; while reducing vulnerability to oil price shocks.

The GCC's oil income contributes to about one-third of the total GDP and three-fourths the annual government revenues and exports. Together, these countries account for about 45% of the World's proven oil reserves and 25% of crude oil exports, and possess at least 17% of the proven global natural gas reserves. Taking that into consideration, KSA accounts for 47% of total region's exports and 37% of the region's imports, this makes it the most important trader in the GCC followed by UAE with a share of 22% and 36% respectively (Table 2). As many GCC members are major oil exporters, most trade is conducted with non-GCC countries, particularly Japan, EU, and USA.

Table 2. Selected socio-economic indicators for the GCC Economics, 2002.

Country	Nominal GDP (million USD)	Population (Millions)	Government Debt (% of GDP)	Gross Nominal GDP Per Capita (\$)	Oil and Gas Exports (% of Total Exports)	Oil Revenues (% of total Revenues)
KSA	188,960	22.1	93.8	8567	81.7	78.0
Kuwait	33,215	2.2	32.9	15098	92.4	66.4
UAE	71,187	3.6	4.5	19,613	45.7	63.3
Bahrain	8,506	0.7	30.3	116 19	69.8	69.9
Qatar	17,321	0.6	58.2	28362	84.2	72.0
Oman	20,290	2.7	16.0	28	77.2	76.7

Sources: Data compiled from International Monetary Fund.

The volume of intra-trade between GCC countries is considered small in volume due to the similarities in the economic structure and the lack of industrial diversification (Sherif, 2008). The limited diversification of GCC exports offers very limited possibilities of expanding inter-industry trade. In addition and as argued by Peterson (1988), the existence of similar second industries in the different GCC countries "could generate long-term detrimental structural overlap" that would stifle efforts to develop regional trade, which makes the trade within the GCC bloc weak compared to other economic blocks.

Despite trade barriers, GCC trade grew three-folds in the past 15 years. Intra-GCC imports grew over 200% between 1986 and 2001 - from \$2.6 billion in 1986, to \$8 billion in 2001. Although the size of intra-GCC imports tripled during this period, their share in overall imports remained steady and low, at less than 10% (Figure 1 and 2).

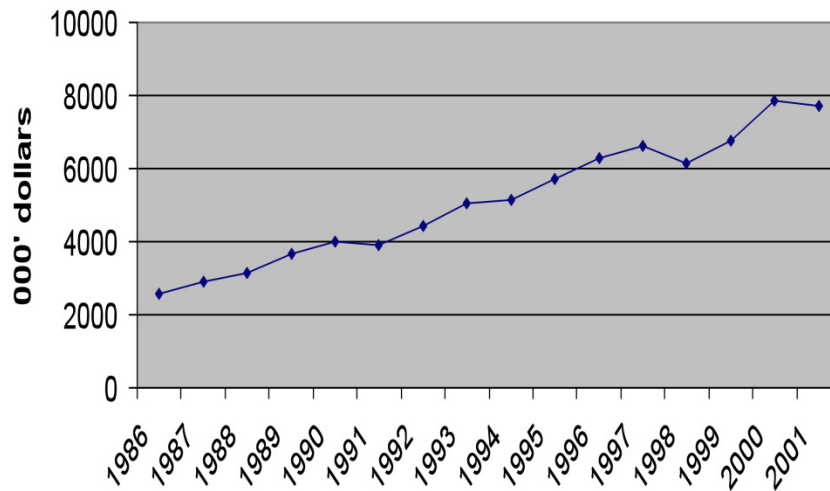


Figure 1. Path of Intra-GCC Imports, 1986-2001.
Source: Al-Uwaisheg, 2003.

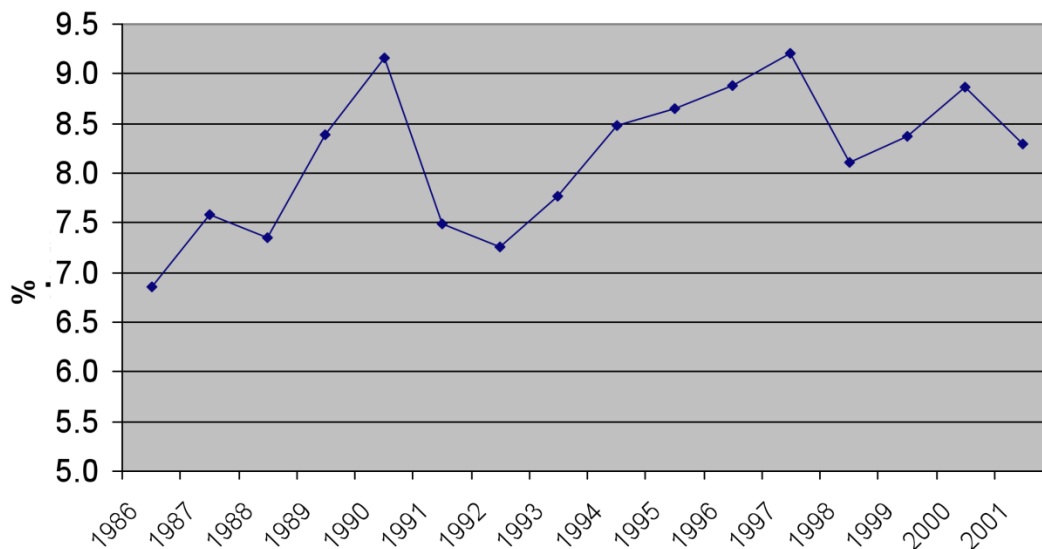


Figure 2. Path of Share of Intra-GCC Imports in Total Imports.
Source: Al-Uwaisheg, 2003.

Intra exports and imports in the GCC were not smooth during the period between 1990 and 2000. However, data provides evidence of increasing trends in 2001 and a dramatic increase in the period between 2002 and 2004 (Table 3). The amounts of manufacturing and high technology exports also demonstrate increasing trends during the period of 1990-2003. One of the underlying causes of such increasing exports might be the implementation of the custom union in the year 2003. After implementing the customs union, the intra exports and imports, and high-tech manufacturing exports showed increasing trends. In addition, the number of joint venture projects, total capital investment and capital investment per project increases dramatically after executing customs union. The result also shows that the investment in large-scale joint venture projects increases at the same period.

Although trade can offer opportunities for gains economically, the potential is best realized within an environment that is driven by skilled resources, technological development, and sound government institutions. Without these fundamentals, the pursuit of economic gains through regional integration will, likely disappoint (Elliot, 2007).

This paper aims to evaluate and assess the intra-regional trade within the GCC using the gravity model. In this study, the GCC was divided into two main blocks, Group A which includes Bahrain and Qatar and Group B which consists of Oman and Kuwait. The reason behind such grouping is based on the economic mass and the population size. Those blocks will be examined against the second largest country in the GCC, the UAE.

Table 3. Intra-GCC Trade (Exports and Imports) and Joint Venture Projects, 1990-2004 (million \$).

Year	Exports	Imports	Joint Venture Project Number	Capital	Capital Per Project
1990	4834.5	2703.8	---	---	---
1991	4928.6	3735.6	---	---	---
1992	5557.1	3478.8	---	---	---
1993	6210.6	3891.7	---	---	---
1994	5343.6	4036.7	---	---	---
1995	6255.0	4457.2	---	---	---
1996	7553.0	4709.9	---	---	---
1997	8110.6	5158.5	---	---	---
1998	6603.5	5612.0	---	---	---
1999	7982.2	5531.7	150	2066.2	13.77
2000	7776.9	5700.7	91	290.79	3.19
2001	6394.7	3651.6	206	222.96	1.08
2002	7734.4	7402.7	1013	737.45	0.72
2003	9649.9	8025.6	---	---	---
2004	11934.9	11760.0	583	4529.25	7.76

Source: Data compiled from GCC Achievements, 2004.

2. THEORETICAL FRAMEWORK

The gravity model in its basic form suggests that the volume of bilateral trade between two countries is positively related to their incomes (GDP's). Moreover, it has recently been argued (Deardorff, 1998) that the relative distances of trading partners have an impact on the volume of trade. To suitably analyze the intra-GCC economic integration, the conventional "gravity" model of international trade is used. Intellectual modeling of the "gravity" analysis has appeared in many studies of the currency/monetary union and economic integration across different regions (Rose and Engel, 2002; Baxter and Kouparitsas 2006). The gravity model has been long criticized for its lack of a strong theoretical background. Later however many authors have shown that the model can be derived from the traditional and the new theories of international trade including Ricardian model, Heckscher-Ohlin Model and Increasing returns to scale models (Anderson 1979 and Evenett and Keller 1998).

The basic framework for estimating the home country bias in the goods market is the long-established and empirically highly successful gravity equation:

$$\ln(X_{ij}) = \beta_0 + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(GDPC_i) + \beta_4 \ln(GDPC_j) + \beta_5 \ln(D_{ij}) + \beta_6 \text{Border}_{ij} \quad (1)$$

Where X_{ij} are exports from country i to country j ; GDP_i and GDP_j are the GDP of countries i and j , respectively, $GDPC_i$ and $GDPC_j$ are the GDP per Capita for countries i and j , respectively, and D_{ij} denotes the distance between the two countries. β_1 and β_2 are expected to be positive as trade between two countries is supposed to increase with their economic size (GDP). Larger countries trade more with each other than smaller countries as they have bigger potential for export supply and import demand. The coefficient β_5 is expected to be negative, as

greater distances between countries tend to increase transport and transactions costs. This coefficient is expected to decline in magnitude over time because of the development of more efficient transport and communication technologies. The distance between countries is taken to be the distance between the two country capitals, assuming that the capital of a country is its economic center. In some cases, however, economic distance and geographic distance are not the same (Eichengreen, 1996). The Border coefficient is expected to be positive assuming that a common border tends to facilitate trade. These basic specifications can be augmented by other variables, assuming to be related to the bilateral volume of trade.

The size of population was excluded from the study because it will have a significant impact (Figure 3); as larger countries tend to be more self-sufficient or alternatively, for a given level of GDP, poorer countries (larger population) trade less than richer countries. Sanso, Cuairan and Sanz (1993) have shown that the model can be formulated alternatively by using the GDP and per capita GDP rather than populations as explanatory variables. Trade and GDP per capita are postulated to be positively related for a given GDP, or equivalently, richer countries (higher GDP per capita) tend to trade more with each other. In this study, the assumption of incomplete specialization in production allowed for the derivation of the gravity equation in the augmented form in which both country size and factor proportion variables affect the volume of Trade (Cieřlik, 2009).

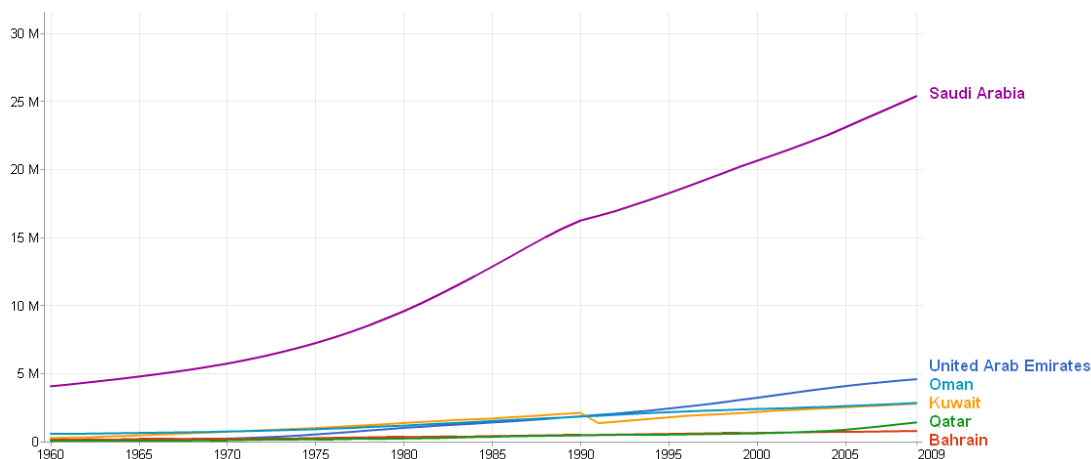


Figure 3. Population of GCC, 1960-2009.

Source: World Bank.

Taking data on trade flows between sub national units (i.e., provinces, states, or regions), this regression can be estimated directly. As international trade statistics are only rarely available, however, measures for trade volumes within countries as well as for internal distances have to be constructed. In fact, one of the contributions of Wei (1996) is the provision of highly imaginative methods to approximate these two missing data series. Furthermore, Kandogan (2008) asserted that there is no question that geopolitics plays an important role in the choices countries make concerning integration.

3. EMPIRICAL MODEL AND RESULTS

The aim of the study is to measure the success of the GCC countries in their attempt to achieve regional economic integration. Consecutively, the GCC economic block was divided into two main groups based on the economic size (measured by GDP) and population for each country, from 1991 to 2009 (18 Years). Group A includes Bahrain and Qatar, and Group B consists of Oman and Kuwait. Both groups were cross-examined against UAE which has a relatively larger economic mass and population through the standard gravity model of trade. The gravity model of trade predicts trade flow based on the economic sizes (GDP), population and distance between two units. In conjunction with the gravity model, a pooled cross sectional (PCS) statistical method was used to analyze the data. The PCS method takes advantage of the large sample size to obtain more precise estimators and more powerful test-statistics. The alternative method was to use a panel data approach and

estimate various versions of fixed effect models that account for the possible unobservable fixed time invariant variables.

The export effect was estimated using the following regression model.

$$\ln(X_{ij}) = \beta_0 + \beta_1 \ln(\text{GDP}_i) + \beta_2 \ln(\text{GDP}_j) + \beta_3 \ln(\text{POP}_i) + \beta_4 \ln(\text{POP}_j) + \beta_5 \ln(D_{ij}) + \beta_6 \text{Group} + u_{ij} \quad (2)$$

Where Ln = natural logarithms,

b0 = estimate of constant, is the average export when all predictors are set to 0,

b1 = coefficient represents the change in estimated Logarithms of GDP of UAE,

b2 = coefficient represents the change in estimated Logarithms of GDP of other countries,

b3 = coefficient represents the change in estimated population of UAE,

b4 = coefficient represents the change in estimated population of other countries,

b5 = coefficient represents the change in estimated country distances,

b6 = coefficient represents the Group A and B.

The export estimates were determined by GDP, population, and distance between UAE and other countries as proxy for transportation costs. Increase in transportation costs would reduce the volume of exports. As a result, the coefficient for distance is expected to be negative. In addition, the Group variable was coded as a dummy variable that has two values 0 and 1; where a zero value represents Group A, Qatar and Bahrain, and a value of one represents Group B, Kuwait and Oman (Table 4).

Table 4. Covariance matrix of parameter estimates

UAE against both Groups A & B				
	Constant	GDP _{UAE}	GDP _{Group A&B}	D ₁
Constant	10.5372	1.2020	-0.2254	-0.2860
Log_GDP _{UAE}	1.2020	0.2418	-0.1285	-0.8050
Log_GDP _{Group A&B}	-0.2254	-0.1285	0.1059	0.586
D ₁	-0.2860	-0.850	0.586	0.6767
UAE against Group A				
	Constant	GDP _{UAE}	GDP _{Group A&B}	
Constant	7.7783	1.2298	-0.4939	
Log_GDP _{UAE}	1.2298	0.2699	-0.1528	
Log_GDP _{Group A}	-0.4939	-0.1528	0.1055	
UAE against Group B				
	Constant	GDP _{UAE}	GDP _{Group A&B}	
Constant	1.3626	0.1397	-0.0114	
Log_GDP _{UAE}	0.1397	0.0397	-0.0248	
Log_GDP _{Group B}	-0.0114	0.0248	0.222	

The regression results show the estimated coefficients of GDP for other countries, distance, and both Group A and Group B have the expected signs and they are both significant. The results provide evidence that UAE's exports trade significantly depends on the economic sizes of the other countries and distance between them. Holding other factors unchanged, exports volume is likely to increase by about 0.9099 with one point unit increase in GDP for other countries while the exports reduced by 2.5346 when distance increase between UAE and the other country. Covariance matrix and parameter estimators were corrected for Heteroskedasticity (White method) (Table 5).

Table 5. Matrix Results

UAE against with both Groups A & B				
	Constant	SE (HC)	t	P> t
Constant	20.0866	3.2461	6.1879	0.0000
Log_GDP _{UAE}	1.5675	0.4918	3.1875	0.0022
Log_GDP _{Group A&B}	-0.1662	0.3254	-0.5108	0.6112
D ₁	1.3553	0.2601	5.2110	0.0000
UAE against Group A				
	Constant	SE (HC)	t	P> t
Constant	22.7903	2.7890	8.1716	0.0000
Log_GDP _{UAE}	0.8822	0.5195	1.6983	0.0983
Log_GDP _{Group A}	0.7513	0.3248	2.3130	0.0267
UAE against Group B				
	Constant	SE (HC)	t	P> t
Constant	20.0472	1.1673	17.1741	0.0000
Log_GDP _{UAE}	3.3060	0.1991	16.6017	0.0000
Log_GDP _{Group B}	-1.9284	0.1490	-12.9410	0.0000

The power of the model to explain UAE's export flows are considered strong enough because the value of the R square is around 0.91 and the value of F-test; the overall significant of the model is highly significant at 1% level. The variables of GDP for other countries, distance, and Group are highly significant at 1% level. The other two variables, GDP for UAE and Population are not significant, so they were dropped from the model (Table 6).

Table 6. Regression Results

UAE against both Groups A & B				
R-sq	F	df1	df2	p
0.06086	35.4311	3.0000	67.0000	0.0000
UAE against Groups A				
0.7681	42.7554	2.0000	35.0000	0.0000
UAE against Groups B				
0.9179	139.3101	2.0000	30.0000	0.0000

The coefficient values of GDP and distance are in logarithm values, the exponential values were taken to get actual values in same units. After running 3 matrices, the main results are illustrated in Table 7.

Table 7. Matrix Results

Matrix	Result
UAE vs. Group A & B (combined)	For every 1 point increase in UAE's GDP, exports from UAE to both groups increases by 1.57 points.
UAE vs. Group A (Bahrain & Qatar)	For every 1 point increase in Group A's GDP, exports from UAE to Group A increases by 0.75 points.
UAE vs. Group B (Oman & Kuwait)	For every 1 point increase in UAE's GDP exports from UAE to Group B increases by 3.3 points. For every 1 point increase in Group B's GDP, exports from UAE to Group B declines by 1.9 points.

Additionally the Group variable plays an important role in determining the export flows. That is, UAE seems to trade more with the Group B countries and less with the Group A countries, about 2.523 points increase in export.

4. CONCLUSION

Empirically, this study concludes that the conventional gravity model has predicted that countries included in this study with closer distance significantly trade more than other members in the GCC. As expected, the distance variable is negative, reflecting the increase in trade cost as the distance between the two trading partners increase. The sign of the border variable indicates that countries which share a border trade more with each other than countries that do not share a border.

The coefficients of the GDP variables of the importers and exporters are positive, indicating that trade increases with the level of the GDP of both countries. However, trade increases less than proportionately with the GDP of the importing country (Groups A & B) and more than proportionately with the GDP of the exporting country (UAE).

In conclusion; regardless of the fact that the share of GCC intra-trade included in this study is too small in absolute terms, the findings indicate it is actually higher than expected on the basis of underlying trade determinants. The UAE seems to trade less with Group A countries and more with Group B countries. However, the potential of trade among GCC countries in this study have been exhausted during the early years of the establishment of the GCC trade arrangement between the periods of 1993 to 1996. The developing member countries with similar incomes would trade extensively more with each other. This result can be partly explained by Hanink's income threshold concept, which argues that the income similarity effect is only applicable to developed countries with very small difference in incomes (Tang 2005). The results suggest that the newly signed trade arrangements are promising in enhancing new opportunities of trade in the region. The newly created GCC Custom Union is therefore promising in enhancing new opportunities of trade as it goes beyond the removal of tariffs to the elimination of non-tariff barriers and the establishment of common standards and regulatory regimes. As these countries become more industrialized, they can then start to produce more manufactured rather than primary goods for export. The emphasis on the production of tradable goods would facilitate high trade between these rapidly growing developing countries in the long run.

REFERENCES

- Al-Uwaisheg, A. (2003) Search for Criteria of Economic Convergence in the GCC Area, paper presented at *The European Commission Conference*, Athens, Greece, Feb 2003.
- Anderson, J. (1979) A Theoretical Foundation for the Gravity Equation. *American Economic Review*, 69(1), pp. 106-116.
- Baxter, M., and Kouparitsas, M. (2006) What determines bilateral trade flows? *National Bureau of Economic Research*, Working Paper No. 12188.
- Cieřlik, A. (2009) Bilateral trade volumes, the gravity equation and factor proportions. *The Journal of International Trade & Economic Development*, 18 (1), pp. 37-59.
- Cooperation Council for the Arab State of the Gulf. Secretariat General, 2004. GCC Achievements: <http://www.gcc-sg.org/statistics.html>
- Deardorff, A. (1998) Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World? in Jeffrey Frankel, ed. *Regionalization of the World Economy*. NBER and University of Chicago Press, pp. 7-32.
- Eichengreen, B. (1996) A More Perfect Union? The Logic of Economic Integration. *Princeton Essays in International Finance*, 198.

- Elliot, D. (2007) Caribbean Regionalism and the Expectation of Increased Trade: Insights from a Time-Series Gravity Model. *The Journal of International Trade & Economic Development*, 16 (1), pp. 117-136.
- Evenett, S. and Keller, W. (1998) On Theories Explaining the Success of the Gravity Equation, *National Bureau of Economic Research Working Paper*, No. 6529.
- GCC Achievements (2004) *Cooperation Council for the Arab State of the Gulf- Secretariat General*, Riyadh, Saudi Arabia , available at : www.gcc-sg.org/statistics.html
- International Monetary Fund (IMF) *Direction of Trade Statistics*, IMF, Washington, D.C.
- Kandogan, Y. (2008) Falling walls and lifting curtains: analysis of border effects in transition countries. *The Journal of International Trade & Economic Development*, 17 (1), pp. 85-104.
- Peterson, E. (1988), *The Gulf Cooperation Council: Search for Unity in a Dynamic Region*. Boulder: Westview Press.
- Rose, A. and Engel, C. (2002) Currency unions and international integration. *Journal of Money, Credit, and Banking*, 34 (4), pp. 1067-1089.
- Sanso, M. Cuairan, R.; Sanz, F. (1993) Bilateral Trade Flows, the gravity equation, and functional form. *The Review of Economics and Statistics*, 75(2), pp.266-275.
- Sherif, S. (2008) Technical Barriers in the GCC Economic Integration Under Globalization, paper presented at *Global Academy of Business and Economic Research Conference*, Houston, Texas, USA, 18 Sep 2008.
- Tang, D. (2005) Effects of the Regional Trading Arrangements on Trade: Evidence from the NAFTA, ANZCER and ASEAN Countries, 1989-2000. *The Journal of International Trade & Economic Development* 14 (2), pp. 241-265.
- Wei, S. (1996) Intra-National Versus International Trade: How Stubborn are Nations in Global Integration, *National Bureau of Economic Research Working Paper*, No. 5531.
- White, H. 1980. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica*, 48 (4), pp. 817-838.
- World Bank, World Development Indicators ,statistics retrieved on June 6, 2011 from Online (WDI) at <http://devdata.worldbank.org/data-query/>.
- Zineldin, M. (1998) Globalization and economic integration among Arab countries, paper presented at The 4th Nordic Conference on Middle Eastern Studies: The Middle East in Globalizing World, Oslo, Norway 13-16 Aug 1998.

Copyright of International Journal of Economic Perspectives is the property of International Economic Society and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.