

Arab Trade Integration: Evidence from Zero-Inflated Negative Binomial Model

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New light is shed on the effectiveness of major Arab Regional Trade Agreements, i.e. GAFTA, AMU, GCC and AGADIR. We use an extended trade data for the years 1997 and 2008 and estimate the gravity equation in its multiplicative form using a Zero-Inflated Negative Binomial model. Results indicate that export and import patterns are comparable. Specific effects to regional integration are disappointing except for GAFTA found to be trade-enhancing to some extent, while GCC, AMU and AGADIR trade gains are not relevant. This can be explained by oil dominance, by persistent barriers and by increasing trade flows towards APEC countries.

1. Introduction

Arab intraregional trade has long been too weak in spite of all undertaken efforts to improve its trend. Indeed, to this end Arab countries have embarked upon liberalizing their trade regime through a complicated web of trade agreements involving bilateral, sub-regional and regional preferential trade agreements. Most important agreements are AMU (Arab Maghreb Union)¹, GCC (Gulf Cooperation Council)², AGADIR 2004 Agreement³, and GAFTA (Greater Arab Free Trade Area)^{4,5}.

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¹ Launched in 1989 between Mauritania, Morocco, Algeria, Tunisia and Libya.

² Launched in 1981 between Saudi Arabia, Kuwait, Oman, Qatar, UAE and Bahrain.

³ Launched in 2004 between Egypt, Jordan, Morocco and Tunisia. It is seen as the first building block of the Europe-Mediterranean Free Trade Area by 2010.

⁴ Launched in 1997 between Jordan, UAE, Bahrain, Tunisia, Saudi Arabia, Syria, Oman, Qatar, Kuwait, Lebanon, Libya, Egypt, Morocco, Yemen, Iraq, Palestine and Sudan. In 2005, Algeria was accepted into the GAFTA.

The latter is a pact adopted in 1997 by 17 Arab countries that agreed on a progressive elimination of trade barriers. GAFTA aims to promote regional trade and achieve a complete Arab economic bloc that can compete internationally in a world where globalization and regionalization live side by side since most countries both industrialized and emerging achieved powerful Regional Trade Agreements (RTAs such as EU, NAFTA, APEC and ASEAN among others) while being members of the World Trade Organization (WTO),

GAFTA has been in force since January 1st, 1998, and reached full trade liberalization of goods as of January 1st 2005 through the full exemption of customs duties and charges having equivalent effect between all Arab countries members of the GAFTA. In order to overcome previous mistakes the Economic and Social Council of the Arab League designed gradual decreasing of tariffs and similar impacts' taxes (by 10% annually and by 20% since 2003) that are imposed on agricultural-animal production, minerals and metals, semi-manufactured products that are mentioned in the approved list of the council, and other manufactured products. Likewise, AGADIR Agreement comes into force in March 2007. This agreement remains open to other Arab countries being linked to the EU in order to facilitate integration between Arab countries and the EU under the EU-Mediterranean integration process. GCC significantly evolved in the few last years to become a customs union in 2003 and a common market in 2007. In the contrary, UMA agreement acquired no progress since its launch in 1989. Therefore, undertaking to quantitatively evaluate Arab trade integration is a crucial feature from policymakers and managers point of views.

Few attempts tried to quantitatively evaluate Arab trade integration trade. Outwards the bulk of descriptive studies (Sekouti 1999, Tahir 1999, Zarrouk 2000, Hadhri 2001, Al Atrach and Youssef 2000, Maamri 2004, Bayar 2005, Galal and Hoekman 2003, among others), Bousseta (2004) and Achy (2006) focused on trade in Maghreb

⁵ Agreements previous to GAFTA include:

- Agreement of facilitating intra trade and crossing borders in 1953,
- Agreement of Arab Economic Unity in 1957,
- Agreement of Arab common market in 1964 which aimed to encourage gradual, reduction of tariffs for all Arab commodities accompanied with free movement for people, services, products and capitals,
- Agreement of facilitating and promoting Arab intra trade in 1981.

countries, while Limam and Abdalla (1998), Al-Obaidan (2000), Ruzita et al. (2005), Neaime (2005), Abedini and Péridy (2006), Iqbal and Nabli (2007), Yu-Feng and Abdelaziz (2009) and Harb (2009) considered trade integration in the whole region. Babili and Baghasa (2008) investigated GAFTA impacts on Syrian trade after its full implementation. Bhattacharya and Wolde (2010) studied the constraints on the trade in the region.

Most of these studies have come to the conclusion that Arab trade agreements have failed to live up to expectations that were raised by their launch. Nonetheless, it is difficult to draw a strong conclusion because most of these studies rely on data prior to their year of entry into effect, i.e., 2005 and 2007 respectively for GAFTA and AGADIR, which makes it difficult to accurately assess the effectiveness of trade integration in the region. In addition, most of these studies focused on Arab Trade Agreements performance solely upon progress of exports flows.

The present paper tries to overcome these drawbacks by looking at Arab intraregional trade trends and determinants as well as GAFTA, AMU, GCC and AGADIR Agreements effectiveness. We use a consistent database of exports and imports flows and a host of explanatory variables over 1997 and 2008 years. Trade flows cover exports and imports flows of 20 Arab countries as well as 77 partners accounting for more than 90% of their trade flows. Moreover, the paper addresses the problem of oil dominance due to oil trade flows collected from COMTRADE. On the other hand, the paper follows the recent developments initiated by Santos Silva and Tenreyro (2006) by estimating the gravity equation in its multiplicative form by using the Zero-Inflated Negative Binomial model suggested by Burger et al. (2009). This robust alternative to OLS and other panel regressions allows tackling the inconsistency of the traditional loglinearized gravity equation in presence of over-dispersion and high frequency of zeroes.

The paper is organized as follows. Section 2 provides a brief discussion of trade trends in Arab countries over 1997-2008 period. Section 3 presents the augmented gravity model. Results are discussed in section 4. Section 5 concludes the paper.

2. Arab Trade Trends

The global trade flows witnessed a rapid surge over the past twenty years reaching 16.05 trillion\$ and 16.7 trillion\$ in 2008 in terms of exports and imports respectively (Table 1) (the difference is often explained by different valuation methods, exports being generally reported on a Free on Board (FOB) basis while imports are generally reported on the basis of Cost, Insurance and Freight (CIF), That's why import values tend to be higher than export values), This represents more than 190% and 198% of increase when compared to trade flows in 1997. Arab region trade flows increased from 0.177 trillion\$ in 1997 to 0.886 trillion\$ in 2008 in terms of exports and from 0.137 trillion\$ to 0.667 trillion\$ in terms of imports for the same period, which means 400% and 386% of increase over the period. Although these increases are greater than those of the global flows, they remain very limited as their proportion of global trade flows do not exceed 5.6% and 4% in terms of exports and imports, respectively. It is noteworthy that these proportions fall to 1.5% and 4.5% if we exclude oil accounting for 77.4% of Arab exports and 6.8% of their imports. Further evidence is given by looking at the annualized growth rates of global and Arab trade flows. Thus, Arab exports and imports growth rates are slightly greater than those of the global flows, even after excluding oil. In fact, exports and imports annual growth rates over the period are 12.4% and 15.1% when excluding oil. Nonetheless, as stated previously, Arab countries failed to significantly increase their proportion in global trade, likely because of their lagging industrialization and their excess reliance on resource based commodities. As pointed by Iqbel and Nabli (2007) "*the MENA region has lagged most other regions of the world in both development outcomes and international integration (such as trade and foreign investment)*".

When it comes to exports destinations and imports sources, countries belonging to APEC⁶, NAFTA⁷ and EU15⁸ blocks represent the main

⁶ Asia-Pacific Economic Cooperation including Australia, Brunai, Canada, Chile, China, Hon Kong, Indonesia, Japan, Korea, Malaysia, Mexico, New Zeland, Papua New Guinea, Peru, Phillipines, Russia, Singapore, Chinese Taipei, Thailand, USA, VietNam.

⁷ North America Free Trade Area including USA, Mexico and Canada.

⁸ EU15 including Austria, Belgium, Greece, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK.

trade partners for the region, notwithstanding the decrease of trade flows with EU countries in favor to APEC countries, while trade flows with NAFTA remain modest. Arab intraregional trade flows remain far behind not exceeding 9% and 12% in terms of exports and imports in 2008. Unfortunately, data regarding oil flows' details being unavailable for most of the Arab countries for 1997 and 2008 years make it impossible to assess Arab intraregional ratios when oil is excluded. According to UN-ESCWA, 2008 Arab intra exports when excluding oil is almost 17.7% in 2007.

Likewise, mainly two facts raise when looking at the bottom part of the Table 1. Firstly, GAFTA, UMA, GCC and AGADIR blocks failed to significantly expand their trade, overwhelmingly relying on oil especially for GCC countries. Secondly, the share of intra-block trade remains far behind those achieved by other trade blocks (67%, 65% and 49% in EU⁹, APEC and NAFTA in 2008 respectively), Nonetheless, AGADIR countries appear as the most integrated despite its recent launch. At the opposite, GCC show the least integrated countries, while GAFTA and UMA show moderate integration rates. It is noteworthy that ARAB and GAFTA countries have slightly similar intraregional trade rates albeit GAFTA comprises only 17 countries from the 20 under study (excluding Iraq and Palestine), This means that trade flows from or to Comoros, Somalia and Mauritania, not being members in GAFTA, are almost insignificant.

Overall, despite the pessimistic findings regarding the incapability of Arab countries to significantly benefit from the surge of global trade flows either to increase their share in international trade nor to enhance their intraregional trade, intraregional trade can be seen as a good advocate of strategic and potential economic development and stability. Therefore, increasing trade integration leads to a need to explain more precisely the factors preventing GAFTA, and the other regional agreements AMU, GCC and AGADIR, from expanding trade to a wider scale. The next sections try to bring more light on Arab trade flows drivers due to the augmented gravity model.

⁹ EU15 plus Bulgaria, Cyprus, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

Table 1: Arab Trade Flows Destinations and Sources for 1997-2008
(million US dollars)

	Exports			Imports		
	1997	2008	GR*	1997	2008	GR*
Total World Trade Flows	5530795	16058845	10.2%	5605744	16709050	10.4%
Oil Trade Flows	441817	2705378	17.9%	465825	2820693	17.8%
Excluding Oil	5088978	13353466	9.2%	5139919	13888356	9.5%
Total ARAB trade flows to World	177206	886297	15.8%	137363	667099	15.4%
Oil Trade Flows	121719	686064	17.0%	4844	45240	22.5%
in %	68.7%	77.4%		3.5%	6.8%	
Excluding Oil	55486	200232	12.4%	132518	621859	15.1%
Share of ARAB to Total World Trade	3.20%	5.52%		2.45%	3.99%	
Share of ARAB to Total World Trade excluding Oil	1.09%	1.50%		2.58%	4.48%	
Intra ARAB Trade Flows	14644	76298	16.2%	13495	79859	17.5%
Share of Intra ARAB Trade flows	8.26%	8.61%		9.82%	11.97%	
Share of ARAB Trade flows to EU15	24.49%	19.43%		39.04%	32.08%	
Share of ARAB Trade flows to NAFTA	9.25%	11.40%		13.41%	9.24%	
Share of ARAB Trade flows to APEC	45.48%	51.69%		32.14%	36.44%	
Total GAFTA trade flows to World	176414	883074		135982	660993	
Share of GAFTA to Total World Trade	3.19%	5.50%		2.43%	3.96%	
Share of GAFTA to Total World Trade excluding Oil	1.08%	1.48%		2.55%	4.44%	
Share of Intra GAFTA Trade flows	8.18%	8.51%		9.80%	11.95%	
Total UMA trade flows to World	34724	175060		32739	129990	
Share of UMA to Total World Trade	0.63%	1.09%		0.58%	0.78%	
Share of UMA to Total World Trade excluding Oil	0.26%	0.42%		0.59%	0.84%	
Share of Intra UMA Trade flows	5.22%	5.27%		4.36%	6.25%	
Total GCC trade flows to World	125988	630803		71803	385823	
Share of GCC to Total World Trade	2.28%	3.93%		1.28%	2.31%	
Share of GCC to Total World Trade excluding Oil	0.64%	0.73%		1.39%	2.71%	
Share of Intra GCC Trade flows	1.90%	2.36%		1.20%	1.63%	
Total AGADIR trade flows to World	16132	73185		35118	145487	
Share of AGADIR to Total World Trade	0.29%	0.46%		0.63%	0.87%	
Share of AGADIR to Total World Trade excluding Oil	0.27%	0.43%		0.63%	0.89%	
Share of Intra AGADIR Trade flows	17.86%	11.68%		11.90%	8.90%	

Note: * Annualized growth rate.

3. Suggested Gravity Model

The analysis of trade relationships amongst countries involves a complex system of geo-economic entities and their relations. The theoretical bases of gravity models were largely developed and rest on the law of Newton, used as well by geographers as by economists (Camagny, 1996). The gravity model of trade in international economics predicts bilateral trade flows (F_{ij} which can be exports or imports flows) based on the economic sizes (often using GDP measurements, i.e., Y_i, Y_j) and distance between two countries (Dis_{ij}). The basic form of the gravity equation can be written as $F_{ij} = \alpha_0 Y_i^{\alpha_1} Y_j^{\alpha_2} Dis_{ij}^{\alpha_3}$ (where i and j are reporter and partner countries respectively). The model being initially introduced in economics by Izard (1954) and Tinbergen (1962) and first tested by Pöyhönen (1963) and Linnemann (1966),

Many authors using the gravity model has also sought to evaluate the impact of various variables in addition to the basic gravity equation. Among these, income level (GDP per capita), price levels, language relationships, tariffs, contiguity, colonial history, exchange rates, institutional quality and macroeconomic environment. The model has also been used in international relations to evaluate the impact of agreements on trade. Specifically, trade flows between two countries should increase with their real GDPs (gravity variable), since large countries should trade more than small ones, and with per capita incomes, since rich countries should trade more than poor ones. It should diminish with geographical distance increasing transportation and information costs. Dummy variables are added to account for common language, border or participating in trade agreements. A positive coefficient on the dummy variable means that two countries trade more with one another than predicted by their incomes and distance, indicating that being part of the same trade agreement is trade-enhancing for its members.

Despite its popularity, the gravity model has been widely criticized for a long time because of its lack of theoretical foundations (Leamer, 1994 and Polak, 1996). Recently, Evenett and Keller (2002) by addressing the so called 'model identification' find a robust evidence that an Increasing Returns to Scale based trade theory largely explains why gravity model

fits trade flows. This result is in line with the contributions of Anderson (1979), Helpman (1987), Leamer (1992) and Eaton and Kortum (2002) among others leading to the conviction that the prediction of the gravity model can be derived from theories based on different foundations, including endowment and technological differences, increasing returns to scale, and Armington demands.

On the empirical side, Polak (1996), Matyas (1997, 1998), Egger (2000, 2002) and Cheng and Wall (2002) are concerned with the appropriate specification of gravity equation. Fik and Mulligan (1998) question the appropriateness of log-linear specification of gravity models. Pirotte (1999) and Egger (2002) think that attention should also be paid to the association of different estimators with short-term and long-term time horizons. More recently, Santos Silva and Tenreyro (2006) explain that the loglinearized gravity equation leads to inconsistent and biased estimates because of the Jensen's inequality, i.e., $E(\ln y) \neq \ln E(y)$, which is likely to hold in presence of heteroskedasticity characterizing trade data. In addition, the existence of zero bilateral trade flows pose an additional problem to the use of loglinearized gravity equation even after using the inverse hyperbolic sine transformation (originally introduced by Johnston (1949)), To address these problems Santos Silva and Tenreyro (2006) suggest estimating the gravity equation in its multiplicative form by using a Poisson Pseudo Maximum Likelihood technique, hereinafter PPML. A second alternative to account for the high prevalence of zero trade flows and the asymmetry in bilateral trade flows between country pairs is the sample selection approach proposed by Helpman, Melitz and Rubinstein (2008), This approach is a two-stage estimation procedure. The first stage uses a probit regression to account for the probability that country j exports to country i . The second stage estimates a loglinearized gravity equation. According to Santos Silva and Tenreyro (2009) it seems that the assumptions needed for the estimation of the Helpman, Melitz and Rubinstein (2008) model are too strong to make it practical.

Likewise, the PPML, despite being accepted as a viable alternative for loglinearized gravity model and widely adopted (see among others Westerlund and Wilhelmsson (2007), Hebble, Shepherd and Wilson (2007)), has been criticized for its restrictive assumption of equi-dispersion while trade data often exhibit over-dispersion and excess zeroes. Burger et al. (2009) extend the empirical model initiated by

Santos Silva and Tenreyro (2006) by suggesting overcoming the drawbacks of PPML by using the Zero-Inflated Negative Binomial or Zero-Inflated Poisson regressions. The Negative binomial regression being able to model count data with over-dispersion, while Zero-inflated regressions address the issue of excess zeroes in their own rights. By comparing several modelling strategies for count data they have found out that zero-inflated negative binomial or zero-inflated poisson models outperform standard negative binomial or poisson models in presence of over-dispersion and high frequency of zeroes. This concurs with previous work as Martin and Pham (2008) and Liu and Cela (2008), .

Following Burger et al. (2009), the present paper implements zero-inflated negative binomial regressions, hereinafter ZINB, to estimate the determinants of the Arab countries exports and imports flows. In addition to the three variables discussed previously in the basic multiplicative gravity equation, further explanatory variables were added. Thus, we use GDP per capita_i and GDP per capita_j to account for the purchase power in reporter and partner countries. Furthermore, dummy variables are used to take into account the common border and the common colonisation history. In order, to evaluate the role of the Arab trade agreements we add four dummies relative to GAFTA, GCC, UMA and AGADIR in addition to three trade partner blocks, i.e., EU15, NAFTA and APEC. These different dummies allow us to measure the relative importance of each block in terms of trade flows. Finally, trade complementarity scores are used in order to assess how well Arab countries exports fit with partners' imports.

4. Data and Empirical Results

4.1. Highlights from the Data

Trade data come from IMF, Direction of Trade statistics, 2010 edition. Hydrocarbon flows used to calculate 'trade flows excluding oil' are extracted from The World Bank's WITS system. The remaining data were collected from various datasets as described in Table 2. The data include 20 Arab countries in addition to 77 trade partners for the years 1997 and 2008. These benchmark periods were chosen so as to evaluate the latest changes in Arab countries trade flows after full entry into force of the trade agreements under study. The list of the countries is reported

in Appendix A. Thus, the number of observations is 1940 for each year (20 Arab countries \times 97 partner countries including the 20 Arab countries),

Table 2: Data sources

Variables	Dataset used
Trade flows	Direction of Trade Statistics, IMF, 2010 edition
Hydrocarbon trade flows	COMTRADE, through WITS system.
GDP and GDP per capita	World bank and IMF
Distance, border, colonisation and language	CEPII
Trade Complementarity index	Author's calculations

Selected summary statistics of the variables are reported in Table 3. It is worth emphasizing that Arab countries are very heterogeneous regarding market size. In terms of GDP, Saudi Arabia accounts for more than 25% of the total GDP of the region. Likewise, GCC countries account for more than 70% of the total GDP and thus have the highest income level while most of the other Arab countries still have lower middle income level and even less than that in Comoros, Djibouti, Somalia and Mauritania. Likewise, Saudi Arabia accounts for more than 30% of the exports of the region in 2008. Saudi Arabia, UAE, Algeria, Kuwait, Libya and Qatar account for almost 80% of the exports. In terms of imports, UAE stands first with almost 30%. UAE, Saudi Arabia, Egypt, Algeria and Morocco account for 66% of the region's imports.

Trade complementarity index¹⁰ is added to show how well Arab countries exports fit with partners' imports. Trade complementarity

¹⁰ Obtained by using the following

$$\text{formula: } TCI_{ij} = 1 - \left(\sum_k \left| \frac{M_j^k}{M_j} - \frac{X_i^k}{X_i} \right| \right) / 2 ; (0 \leq TCI_{ij} \leq 1).$$

Where i is an exporting country, j is an importing country, and k represents goods categories. This index takes the value of one when a composition of import needs in an importing country matches perfectly with the export bundle of an exporting country. Inversely, this index is equal to zero when an export bundle of an exporting country has no relevance to the import needs of an importing country. The indices are computed based on the United Nations/COMTRADE bilateral trade flow data at the SITC two-digit level.

scores varies widely from a minimum of 0.02 to a maximum of 0.88. Appendix B reports only Arab countries scores. Their exports fit moderately with their imports since the average is about 0.35. This concurs with Arab trade structure as described by the Arab Economic Report 2006 emphasizing that Arab region mainly exports Oil (73.4% in 2005) followed by Manufactures, Machinery and transport equipment and Food and drinks in addition to other goods (with 13.2%, 3.4% and 3% respectively in 2005), Inversely, Arab countries imports are dominated by Manufactures, Machinery and transport equipment and Food and drinks (37.7%, 26.3% and 14% respectively in 2005),

4.2. Results and Discussion

Table 4 and Table 5 report the estimation outcomes resulting from ZINB regressions applied to the multiplicative form of the gravity equation as stated previously. Precisely, Table 4 reports estimation outcomes using exports flows as the dependant variable for years 1997 and 2008. While, Table 5 reports estimation outcomes using imports as the dependant variable for years 1997 and 2008. For comparison, exports and imports excluding oil are then used as dependant variables. Their estimation outcomes are added to Tables 4 and 5 respectively. It is worth pointing out that oil trade flows are unavailable in COMTRADE data base for several Arab countries and for several years. Hence, for the year 1997, Bahrain, Comoros, Djibouti, Kuwait, Libya, Mauritania, Qatar, Saudi Arabia, Somalia, Syria, UAE and Yemen are excluded, limiting the number of observations to 776. In 2008, only Bahrain, Comoros, Djibouti, Kuwait, Libya, Mauritania, Saudi Arabia, Somalia and Syria are excluded, which leads to 1076 observations.

As expected, the basic gravity specification works well since reporter and partner countries market size as expressed by GDP are found to be trade-enhancing while distance is found to be trade-inhibiting. All variables are significant at 1% level. GDP per capita of reporter countries are export-enhancing while GDP per capita of partners plays no role or a negative role on trade. As found by Santos Silva and

Table 3: Summary statistics

	Mean	Maximum	Minimum	Std. Dev.	Obs.
Exports 1997 (million US dollars)	82.2	11190.4	0	517.1	1940
Exports 2008(million US dollars)	409.2	51823.1	0	2452.9	1940
Imports 1997(million US dollars)	66.6	6391.7	0	263.2	1940
Imports 2008(million US dollars)	334.4	25313.4	0	1283.3	1940
Exports excluding oil 1997 (million US dollars)	20.9	1478.7	0	98.177	776
Exports excluding oil 2008 (million US dollars)	183.8	14377.8	0	824.1	1067
Imports excluding oil 1997 (million US dollars)	65.2	2265.8	0	196.1	776
Imports excluding oil 2008 (million US dollars)	399.5	25299.7	0	1497.9	1067
Reporter's GDP 1997 (million US dollars)	27533.0	164993.9	212.1	37170.8	1940
Reporter's GDP 2008 (million US dollars)	90558.4	468800.3	530.1	109897.7	1940
Reporter's GDP per capita 1997(thousand US dollars)	5.131	20.494	0.360	6.3	1940
Reporter's GDP per capita 2008 (thousand US dollars)	15.434	79.870	0.491	22.3	1940
Partner's GDP 1997 (million US dollars)	299815.0	8250900.0	212.1	972465.1	1940
Partner's GDP 2008 (million US dollars)	601117.2	14093310.0	429.6	1636280.0	1940
Partner's GDP per capita 1997 (thousand US dollars)	8.544	37.328	0.185	10.5	1940
Partner's GDP per capita 2008 (thousand US dollars)	18.316	94.759	0.252	21.3	1940
Distance (kilometer)	5205.9	18953.2	85.9	3303.1	1940
Border	0.02	1	0	0.15	1940
Language	0.26	1	0	0.44	1940
Colonizer	0.15	1	0	0.36	1940
GAFTA	0.13	1	0	0.34	1940
GCC	0.02	1	0	0.12	1940
UMA	0.01	1	0	0.10	1940
AGADIR	0.01	1	0	0.08	1940
EU15	0.14	1	0	0.35	1940
NAFTA	0.03	1	0	0.17	1940
APEC	0.18	1	0	0.38	1940
Trade Complementarity index 1997	0.36	0.88	0.03	0.2	1940
Trade Complementarity index 2008	0.39	0.88	0.02	0.2	1940

Tenreyro (2006) the coefficients generated by Poisson estimates are oftentimes smaller than those commonly generated by OLS. Thus, this finding contradicts with the widely accepted proportional relationship between trade and GDP.

Furthermore, common colonizer dummy is shown to affect trade flows. Its coefficient is generally larger before excluding oil from exports flows and the opposite when it comes to imports. Similarly, common border is largely trade-enhancing when explaining exports and imports flows including oil. This effect surprisingly disappears after excluding oil, indicating that Arab countries do not benefit from contiguity. Common language is dropped since it is highly correlated to GAFTA dummy (see Appendix C reporting correlation matrix),

As for the dummies representing the four Arab blocks, the results are to the least disappointing except for GAFTA. In 1997, GAFTA coefficient is not significant neither in explaining exports nor in explaining imports then becomes positive and weakly significant in 2008. When oil is excluded from exports flows, GAFTA coefficient becomes substantial (around 1 and 0.9 in 1997 and 2008, respectively) and significant at 1% level. This means that GAFTA did help its members to reap benefits from the agreement since 1997. This effect is substantial when we count for exports apart from oil. Regarding imports flows, GAFTA coefficient is only significant in 2008. Its magnitude has roughly doubled since 1997. This means that imports flows patterns between GAFTA members have improved after the entry into force of GAFTA as well. Therefore, this result contradicts with many previous pessimistic findings but remains below the expectations raised by the launch of GAFTA by Arab countries, as shown when GAFTA results are compared with APEC coefficient estimates. In fact, the coefficient of APEC dummy exceeds 2 in 2008 while GAFTA dummy coefficient do not exceed 0,29 and 0,9 in 2008 before and after excluding oil respectively.

Contrarily, AMU dummy coefficient becomes negative and significant at 1% in 2008. When oil is excluded, its coefficient turns positive but not significant when we look for exports flows and negative and significant when we look to imports flows, which shows its failure to create a significant incremental effect on trade between Maghreb countries. Likely, as for GCC dummy, coefficients are oftentimes

negative and not significant before and after excluding oil. Only in 2008 coefficients are substantially negative and significant revealing the failure of GCC to have an incremental effect on trade despite the launch of the customs union in 2003 and a common market in 2007. These results are to be taken with caution since numerous countries have been removed for unavailable oil flows as stated previously. For example, Saudi Arabia and Bahrain are well integrated since the opening of the King Fahd Causeway, both countries being excluded from regressions ran in the right side of Tables 4 and 5.

Looking at AGADIR dummy, the coefficient estimates are everywhere positive when using exports flows as dependant variable, even though not significant except in 1997. In contrary, the coefficient is oftentimes negative and not significant when imports flows are used as dependant variable. This result is even more disappointing because of the higher inherent trade complementarity between Tunisia, Egypt, Jordan and Morocco than in the other groups. Indeed, complementarity index is, on average, much higher through AGADIR countries (0.67) than in other Arab countries groups (0.35, 0.34, 0.47 and 0.23, for Arab, GAFTA, UMA and GCC groups respectively) once again because of the heavy reliance on oil production and exports in many Arab countries. With this regard, Trade complementarity index plays a significant substantial positive effect only when oil is excluded, as reported in Table 4. Then, one would expect higher trade complementarity within AGADIR countries to make it much easier and prompt to reap benefits from the trade agreement. Though, as said previously, AGADIR agreement is not yet effective indicating that large exports similarity coupled with low levels of trade complementarity are not the only reasons why Arab countries have so far failed to effectively expand their intraregional trade, as stated in previous empirical research.

One key factor underlying this failure is that Arab countries trade with each other less than with many other developed or developing countries as picked up by the substantial positive and significant coefficient of APEC dummy, either before or after excluding oil from exports or imports point of view. The story about EU15 and NAFTA is quite different. Exports towards EU countries are positive and significant only in 2008 and after excluding oil in 1997, while imports are not significant everywhere. Regarding NAFTA, exports and imports coefficients are negative and significant everywhere, indicating that trade with North

American countries is not active at all. One explanation, the most obvious, is that North African countries trade historically widely with Europe, because of different colonial history and trade cost, while Middle Eastern countries trade more with North America and increasingly with Asian countries (In table 4, EU coefficient falls from 0.491 in 1997 to 0.086 in 2008 given that Qatar and UAE are added to the countries list),

Other deterring factors that hamper integration have been cited. Many argue that lagging industrialization, slow structural transformation and weak private sector are the most important disabilities preventing Arab countries from expanding trade (Abdmoula and Laabas, 2010), Furthermore, Bhattacharya and Wolde (2010) find that transport constraints and inefficiencies in customs clearance processes are important in explaining the region's underperformance in trade. This is consistent with the tangible barriers introduced by Andersen and Van Wincoop (2004) and Linders et al. (2008), Besides, other intangible barriers (incomplete information, and institutional barriers for example) as identified by these authors would inhibit trade between Arab countries, likely to a larger extent, as discussed in Saidi (2003) and Ruzita et al. (2005), This deserves to be studied in future research.

Table 4: Determinants of Arab countries Exports flows

	Exports		Exports Excluding Oil	
	1997	2008	1997	2008
GDP of reporter country	0.803*	0.863*	0.415*	1.126*
	(0.055)	(0.051)	(0.111)	(0.089)
GDP of partner country	0.892*	0.900*	0.796*	0.824*
	(0.050)	(0.045)	(0.066)	(0.048)
GDP per capita of reporter country	0.255*	0.209*	0.428*	0.277*
	(0.068)	(0.057)	(0.116)	(0.060)
GDP per capita of partner country	-0.124***	-0.300*	-0.215*	-0.321*
	(0.067)	(0.055)	(0.079)	(0.055)
Log Distance	-1.603*	-1.565*	-0.863*	-1.228*
	(0.131)	(0.122)	(0.145)	(0.133)
Common Colonizer dummy	1.087*	1.041*	0.866*	0.705*
	(0.233)	(0.200)	(0.235)	(0.175)
Common Border dummy	2.178*	2.883*	0.496**	0.504***
	(0.766)	(0.934)	(0.320)	(0.270)
GAFTA	-0.067	0.297***	1.019*	0.919*
	(0.184)	(0.177)	(0.183)	(0.222)
AMU	-0.163	-0.933**	0.571	0.199
	(0.528)	(0.457)	(0.442)	(0.366)
GCC	-0.789	-1.041**	0.576	-0.410
	(0.527)	(0.479)	(0.610)	(0.380)
AGADIR	1.239**	0.136	0.425	-0.744
	(0.644)	(0.266)	(0.559)	(0.305)
EU15	-0.240	0.415***	0.491***	0.086
	(0.259)	(0.241)	(0.263)	(0.252)
NAFTA	-1.893*	-1.254*	-1.060**	-0.990**
	(0.319)	(0.366)	(0.475)	(0.458)
APEC	1.832*	2.249*	0.728**	2.047*
	(0.265)	(0.248)	(0.320)	(0.321)
Trade Complementarity	-1.102*	-0.184	1.075***	2.231*
	(0.359)	(0.325)	(0.623)	(0.403)
Constant	4.197*	4.135*	0.769	-2.631
	(1.459)	(1.300)	(2.057)	(1.664)
Number of obs.	1940	1940	776	1067
Nonzero obs.	1308	1537	632	872
Zero obs.	632	403	144	195
Wald chi2 (16)	1054.67	1498.02	439.42	983.50
Prob > chi2	0.000	0.000	0.000	0.000

Note: Reporter countries are the 20 Arab countries while the partner countries are the 97 countries including the 20 Arab countries. Robust standard errors in parentheses. * significant at 1%; ** significant at 5% and *** significant at 10%.

Table 5: Determinants of Arab countries Imports flows

	Imports		Imports Excluding Oil	
	1997	2008	1997	2008
GDP of reporter country	0.622*	0.636*	0.685*	0.917*
	(0.037)	(0.042)	(0.073)	(0.089)
GDP of partner country	0.830*	0.943*	0.955*	0.961*
	(0.041)	(0.040)	(0.045)	(0.046)
GDP per capita of reporter country	0.028	0.004	0.167*	0.042
	(0.041)	(0.040)	(0.072)	(0.048)
GDP per capita of partner country	0.019	-0.027	0.094***	-0.068
	(0.044)	(0.046)	(0.050)	(0.053)
Distance	-1.042*	-1.171*	-0.854*	-0.952*
	(0.107)	(0.088)	(0.087)	(0.110)
Common Colonizer dummy	0.572*	0.479*	1.584*	0.830*
	(0.155)	(0.169)	(0.222)	(0.231)
Common Border dummy	1.843*	2.847*	1.377**	0.336
	(0.654)	(0.905)	(0.611)	(0.258)
GAFTA	0.076	0.285***	0.012	0.509*
	(0.168)	(0.154)	(0.178)	(0.179)
AMU	-0.264	-0.831**	-1.314*	-0.699**
	(0.349)	(0.396)	(0.437)	(0.311)
GCC	-0.239	-0.908**	0.240	-0.311
	(0.416)	(0.434)	(0.500)	(0.507)
AGADIR	-0.221	-0.059	0.294	-0.080
	(0.221)	(0.254)	(0.222)	(0.240)
EU	0.029	-0.125	-0.237	0.258
	(0.137)	(0.152)	(0.177)	(0.162)
NAFTA	-0.623*	-1.322*	-0.894*	-1.310*
	(0.185)	(0.200)	(0.258)	(0.212)
APEC	0.698*	1.028*	0.278***	1.080*
	(0.153)	(0.132)	(0.174)	(0.152)
Constant	2.672*	2.793*	-2.719**	-2.553**
	(0.973)	(0.875)	(1.283)	(1.296)
Number of obs.	1940	1940	776	1067
Nonzero obs.	1390	1603	663	927
Zero obs.	550	337	113	140
Wald chi2 (16)	1191.42	1183.03	1152.37	1007.07
Prob > chi2	0.000	0.000	0.000	0.000

Note: Reporter countries are the 20 Arab countries while the partner countries are the 97 countries including the 20 Arab countries. Robust standard errors in parentheses. * significant at 1%; ** significant at 5% and *** significant at 10%.

5. Conclusion and Recommendations

This paper addresses the many drawbacks of previous research concerned with Arab trade integration regarding data and econometric method. First, exports and imports flows are used for the years 1997 and 2008, allowing us to account for the relevance of Arab Trade agreements under study, i.e., GAFTA, AMU, GCC and AGADIR, fairly after their entry into force. Besides, oil trade flows of many Arab countries collected from COMTRADE allowed addressing the problem of trade dependence on oil. Most importantly, the paper is in line with Santos Silva and Tenreyro (2006) and Burger et al. (2009) as it addresses the problem laid by the traditional loglinearized gravity equation in presence of over-dispersion and high frequency of zeroes by estimating the gravity equation in its multiplicative form by using a Zero-Inflated Negative Binomial model.

There are many pieces of evidence resulting from the analysis. First, standard market size and distance are shown to affect trade regarding intuition. Their coefficients are found to be systematically smaller than those commonly obtained using the loglinearized form. Furthermore, common colonizer and border are shown to be trade-enhancing. The outcomes regarding Arab trade agreements are to the least disappointing except for GAFTA. The regression coefficients regarding AMU, GCC and AGADIR dummies estimated using exports or imports flows as dependent variables are oftentimes negative and/or not significant either in the years 1997 or in 2008, proving that these agreements are not effective so far. This is contrary to the results obtained regarding GAFTA dummy's coefficient, which becomes positive and significant in 2008 and even substantial after excluding oil from exports and imports flows. This result contradicts with many previous pessimistic findings but remains below the expectations raised by the launch of GAFTA by Arab countries.

Furthermore, trade complementarity index is found to have a substantial effect on trade only when oil is excluded. Although, higher trade complementarity between AGADIR members were not found to reap benefits from the AGADIR agreement, proving that large exports similarity through Arab countries coupled with low levels of trade complementarity are not the whole story in explaining the failure of these countries in expanding the intraregional share of trade, as stated in

previous empirical research. One key feature underlying this failure is that Arab countries trade with each other less than with many other developed or developing countries particularly towards APEC countries. Moreover, tangible and intangible trade barriers between Arab countries are crucial deterring factors preventing the region from expanding intraregional trade.

These findings suggest that Arab countries could boost intraregional trade first by diversifying exports from oil dominance and secondly by promoting local products in other Arab countries and thus reap effective benefits from proximity and advantages ensured by these different Agreements. Furthermore, efforts have to be undertaken in order to unify visions and efforts regarding the regional integration project, as well as removing the remaining barriers on intraregional trade by developing infrastructure of means of transport and telecommunications in order to foster and facilitate movements of goods, services, labour as well as capital.

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Appendix A: List of countries

Algeria	Egypt, Arab Rep.	Madagascar	Slovenia
Angola	Finland	Malaysia	Somalia
Argentina	France	Malta	South Africa
Australia	Germany	Mauritania	Spain
Austria	Ghana	Mauritius	Sri Lanka
Azerbaijan	Greece	Mexico	Sudan
Bahrain	Guinea	Morocco	Sweden
Bangladesh	Guinea-Bissau	Netherlands	Switzerland
Belarus	Hong Kong SAR, China	New Zealand	Syrian Arab Republic
Belgium	Hungary	Niger	Tanzania
Benin	Iceland	Nigeria	Thailand
Brazil	India	Norway	Togo
Bulgaria	Indonesia	Oman	Tunisia
Cameroon	Iran, Islamic Rep.	Pakistan	Turkey
Canada	Ireland	Peru	Uganda
China	Italy	Philippines	Ukraine
Colombia	Japan	Poland	United Arab Emirates
Comoros	Jordan	Portugal	United Kingdom
Costa Rica	Kazakhstan	Qatar	United States
Cote d'Ivoire	Kenya	Romania	Vietnam
Croatia	Korea, Rep.	Russian Federation	Yemen, Rep.
Cyprus	Kuwait	Saudi Arabia	Zambia
Czech Republic	Lebanon	Senegal	Zimbabwe
Denmark	Libyan Arab Jamahiriya	Singapore	
Djibouti	Lithuania	Slovak Republic	

