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Determinants of Trade Flows among GCC Countries: Potentials, Limitations, and Expectations

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This paper provides two contributions to the literature on trade integration among GCC countries. First, we assess the intra-GCC trade flows of member states based on the nature of goods and services *transacted. Two categories are defined: oil flows and non-oil flows*. Second, *in exploring trade determinants of both categories*, we introduced a number of indicators of behind-the-border infrastructure that we believe have an impact on transaction costs in international trade *and might be a significant determinant of trade flows among GCC countries*. *Our analysis shows that if oil is excluded from trade flows, the GCC intra-trade becomes a significant proportion of total GCC trade flows suggesting that GCC intra-trade is quite intensive and the GCC economies are more trade integrated than what aggregate data (inclusive of oil) may indicate. Next, we estimate the determinants of non-oil trade flows among GCC countries using a gravity model that incorporates, in addition to the traditional variables, indicators for the quality of infrastructure (roads, air transport, port efficiency,and telecommunication). The robustness of the results is tested by estimating a fixed-effect model. Our results suggest that the quality of infrastructure is an important determinant of trade performance. In particular, port efficiency appears to have the largest impact on trade among all indicators of infrastructure. Income levels, factor endowments, as well as level of development have significant effects on non-oil exportsandnon-oil imports. Our findings suggest that policies that promote trade integration in the region should be maintained. Moreover, additional measures need to be undertaken to ensure low transportation costs that include improving both the physical infrastructure and the efficiency of transportation systems.*

JEL Classification: F13, F14, F15, F17.

Keywords: trade, non-oil exports/imports, infrastructure, gravity model.

1. Introduction

Despite the various regulations and trade agreements between GCC countries over the last three decades, many studies have found that the GCC intra-trade remains insignificant and reflects unsuccessful economic integration policies. These results were based on econometric evaluations suggesting that trade flows between GCC members continued to be relatively low. Similarities of economic structures, weak institutions, as well as the lack of industrial diversification were to blame. In this paper we revisit this literature on economic integration among GCC countries and ask two fundamental questions: (1) why all existent studies conclude that intra-GCC trade is insignificant? And (2) what additional data we can use to refine and or improve the previous findings?

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In other words, what common framework the literature used so that results are similar (and persistent across studies)? And, are there other ways to interpret the intra-GCC trade patterns?

In answering these questions, our starting point is the examination of the data used in different models of this literature. A key observation from this exercise is that trade follows variable considered in these models consist in the total of ALL goods and services exchanged by GCC countries with the rest of the world. This variable is then regressed against a set of socio-economic variables specific to member states such as GDP, population, etc. This approach is, to me, misleading and do not consider the specific nature of GCC economies. In fact, all member states of the GCC region depend mainly on huge quantities of crude oil as a source of national income. As a result, oil products (especially exports) will dominate all other components of trade flows. And since GCC economies are relatively small and lack diversification share of other (non-oil) products in total trade flows is expected to be small, too. Consequently, results of gravity regressions would indicate insignificant intra-GCC trade integration and recommend review of policies and agreements administrating trade arrangements between GCC countries.

To resolve these issues, we reassess the trade potential in this economic block by addressing the limits of previous studies and by including additional variables that were, to our knowledge, ignored in GCC intra-trade models. We proceed in two steps. First, we decompose GCC intra-trade flows to oil and non-oil flows. Second, we investigate the determinants of non-oil trade flows using, in addition to the traditional variables widely used in the literature, indicators for the quality of infrastructure (roads, air transport, port efficiency, and telecommunication)that we believe have an impact on transaction costs in international trade *and might be a significant determinant of trade flows among GCC countries*. To do so, we estimate a gravity model based on pooled time series-cross-sectional data. The robustness of the results is tested by estimating a fixed-effect model. Our findings show that if oil is excluded from trade flows, the GCC intra-trade becomes a significant proportion of total GCC trade flows. Without oil sector, our analyses suggest that GCC intra-trade is quite intensive and the GCC economies are more trade integrated than what aggregate data (inclusive of oil) may indicate. In other worlds, the results indicate that in spite of the fact that the share of GCC intra-trade is too small in absolute terms, it is actually higher than expected on the basis of underlying trade determinants.

Moreover, trade creation is found to be present for non-oil flows. Income levels, transportation costs, factor endowments, as well as level of development have significant effects on non-oil trade. More interestingly, the quality of infrastructure is found to be an important determinant of trade performance. In particular, ports efficiency appears to have the largest impact on trade. These findings suggest that policies that promote growth and development in the region should be maintained. Note, however, that although the infrastructure is good in all GCC countries, additional measures need to be undertaken to ensure lower transportation costs and improve the quality of the existent infrastructure. Moreover, the results suggest that the newly signed trade arrangements are promising in enhancing new opportunities of trade in the GCC region.

The remainder of the paper is organized as follows. Section 2 surveys the literature and compares the findings of this study with the results of existent literature. Section 3 assesses the trade structure of GCC countries. Section 4 describes the methodology, data, and related issues. Section 5 discusses model specifications. Section 6 discusses the results. Finally, concluding remarks are given in section 7.

2. Literature Review

The gravity model has been used extensively in the literature to address the trade potential in a wide variety of countries, regions, and levels of commodity aggregation. For instance, Boughanmi (2008 investigates the potential of trade of the GCC countries within the context of the old and the emerging preference trade arrangements in the region of Middle East and North African Countries (MENA). He estimates a gravity model based on panel data of bilateral trade of the MENA countries with their major trading partners. His results indicate that the level of the GCC intra-trade has not changed significantly over the years and had probably reached its full potential during the first decade of the GCC creation.

A research by (Akhtar and Rouis 2010) the integration process among the GCC and other MENA countries. They find that intraregional GCC trade flows remain relatively small despite strong growth in recent years. They argue that this figure compares unfavorably with other trading blocs such as ASEAN, NAFTA, and EU-15, reflecting weak complementarities among GCC member states and the relatively liberal trade regimes that had historically characterized the GCC economies.

In a related study (l-Atrash and Yousef 2000) used a gravity model to address the question whether intra-Arab trade is too little. Their results indicate that Intra-GCC and intra-Maghreb trade are relatively low while that of the Mashreq countries are higher than expected. A gravity model developed by (Nugent 2002) examines the potential of intra-regional and extra-regional trade of MENA countries and to determine the extent to which intra-trade has varied across MENA sub-regions. Based on a worldwide data set covering periods from 1970 until 1997, Nugent's study shows strong evidence that sub-regional trade arrangements such as the Arab Common Market (ACM) and the Arab Maghreb Union (AMU) failed to increase trade while that evidence is weak for the GCC countries. More recently, (Bolbol and Fatheldin 2005) used a gravity approach for the 1997-2003 period to analyze the determinants of intra-Arab exports and Foreign Direct Investment (FDI). Their findings indicate that intra-Arab exports are below normal and that deficiency mainly arises from the lack of enough exports between the GCC-Maghreb and Maghreb-Mashreq countries.

The data for trade flows used in the gravity models discussed above were based on variables that incorporate all goods and services transacted by GCC member states, regardless of their nature. Oil products would dominate these statistics and, given the similarities of economic structures of GCC countries, estimates of trade potential of the golf region would suggest weak economic integration. In the present work, we address this issue by separating trade flows to oil and non-oil flows. Proceeding this way, we focus our analysis on trade flows other than natural resources, which could be

influenced by trade policies and agreements. Therefore, although non-oil flows represent small fraction of total trade flows in the region, they play a key role in trade creation.

A gravity model estimated by (Nordås and Piermartini 2004) bilateral tariffs and a number of indicators for the quality of infrastructure. Their results suggest that bilateral tariffs have a significant negative impact on trade and quality of infrastructure is an important determinant of trade performance. İnsel and Tekçe (2010) investigate whether the trade flows of each GCC country with its partners have sustained and/or they have developed new relations over time, mainly after 2003 custom union agreement of the GCC. More recently, Behar and Venables (2010) investigate the impact of transport costs on international trade, looking both at the influence of transport costs on trade and at the determinants of international transport costs. They found that Infrastructure investment, while costly to undertake, has a major impact in reducing transport costs. Limão and Venables (2001) find that variation in infrastructure accounts for 40%of the variation in predicted transport costs in coastal countries and up to 60% in land locked countries. Improvements in road, rail and telephone infrastructure from the 25th to 75th percentile would overcome more than half the disadvantage of being landlocked.

None of these studies, however, introduced the infrastructure variables in gravity models investigating trade potential among the GCC countries. One possible explanation for this limitation is the scarcity of data on these variables. In this paper, I collect few indicators of infrastructure relevant to the GCC region and incorporate them in our estimations of gravity models, short time series and many missing observations though (see discussion in section 4).

3. Trade Structure of GCC Countries

3.1 Total Trade

GCC economies depend on trade with an export to GDP ratio varying from almost 70% in Bahrain to around 50% in Saudi Arabia. More than 80% of the region's exports consist of oil. In Table1, we provide data for the exports of all GCC countries to other GCC countries and to the rest of the world. As we can see, exports had increased over time for all GCC countries. Most trade, however, is conducted with non-GCC countries. In 2001, the region's total exports were $144.1 billion, out of which 4.3% only is to GCC countries. By 2007, total exports reached $534.6 billion only 5% of it to GCC countries. Saudi Arabia is the most important exporter, accounting for almost 44% of total region's exports in 2007, followed by UAE with a share of 29.3% then Kuwait with a share of 11.7%.

Table 1: GCC Exports to GCC vs. to the rest of the World ($Millions)

Exports of	1991		1996		2001		2007	
	GCC	Total	GCC	Total	GCC	Total	GCC	Total
BA	-	-	438.4	1542.6	520.6	5551.3	1189.5	13664.9
KW	61.4	1088.9	288.9	14855.7	364.5	16164.8	1188.9	62691.2
OM	370	4873.5	711.9	7221.9	1067	11036.6	3344.3	24691.5
QR	273	3209.8	377.5	3832.9	335	10705.9	2014.8	42019.9
SA	773	47053.3	1688.8	56509.5	1799.8	67974.5	13106.3	234951
UAE	53.6	485.6	-	-	2113.1	32669	6186.4	156634

Source: United Nations Statistics Division

Note that despite the huge increase in total exports of the region (i.e., an increase of 370%) the share of GCC countries in these flows (i.e. the intra-GCC trade) remains small and insignificant. In Table 2 below, we calculate, for each GCC member state, the share of exports to GCC in its total exports. In 1996, Bahrain products seemed to be more oriented to GCC markets as the share of its exports to GCC exceeded 28%, followed by Oman and Qatar with a share of almost 10% each. A decade later (i.e., in 2007), only Oman exports a significant part of its products to GCC countries with a share of 13.5% while Bahrain and Qatar observed a decrease in the share of their exports to GCC.

Table 2: Share of Exports to GCC in Total exports

	1991	1996	2001	2007
BA	-	28.40%	9.40%	8.70%
KW	5.60%	1.90%	2.30%	1.90%
OM	7.60%	9.90%	9.70%	13.50%
QR	8.50%	9.90%	3.10%	4.80%
SA	1.60%	3.00%	2.60%	5.60%
UAE	11.00%	-	6.50%	3.90%

Source: Calculated based on data of United Nations Statistics Division

As for the imports, Table 3 below shows that in 2008, the region as a whole imported $366.3 billion, out of which 7% is from GCC countries. UAE is the most important importer, accounting for 46.4% of the region's imports in 2008, followed by Saudi Arabia with a share of 30.5%.

In Table 4 we calculate, for each member state, the share of its imports from other GCC countries in its total imports. Oman is the most important importer from the GCC region with GCC products accounting for 31.3% of its imports, followed by Qatar and Kuwait with shares of 14.3% and 10.7%, respectively.

Table 3: GCC Imports from GCC vs. from the rest of the World ($Millions)

Imports of	1992		1996		2000		2008	
	GCC	TOTAL	GCC	TOTAL	GCC	TOTAL	GCC	TOTAL
BA	-	-	301.5	2488.7	378.8	4633.6	1013.3*	11515.1*
KW	594.3	7251.4	801.9	8373.7	851.4	7156.5	2663.7	24839.6
OM	1170	3769.2	1282.5	4577.8	1672.7	5039.2	7175.4	22924.7
QR	214.4	2015.4	357.7	2868.3	483.3	3252.2	3995.7	27900
SA	568.3	33272.6	892.3	27764.9	1078.6	30237.3	4974	115134
UAE	160.8	5188.9	-	-	1235.7	27191.9	6996.3	175486

Source: United Nations Statistics Division
*This is 2007 data

The assessment of trade flows discussed above confirms the existent findings of the literature that intra-GCC trade is small and insignificant. A commonly used argument in the literature is that the small-observed volume of GCC intra-trade is usually attributed to the similarity of the economic structure of the GCC member countries as well as their lack of industrial diversification (Havrylyshyn and Kusnel, 1997). However, if oil is excluded from trade, the above findings would not sustain, as the GCC intra-trade become a significant proportion of total GCC trade flows.

Table 4: Share of Imports from GCC in Total Imports

Imports of	1992	1996	2000	2004	2008
BA	-	12.1%	8.2%	9.9%	8.8%*
KW	8.2%	9.6%	11.9%	13.3%	10.7%
OM	31.0%	28.0%	33.2%	34.3%	31.3%
QR	10.6%	12.5%	14.9%	18.4%	14.3%
SA	1.7%	3.2%	3.6%	4.9%	4.3%
UAE	3.1%	5.1%*	4.5%	3.5%	4.0%

Source: Calculated based on data of United Nations Statistics Division
* For Bahrain this is 2007 data, and for UAE this 1999 data.

3.2 Non-Oil Trade

The examination of GCC member states exports structure show that non-oil exports to the region constitute a significant portion of all member states except UAE. In Table 5below, we calculate, for each member state, the share of non-oil exports to GCC in its total exports. Oman's non-oil products seem to be the most demanded in the region as 55.8%of them are traded in the GCC member states. Bahrain's non-oil goods and services are also distributed intensively in the region with a share of 41.4% of total non-oil exports. Kuwait and Saudi in turn export around one third of their non-oil exports to the GCC countries. This suggests that GCC intra-trade is quite intensive and the GCC

economies are more trade integrated than what aggregate data (inclusive of oil) may indicate.

Table 5: Share of Non-Oil Exports to GCC in Total Non-Oil Exports				
Exports to	**1991**	**1996**	**2001**	**2007**
BA	-	28.4%	27.8%	41.4%
KW	28.7%	40.6%	27.7%	34.0%
OM	56.8%	47.3%	46.1%	55.8%
QR	44.0%	42.1%	30.1%	22.7%
SA	22.6%	26.1%	19.0%	32.9%
UAE	9.0%	-	19.9%	7.7%

Source: Calculated based on data of United Nations Statistics Division.

As for non-oil imports from the region, Oman is the most important importer of non-oil products from the other member states with a share of 30.6%, followed by Bahrain then Qatar with shares of 17.6% and 13.8%, respectively. Table 6 shows also that Saudi Arabia and UAE markets are less oriented towards the region's products as the shares of their non-oil imports from the GCC member states do not exceed 4.3% and 3.7%, respectively.

Table 6:Share of non-oil Imports from GCC in Total non-oil Imports					
Imports of	**1992**	**1996**	**2000**	**2004**	**2008**
BA		12.2%	8.1%	16.7%	*17.6%
KW	8.0%	9.2%	11.6%	13.1%	10.4%
OM	30.0%	27.5%	32.2%	32.8%	30.6%
QR	10.2%	12.2%	14.6%	18.1%	13.8%
SA	1.7%	3.2%	3.5%	4.8%	4.3%
UAE	0.9%	-	4.4%	3.4%	3.7%

Source: Calculated based on data of United Nations Statistics Division

* This is a 2007 data.

Note that although non-oil imports are more intensive for some member states such as Bahrain and Oman, given the relatively small size of these two countries, the overall structure of the GCC trade is quite similar in terms of total imports and non-oil imports.

4. Methodology, Data and Related Issues

4.1 Methodology and Estimation Issues

Empirical studies on economic integration have used extensively the gravity model. According to the basic gravity model, the volume of trade between two states is a function of their incomes (GDPs), populations, geographical distance and a set of dummies. Martinez-Zarzoso and Nowak-Lehmann (2003) augmented the gravity model of Boughe et al. (1999) by introducing a new infrastructure index to improve measurement of transport cost, which is not only a function of distance but also public infrastructure.

Note that empirical literature on GCC intra-trade models has used either a single year or a pooled cross sectional regression method to estimate the gravity equation. One advantage of the pooled cross sectional method is that large sample sizes they use result in estimators that are precise and test-statistics that are more powerful. But, as emphasized by (Baier and Bergstrand 2005), (Cheng and Wall 2003), Martinez-Zarzoso and Nowak-Lehmann (2003), among others, estimators of this method is that missing variables will result in a heterogeneity bias that capture the individual effects of the trading parties.

To address these limitations, many studies consider a panel data approach and estimate various versions of fixed effect models that account for possible unobservable fixed, time invariant variables. A good example of such alternatives is Bayoum and Eichengreen's (1995) approach, which specified the model in difference rather than in levels to eliminate the fixed effects and avoid the heterogeneity across countries. Nevertheless, this approach would also eliminate all the time-invariant variables (mainly distance and border variables) that are accounted for in the panel regressions.

In the present work, we use the standard pooled cross-section model and the fixed effect model in difference (à la Bayoum and Eichengreen, 1995). Hence, for each GCC member state, we formulate and estimate four gravity equations using the Panel Data procedure for the six founding members of GCC. The gravity equations constructed describe the relationship between bilateral trade to core factors such as GDP, distance, factor endowment as represented by population, and geographical factors as represented by adjacency of one country to another. In line with Martinez-Zarzoso and Nowak-Lehmann (2003), additional variables are also included, namely infrastructure variables. We introduce six infrastructure variables in the present work. These are port efficiency, paved roads (% of total roads), two air transport variables, international departures of aircrafts and freight (million ton-km), and two telecommunication variables, internet users and telephone lines per 100 people. We use these six indicators separately in the regressions.

4.2 Data and Related Issues

Data on infrastructure are taken from the World Bank's World Development Indicators, WDI. Port efficiency is measured by an index that ranges between one and seven

(1=extremely underdeveloped to 7=well developed and efficient by international standards). It is based on surveys conducted on representative firms of each country by the World Economic Forum, WEF. Tables 7-9 provide a summary of the infrastructure variables used in this study.

The data show large differentials in the quality of infrastructure across GCC member states. To take an example, Oman and Saudi Arabia have only 30% of their roads paved while all roads are paved in UAE (100%). In UAE and Bahrain, internet users exceed 65 and 51 per 100 people, respectively, while Saudi Arabia and Oman do not exceed 31 and 20 per 100 people, respectively. Less 10 per 100 people are connected to telephone lines in Oman while at least third of the people are connected in UAE.

Table 7: Quality of Physical Infrastructure

	Port Efficiency (1-7)			Roads, paved (% of total roads)		
Country	**2007**	**2008**	**2009**	**1992**	**1996**	**2000**
BH	5.3	5.4	5.5	78.8	75.8	77.6
KW	4.2	4	4.1	75.9	80.6	80.6
OM	4.8	5.1	5.2	21.2	30	30
QR	4.4	4.4	5	87.3	90	90
SA	4.5	4.5	4.7	40	29.8	29.9
UAE	6	6.1	6.2	98	100	100

Source: WDI

Table 8: Air Transport

	international departures of aircrafts			freight (million ton-km)		
Country	**1995**	**2000**	**2004**	**1995**	**2000**	**2004**
BH	13400	21303	32488	132.8	208.801	416.514
KW	17900	17486	19512	329.7	243.091	226.93
OM	15700	22322	31871	132.8	152.145	235.186
QR	13400	26652	34931	132.8	244.07	469.19
SA	98100	108981	113329	894.9	999.56	956.687
UAE	34200	48330	87217	557.2	1456.349	3733.658

Source: WDI

Table 9: Information and Communication Technologies

	Internet users (per 100 people)				Telephone lines (per 100 people)			
Country	**1996**	**2000**	**2004**	**2008**	**1996**	**2000**	**2004**	**2008**
BH	0.8	6.2	21.5	51.9	24.4	26.3	26.9	28.4
KW	0.8	6.8	24.4	36.7	20.7	21.3	20.2	19.8
OM	0.0	3.5	6.8	20.0	8.9	9.2	9.4	9.8
QR	0.9	4.9	20.7	34.0	24.8	26.0	23.9	20.6
SA	0.0	2.2	10.5	31.3	9.6	14.4	16.4	16.5
UAE	0.4	23.6	30.1	65.2	28.7	31.5	30.2	33.6

Source: WDI

The dependent variables are non-oil exports and non-oil imports. As mentioned above, we use panel data approach and estimate fixed effect models that account for the possible unobservable fixed, time invariant variables. As a result, for each GCC member state, four (4) gravity equations are constructed and estimated, using the Panel Data procedure and the fixed effects approach.

Note that due to constraints in obtaining complete data for all the pairs of trading countries, estimations that exclude quality of port infrastructure as well as paved roads utilize data from 1990 until 2008. For estimations that include paved roads, the data spans from 1995 to 2008. Estimations that include quality of port infrastructure face larger data constraints to the extent that we can do estimations for only three years, i.e., 2007, 2008, and 2009.

5. Model Specification

The specification of the model used in this analysis is:

$$\begin{aligned} ln\, X_{ijt} \;=\; & \beta_0 + \beta_1\, ln(Y_{it}) \\ & + \beta_2 ln\big(Y_{jt}\big) + \beta_3\, ln(pop_{it}) + \beta_4\, ln\big(pop_{jt}\big) + \beta_5\, ln\big(distan_{ij}\big) + \beta_6 Border \\ & + \beta_7\, ln(infra_{it}) + \beta_8\, ln\big(infra_{jt}\big) + \epsilon_{ijt} \end{aligned}$$

WhereX_{ijt} denotes the value of non-oil exports, or non-oil imports between countries *i* and *j* at time *t.*Y_{it} is nominal GDP of country *I* and Y_{jt} is nominal GDP of country *j.*pop_{it} is population for country *i* and pop_{jt} is population in country *j.*$\mathrm{distan}_{\mathrm{ij}}$ is distance between *i* and *j.*Border is a dummy variable that takes the value of 1 if *i* and *j* share a border and 0 otherwise. $\mathrm{infra}_{\mathrm{it}}$ is an infrastructure variable in country *i*. $\mathrm{infra}_{\mathrm{it}}$ is the infrastructure variable in country *j.* ϵ_{ijt} is an error term.

Each of the six indicators discussed above is added one at time in the regression.$\beta_0, \beta_1, \ldots., \beta_8$ are parameters to be estimated. In the model above, $\beta_1 \mathrm{and}\, \beta_2$ 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. Coefficients $\beta_3 \text{and} \beta_4$ are expected to be negative 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. 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 transport that is more efficient and communication technologies. The Border coefficient is expected to be positive assuming that a common border tends to facilitate trade. The effects of infrastructure variables are captured by the coefficients $\beta_7 \text{ and } \beta_8$. Positive and significant coefficient on the infra_{it} and infra_{jt} variables ($\beta_7 \text{and} \beta_8$) indicate that good quality of infrastructure is crucial in developing bilateral trade.

6. The Results

Despite the fact that some of the estimates are different across specification, both specifications (panel regression and fixed effect regression) lead to the same conclusion in terms of statistical significance and the effect of integration in the GCC area. That is, the effect of GCC integration is trade creating in the panel regressions as well as in the fixed effects regressions. Results of al gravity equations are reported in Tables 10-13.

Table 10 shows the estimates of total bilateral non-exports. The first column shows the results for the traditional gravity regression. As in similar studies, the core variables of the gravity model have the expected signs and are all highly significant (at the 1% significance level), except the population of the trading partners. 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 and more than proportionately with the GDP of the exporting country.

The parameter estimate for the population variable is negative as hypothesized, indicating that larger, more populous countries tend to be more self-sufficient and therefore import less from other countries. The distance variable is negative as expected, reflecting the increase in trade cost as the distance between the two trading partners increase. The sign of the border variable indicates that countries that share a border trade more with each other than countries that do not share a border.

Columns 1- 6 introduce various measures of the quality of infrastructure. It appears that port efficiency has the largest impact on exports flows, although the results are not entirely comparable since the data on port efficiency are small. Nevertheless, we notice that a ten per cent improvement in port efficiency increases exports by over 6 per cent.

Table 10: Panel Regression: Importance of Infrastructure for Non-Oil Exports

	(Benchmark)	(1)	(2)	(3)	(4)	(5)	(6)
GDP country *i*	0.96***	.94***	.95***	.80***	.97***	.97***	1.00***
GDP country *j*	1.17***	1.12***	1.14***	.91***	1.14***	1.13***	1.17***
Pop country *i*	-0.14***	-0.19***	-0.10***	-0.11***	-0.12***	-0.15***	-0.17***
Pop country *j*	0.11	0.08**	0.14**	0.13**	0.12**	0.14**	0.09***
Distance	-1.31***	-1.22***	-1.22***	-.71***	-1.24***	-1.24***	-1.34***
Border	.58***	.66***	.70***	.02	.67***	.64***	.66***
roads country *i*		.12***					
country *j*		.10***					
port country *i*			.68***				
country *j*			.61***				
Internet country *i*				.11***			
country *j*				.11***			
Telephonecountry *i*					-.01		
country *j*					.09***		
Aircraft-departures							
country *i*						-.30***	
country *j*						.02	
Freightcountry *i*							.26***
country *j*							.33***
Adjusted R sq	**0.74**	**0.75**	**0.77**	**0.80**	**0.82**	**0.69**	**0.78**
Note: ***,**,* denote 1, 5, 10 per cent significance level respectively.							

Table 11: Panel Regression: Importance of Infrastructure for Non-Oil Imports

	(Benchmark)	(1)	(2)	(3)	(4)	(5)	(6)
GDP country *i*	0.96*	.94**	.95***	.80***	.71**	.89***	.63*
GDP country *j*	1.00**	.99***	1.32**	.88*	1.01*	1.27	1.00***
Pop country *i*	-.07***	-0.19***	-0.10***	-0.11***	-0.12***	-0.15***	-0.17***
Pop country *j*	0.16	0.1***	0.17**	0.13**	0.09***	0.1**	0.19
Distance	-1.36*	-1.07*	-1.31***	-.79**	-1.01**	-1.24***	-1.13*
Border	.51	.70**	.72***	.08	.75**	.49***	.86**
roads country *i*		.2**					
country *j*		.15*					
port country *i*			.45*				
country *j*			.37***				
Internet country *i*				.13			
country *j*				.09*			
Telephonecountry *i*					.05		
country *j*					1.0**		
Aircraft-departures							
country *i*						.19***	
country *j*						1.2*	
Freightcountry *i*							.20
country *j*							.22*
Adjusted R sq	**0.67**	**0.68**	**0.68**	**0.75**	**0.68**	**0.68**	**0.71**
Note: ***,**,* denote 1, 5, 10 per cent significance level respectively.							

Next, we estimated a fixed effects model for non-oil exports and non-oil imports equations. This gives us an unbiased estimate of the impact of distance and border on bilateral trade flows. The results are presented in Tables 12&13. We notice that the results for almost all variables are similar to those observed in the standard polled cross-section-regressions.

7. Concluding Remarks

This paper has provided two contributions to the literature on trade integration among GCC countries, using the gravity model. First, we assess the intra-GCC trade flows of member states based on the nature of goods and services. We divide trade flows to oil versus non-oil flows. Assessing trade potential of GCC countries based on its structure is, to my knowledge, ignored in the empirical gravity literature. Second, we introduce a number of indicators of behind-the-border infrastructure that we believe have an impact on transaction costs in international trade.

Contrary to the stylized view that GCC countries trade little with each other, the findings of the study indicate that if oil is excluded from trade flows GCC countries actually trade more with each other than expected based on the underlying trade determinants. Further analyses indicate that the GCC as a preference trade arrangement has actually "created trade". The newly created GCC Custom Union seems to be 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.

We also find that the quality of infrastructure has a significant and relatively large impact on bilateral flows. Among the individual infrastructure indicators, port efficiency has the largest impact on bilateral trade, but there is possibly a selection bias in the sample here, since data are available only for three years.

Interestingly, we find that the importance of distance is not diminished when the quality of infrastructure is included. Since distance is a proxy for trade costs and trade costs, according to several studies, are largely determined by the quality of infrastructure, this is somewhat surprising. It is, however, likely that better infrastructure and lower transport costs primarily increase the total volume of trade, while the distance is as important as before for the distribution of (a larger volume) of trade on individual trading-partners.

Table 12: Fixed Effect Regression: Importance of Infrastructure for Non-Oil Exports

	(Benchmark)	(1)	(2)	(3)	(4)	(5)	(6)
GDP country *i*	0.99***	1.02***	.95***	.80***	.97***	.97***	1.00***
GDP country *j*	1.02***	1.1***	1.14***	.91***	1.14***	1.13***	1.17***
Pop country *i*	-0.09***	-0.2***	-0.10***	-0.11***	-0.12***	-0.15***	-0.17***
Pop country *j*	0.16*	0.11**	0.14**	0.13**	0.12**	0.14**	0.09***
roads country *i*		.15***					
country *j*		.08*					
port country *i*			.55***				
country *j*			.42***				
Internet country *i*				.17***			
country *j*				.13***			
Telephonecountry *i*					.08*		
country *j*					.04*		
Aircraft departures country *i*						-.21***	
country *j*						.11	
Freightcountry *i*							.29**
country *j*							.44
Adjusted R sq	**0.69**	**0.66**	**0.70**	**0.67**	**0.70**	**0.59**	**0.68**
Note: ***,**,* denote 1, 5, 10 per cent significance level respectively							

Table 13: Fixed Effect: Regression Results for Non-Oil Imports

	(Benchmark)	(1)	(2)	(3)	(4)	(5)	(6)
GDP country *i*	0.91**	1.0**	.89*	.88*	1.01**	.91***	1.04*
GDP country *j*	1.0*	1.14***	1.1**	.94***	1.02**	1.01***	1.1**
Pop country *i*	0.11***	0.15**	0.13*	0.10*	-0.14**	0.10***	-0.09***
Pop country *j*	-0.14**	0.17**	0.09	-0.13**	0.12**	0.14**	0.11***
roads country *i*		.10*					
country *j*		1.02*					
port country *i*			.37***				
country *j*			.32***				
Internet country *i*				.2***			
country *j*				.19**			
Telephonecountry *i*					1.01**		
country *j*					.07*		
Aircraft-departures							
country *i*						-.27*	
country *j*						.11**	
Freightcountry *i*							.2**
country *j*							.31***
Adjusted R sq	**0.64**	**0.70**	**0.66**	**0.64**	**0.73**	**0.64**	**0.69**
Note: ***,**,* denote 1, 5, 10 per cent significance level respectively							

These findings have important policy implications for the GCC countries. Since all GCC countries have the means to improve the quality of their infrastructure, their intra-trade and their share of world trade can be easily improved. This study suggests that port efficiency is the most important infrastructure variable. Developing industrial areas close to major harbors or airports could be a starting point in countries that cannot afford universal infrastructure services in the short to medium term.

Although our results are promising in terms of trade creation among GCC countries, the region, as (Akhtar and Rouis2010) outlined, still faces many challenges to achieve full economic integration. First, GCC countries are all highly dependent on hydrocarbons, which remain a core prerogative of national (not regional) policy. Second, sovereignty is still shared cautiously so supranational institutions are being built up slowly; key decisions work through parallel intergovernmental processes rather than empowered regional institutions. Fourth, GCC countries compete with each other in sectors that might otherwise offer scope for regional initiatives, such as finance, transport, and downstream energy. Fifth, public sectors in all member states are closely linked to the sharing of benefits from hydrocarbon wealth among nationals. This complicates the political economy of economic reform strategies such as privatization and subsidy reduction, which in turn limits the scope for regional integration in areas where the public sector is dominant. Besides ongoing integration mechanisms (particularly in infrastructure), addressing common challenges should impart further momentum to the GCC. However, a more empowered regional institution will be necessary to push this agenda forward.

Note, however, that the major contributions of this study should not divert our attention from a number of limitations, above all, the availability and comparability of data with regard to infrastructure variables in all member states (especially port efficiency variable). In addition to the short time series data availability for some variables, missing observations for other variables weaken the results and make the estimation method more complex. Hence, empirical research on intra-GCC trade integration requires further development of adequate data sets for the purpose of further systematic study.

Considering these limitations, we make a case here for a differentiated approach of trade integration framework when including all member states of the GCC countries. By presenting a systematic approach for the analysis of what we call intra-trade integration, we conclude that the integration among GCC countries can, under certain circumstances, be a prospective development strategy that provides opportunities for a sustainable development process in these countries. Future research should analyze to what extent intra-regional heterogeneity and hierarchical economic structures (in particular institutions) between the integrating countries may contribute to the success of other regional integrations (e.g. monetary, financial).

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