Georges Harb* and Nora Abou Shady

Arab Trade Dynamics after the Implementation of the Pan Arab Free Trade Area (1998–2012)

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Abstract: With the entry into force of the Pan Arab Free Trade Area (PAFTA) in 2005, intra-Arab trade became tariff free, completing the trade liberalization process started in 1998. Making use of data covering the 1998–2012 period, we estimate the impact of PAFTA on intra-Arab trade in manufactured goods using a gravity model and applying panel data estimation techniques. Results suggest that PAFTA has increased intra-members' trade by nearly 20 %. We also examine potential changes in the trends of Arab countries' imports of manufactured goods from their main providers after the entry into force of PAFTA. In this respect, there is some evidence of an increase in Arab countries' imports from Asia from 2005 onwards, in relation to the 1998–2004 period.

Keywords: Pan Arab Free Trade Area, Arab trade, gravity model

1 Introduction

The year 2005 was important in the history of intra-Arab trade relations with the entry into force of the Pan Arab Free Trade Area (PAFTA) and the completion of the trade liberalization process between member countries that began in 1998. The phasing out of tariffs on intra-PAFTA trade as well as the endeavors undertaken to eliminate non-tariff barriers (NTBs) and simplify trade-related procedures were the crowning steps of a process that can be traced back to the 1950s. Strengthening intra-regional ties was concomitant to a series of policies implemented by several Arab countries that aimed at speeding up their insertion into the world economy. These encompassed implementing trade policy reforms, adhering to the World Trade Organization (WTO), and concluding trade agreements with extra-regional partners. Moreover, the liberalization of intra-Arab trade within PAFTA was accompanied with the rise of China on the global scene

***Corresponding author: Georges Harb,** Faculty of Business Administration and Economics, Notre Dame University, P.O. Box 72, Zouk Mikael, Zouk Mosbeh, Lebanon, E-mail: gharb@ndu.edu.lb
Nora Abou Shady, Faculty of Economics and Political Science, Cairo University, P.O. Box 12613, Al Orman, Giza, Egypt, E-mail: nora.aboushady@feps.edu.eg

as a key trading partner worldwide. As far as Arab countries are concerned, this was mainly reflected by the outstanding rise of the share of Asia in Arab imports throughout their intra-regional trade liberalization process.

Examining the effect that PAFTA has had on Arab trade dynamics is timely, especially after the full liberalization of intra-Arab trade. In this paper, we evaluate the impact that the full implementation of PAFTA had on intra-Arab trade in manufactured products using recent trade figures and applying a gravity analysis with panel data estimation techniques. Our findings suggest that PAFTA has had a positive and significant effect on intra-Arab trade. Our investigation also reveals that the implementation of PAFTA was accompanied with net trade creation: PAFTA' s imports of manufactured goods from nonmember countries increased in parallel to the increase in intra-regional imports. Our results should be particularly narrating given that this estimation of the impact of PAFTA on intra-Arab trade covers a relatively long period following the entry into force of the agreement.

We also use the gravity framework to examine the dynamics of the imports of manufactured goods of PAFTA members from the European Union (EU)-27 and Asia–Arab countries' main trading partners – during the intra-Arab trade liberalization process. Results suggest that there has been an important change in the dynamics of Arab imports from Asia after 2005, with a substantial increase in imports originating from the latter.

The rest of the paper is structured as follows: Section 2 describes the recent trends in Arab trade relations, both intra-regionally and extra-regionally, in terms of manufactured and agricultural goods. Section 3 reviews some of the empirical papers that examined Arab trade as well as PAFTA's impact on the latter applying gravity analysis. Section 4 presents the methodology and the data used. Results are presented in Section 5. A discussion of the implications of our main findings is provided in Section 6, while Section 7 concludes.

2 PAFTA (1998–2012): Facts and Figures

2.1 PAFTA: An Overview

The Arab Economic and Social Council (AESC) gave birth to PAFTA, originally encompassing 14 members, on February 1997.[1] Initially, the trade liberalization

1 The established free trade area between the signatories was labeled the Greater Arab Free Trade Area. At that time, 14 Arab countries were PAFTA members: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia and the United Arab Emirates (UAE).

process was scheduled to take place over a 10-year period starting in 1998, mainly through the gradual phasing out of tariffs on intra-PAFTA trade in goods. Moreover, PAFTA's executive program called for the elimination of NTBs by the end of the transitional period. In 2002, the AESC accelerated tariff reductions, and the removal of tariffs on intra-PAFTA trade was fully completed in 2005 when the number of PAFTA members reached 17 countries.[2] PAFTA gained a new member with the accession of Algeria in 2008 (AMF 2010).

PAFTA member countries have recently implemented a series of measures to consolidate intra-regional trade. In this respect, member countries have adopted the international classification of nontariff measures and announced their commitment to efficiently eliminate the latter.[3] The abolition of these barriers is expected to reduce the cost of intra-regional trade and enhance the competition in the regional market. In addition, PAFTA members that are also WTO members have started the implementation of the customs valuation agreement, thus minimizing the risks of arbitrary customs valuation and facilitating intra-regional trade. Furthermore, member countries can no longer use the "agricultural calendar," a program that has previously allowed them to freeze the reduction of their tariffs applied to regional agricultural imports during certain months of the year (AMF 2011). This should boost intra-PAFTA trade in terms of agriculture produce. Parallel to these endeavors, PAFTA member countries pursued their strive for establishing a customs union with a continuous advancement in the negotiations aiming at implementing a common external tariff (AMF 2012).

Despite these efforts, intra-PAFTA trade is still hampered by a number of factors. Inefficient transportation networks, partially due to weak infrastructures, and cumbersome border procedures are among the main obstacles to intra-regional trade (AMF 2010).[4] In a survey completed by 300 firms operating in nine PAFTA countries, Hoekman and Zarrouk (2009) reported that transport-

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2 The additional countries were Gaza Strip and the West Bank, Sudan and Yemen. Gaza Strip and the West Bank were exempted from the trade liberalization process while benefiting from a free access to their PAFTA partners. Sudan and Yemen were granted a special treatment whereby they gradually reduce their tariffs on PAFTA imports starting in 2005, with their complete elimination expected to take place in 2012 (AMF 2006; 2012).

3 Among the agreed-upon measures were removing tax discrimination between local and imported products, eliminating excessive payments on trade-related services, as well as relaxing sanitary and phytosanitary control procedures (AMF 2011).

4 Many studies have pinpointed the negative impact of high transportation and communication costs on the Arab world's trade; see for instance Dennis (2006), ESCWA (2003), Harb (2008) and Zarrouk (2004).

related infrastructure and red tape costs were ranked as the most important constraint facing these firms. In addition to these barriers, the report by ESCWA (2014) sheds light on the negative impact of technical standards on intra-PAFTA trade: differences in quality, specifications and standard systems adopted by PAFTA members, the absence of mutual recognition agreements, as well as complicated rules of origin, all place an additional burden on intra-Arab trade. Moreover, the latter is hindered by inefficient provision of trade-related services, especially financial and insurance services, notably in countries that have not yet joined the WTO or committed to services liberalization.[5]

2.2 PAFTA: Trade Dynamics

Table 1 suggests that the trade liberalization process among PAFTA members that started in 1998 was accompanied with an increase in the share of intra-PAFTA trade in total PAFTA trade compared to the pre-liberalization period.[6]

Table 1: Intra-PAFTA imports as a share of PAFTA's total imports during 1990–1997, 1998–2005 and 2006–2012.

Average share of intra-PAFTA imports of PAFTA's total imports (%)	1990–1997	1998–2005	2006–2012
	8.1	9.8	12

Source: Authors' calculations based on the United Nations Comtrade database.

Indeed, intra-regional imports among the countries that later became PAFTA members represented on average 8.1% of the region's total imports during 1990–1997. This ratio increased to almost 10% during the first 8 years of the trade liberalization process. Moreover, the entry into force of PAFTA in 2005 seems to have further consolidated intra-PAFTA imports as the ratio of intra-PAFTA imports to total PAFTA imports over the period 2006–2012 averaged 12%.[7]

5 Political instability, notably in the last 4 years, is also a key factor hindering intra-Arab trade prospects.

6 PAFTA member countries covered in this section include Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, the UAE and Yemen. We excluded Gaza Strip and the West Bank as well as Iraq for lack of consistent data.

7 The international financial and economic crisis that hit PAFTA's trading partners, notably the EU and the United States, might also have contributed to the increase of the share of intra-PAFTA imports after 2008.

A look at intra-regional imports in manufactured products reveals an increase in their share in total PAFTA imports of manufactured goods, from nearly 7 % in 1998 up to almost 11 % in 2012, as shown in Figure 1. The latter suggests that part of the consolidation of intra-PAFTA trade after 2005 was driven by trade in manufactured products: the pre-2006 ratio of intra-PAFTA imports in manufactured products to total PAFTA imports of manufactured goods averaged 7 %, compared with an average of 9 % between 2006 and 2012.

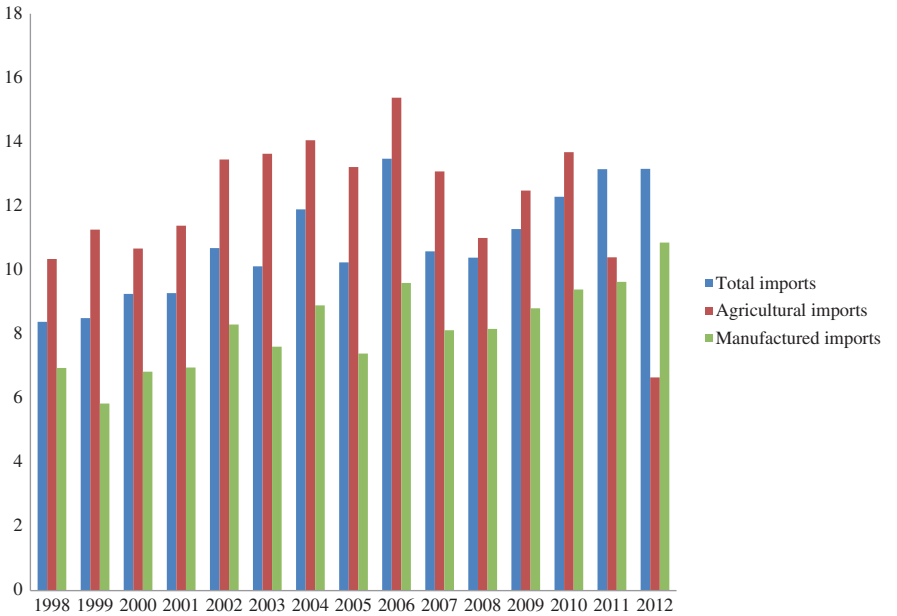

Figure 1: Intra-PAFTA's share of PAFTA's total imports, manufactured imports and agricultural imports (in %), (1998–2012).
Note: Manufactured products are product categories number 5 (chemicals), 6 (manufactured goods), 7 (machinery and transport equipment) and 8 (manufactured articles) of the United Nations' Standard International Trade Classification, SITC-Rev 1.
Source: Authors' calculations based on the United Nations Comtrade database.

A glimpse on intra-regional trade in agriculture shows a slight increase in the share of intra-regional imports of PAFTA's total imports in agriculture during the period 1998–2005, with an average of 12 %. However, a decreasing trend seems to have set in after 2006. This points to the existence of a number of problems related to regional trade liberalization. In addition to the complexity of barriers to trade in agricultural goods, it has been regularly reported that several member

countries have excessively used the agricultural calendar, resulting in an extended protection of their agricultural sector over a longer period of time in relation to the one originally permitted.

In sum, the increase of intra-PAFTA trade appears to be mainly driven by manufactured products, while the liberalization of intra-regional trade in agriculture seems to have been sluggish, notably since 2006.

After presenting the evolution of intra-PAFTA trade as a share of overall PAFTA trade, we explore the progress of the composition of intra-PAFTA trade over the trade liberalization period. As shown in Figure 2, manufactured products have had the lion's share in intra-PAFTA trade throughout the liberalization period, albeit with a slight decrease in their importance over time. In fact, the share of manufactured goods in intra-regional imports dropped from an average of 52.2% during 1998–2005 to 50.8% during 2006–2012. On the other hand, the share of agriculture in intra-PAFTA trade plummeted substantially during the liberalization period: from an average of 17.4% during 1998–2005 to an average of 11.7% between 2006 and 2012. Again, this would signal obstacles

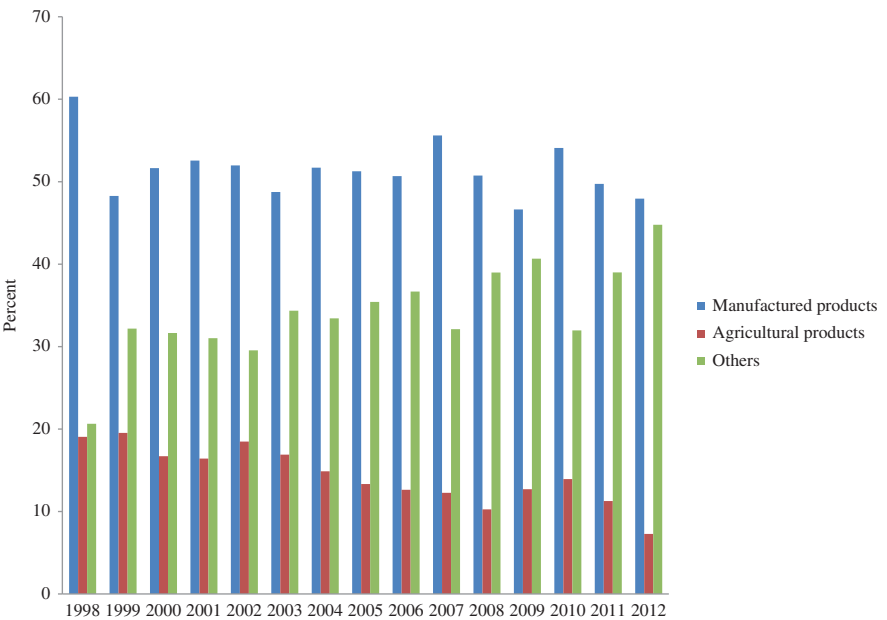

Figure 2: Composition of intra-PAFTA imports, (1998–2012).
Note: "Others" mostly include mineral fuels and, to a lesser extent, beverages and tobacco as well as animal and vegetable oils and fats.
Source: Authors' calculations based on the United Nations' Comtrade database.

hindering the complete liberalization of trade in agricultural products between PAFTA member countries.

After studying intra-PAFTA trade dynamics, we next examine the evolution of the shares of PAFTA's main trading partners throughout the intra-PAFTA trade liberalization process.[8]

This is done to check if the intra-PAFTA liberalization process was accompanied with significant changes in PAFTA's trade with the rest of the world. We first consider PAFTA's imports of manufactured products before shedding light on its imports of agricultural products.[9]

As illustrated in Figure 3, the top providers of PAFTA in terms of manufactured products between 1998 and 2012 have been the EU and Asia: their combined share in PAFTA's imports of manufactured products averaged nearly 70 % during the examined time span. What is noticeable is the opposite dynamic that was experienced by these two partners: the EU's share was steadily declining, whereas that of Asian countries was increasing.[10]

This differing dynamic became more pronounced over time: the EU's share of PAFTA's manufactured imports averaged around 45.3 % during 1998–2005, before dropping to an average of 38 % during 2006–2012; whereas Asia's share averaged around 25 % during 1998–2005 before increasing to an average of nearly 31 % during 2006–2012. The US and Canadian share witnessed a slight decrease over the period with an average of 10 % and no substantial changes between the two subperiods (pre-2005 and post-2005). As mentioned previously, PAFTA's share of its own imports of manufactured products experienced an increase over the period that accelerated in the second subperiod.[11]

In sum, an important change has been taking place during intra-PAFTA trade liberalization process: Asia's part in PAFTA's imports of manufactured products was rising, unlike the EU's part. This dynamic seems to have accelerated after the full elimination of tariffs on intra-PAFTA trade in 2005.

Examining PAFTA's imports of agricultural products, Figure 4 shows that the EU and Latin America have been the main providers of agricultural products to PAFTA: between 1998 and 2012, their combined share averaged 42.8 % of PAFTA's imports of agricultural products.

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8 PAFTA's trading partners under examination represented on average nearly 73 % of PAFTA's total imports between 1998 and 2012.

9 The trading partners considered represented on average 80.8 % of PAFTA's manufactured imports and 66.7 % of its agricultural imports between 1998 and 2012.

10 That trend seems to have reversed starting from 2008.

11 Africa and Latin America did not experience major changes in their shares of PAFTA's imports of manufactured products throughout the trade liberalization process between PAFTA members.

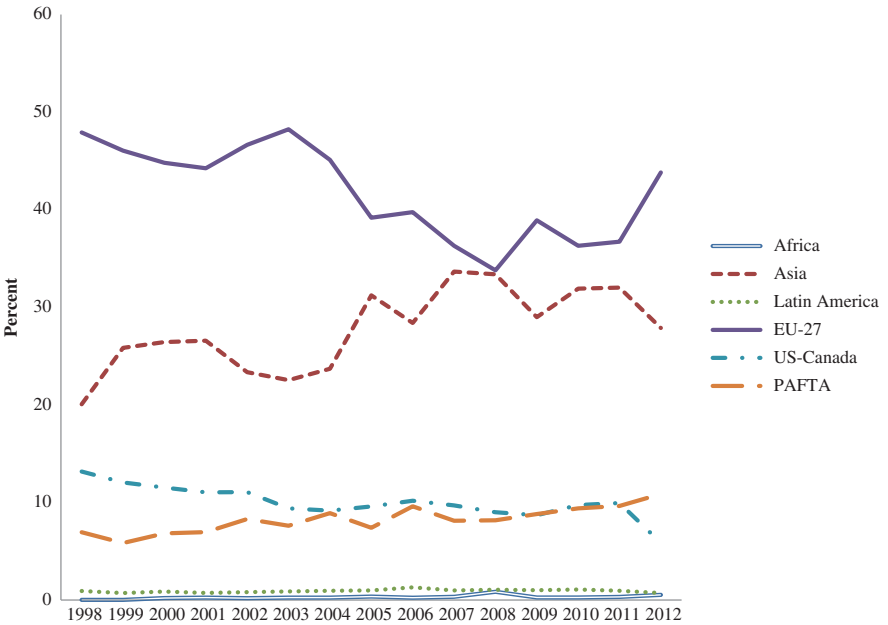

Figure 3: PAFTA's imports of manufactured products by region (1998–2012).
Note: "Africa" includes Cameroon, Ethiopia, Ghana, Kenya, Nigeria and South Africa; "Asia" includes Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea and Thailand; "Latin America" includes Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela.
Source: Authors' calculations based on the United Nations' Comtrade database.

As in the case of manufactured products, the EU witnessed an impressive decline of its share of PAFTA's imports of agricultural produce: dropping from 32.8 % in 1998 to 23.6 in 2012, with an average of 26.7 % over the period.

The decrease of the EU's share contrasts with the significant increase in the share of Latin America that moved from a meager 10 % in 1998 to a high of 27.3 % in 2012, averaging around 16.1 % over the period. Similar to the EU, the United States and Canada experienced a decrease in their share over the period. As discussed earlier, PAFTA's share of its own imports of agricultural products has witnessed a modest increase in the first subperiod (with an average share of its global agricultural imports of 12.1 %) before decreasing along the second subperiod with an average of 11.9 %.[12]

12 Africa and, to a lesser extent, Asia did not experience important modifications in their shares of PAFTA's imports of agriculture during 1998–2012.

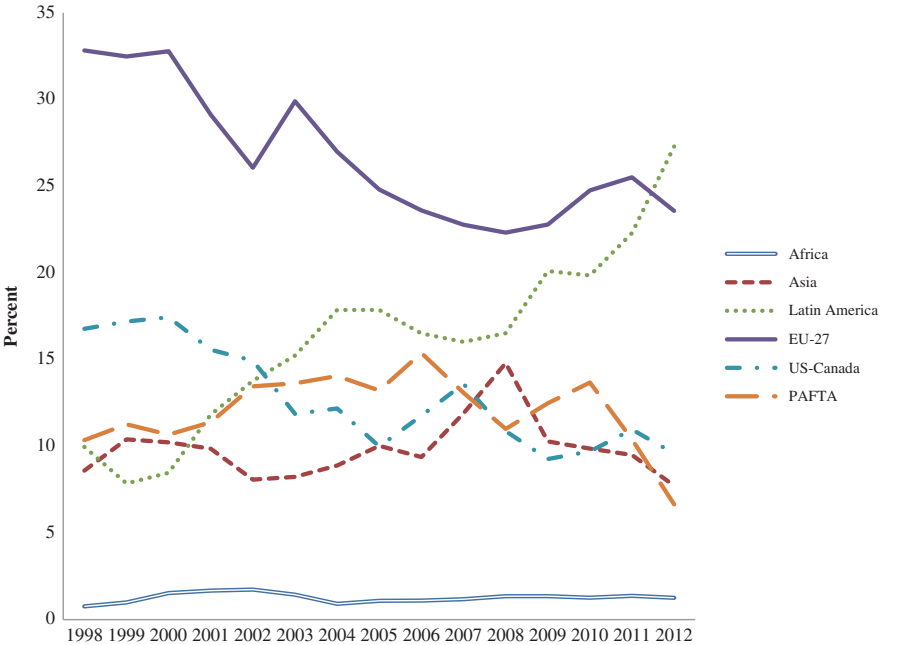

Figure 4: PAFTA's imports of agricultural products by region (1998–2012).
Note: "Africa" includes Cameroon, Ethiopia, Ghana, Kenya, Nigeria and South Africa; "Asia" includes Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea and Thailand; "Latin America" includes Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.
Source: Authors' calculations based on the United Nations' Comtrade database.

All in all, the EU's part in PAFTA's imports of agricultural products was substantially declining to the benefit of Latin America.

3 PAFTA and Intra-Arab Trade: Literature Review

Gravity models have been the workhorse of most empirical papers assessing intra-Arab trade as well as Arab trade with extra-regional partners, notably the EU. Within this literature, early studies evaluated intra-Arab trade in the light of the standard gravity variables encompassing the trading partners' "masses" [as captured by their gross domestic products (GDPs)] and transportation costs proxied by the distance separating the country pairs. Consequently, these papers assessed whether there was an untapped potential for greater intra-Arab trade,

gauging the possibility that a free trade area (FTA) strengthens trade between the Arab countries. These studies can therefore be labeled ex ante studies in the sense that they estimated the potential of deeper intra-Arab trade prior to the conclusion of PAFTA. Later papers chiefly examined the impact of PAFTA on intra-members trade, while some of them evaluated the effect of a number of NTBs on intra-regional trade. These ex post papers have thus mainly investigated the effectiveness of the gradual phasing out of tariffs between PAFTA members. In what follows, we review the main studies of each one of the two streams of the literature that applied gravity analysis to Arab trade starting with ex ante studies.

An early study by Al-Atrash and Yousef (2000) examines the potential of intra-Arab trade for the period 1995–1997. By considering period averages of each of the standard gravity variables, the authors apply a cross-sectional analysis while augmenting the model with a set of regressors controlling for cultural proximity, trade restrictiveness and Arab regional dummies accounting for Arab trade with the rest of the world as well as intra-Arab trade. Their main results show that both, Arab trade with extra-regional partners and intra-Arab trade, are below what is expected given the gravity variables, indicating a considerable scope for greater intra-Arab trade with the conclusion of a regional trade agreement. However, one of the shortcomings of the cross-sectional approach is its failure to properly account for unobservable country-specific characteristics, subsumed into the error term. These country-specific effects are likely to be correlated with a subset of the regressors, inducing an omitted variable bias.

Bolbol and Fatheldin (2005) investigate Arab trade dynamics during 1997–2003 using two samples: the first is confined to the Arab region, whereas the second adds countries from the rest of the world. The authors augment the standard gravity model with indices reflecting each of the trading partners' costs of doing business and openness, and a set of regional dummies among which an "Arab" dummy equals to one when trade partners are Arab countries.[13] The authors find that Arab countries trade less among themselves given the gravity fundamentals. Although the authors control for universal shocks affecting countries simultaneously, they do not account for country-specific effects. The omitted variable bias is thus likely to affect their estimates.

Using data over a period spanning 1970–2000 with 5-year intervals, Nugent and Yousef (2005) estimate a gravity model and examine intra-Arab trade potential as well as the potential of the Middle East and North Africa (MENA) countries trade with the rest of the world. In addition to traditional gravity

13 This specification is used in the large sample.

variables, the authors control for a large number of factors affecting trade costs such as having a common currency, exchange rate volatility, governance indicators, macroeconomic policies and countries' legal framework. Applying a number of estimators, the authors find that both intra-MENA trade and MENA trade with the rest of the world are less than predicted by the gravity model.

One of the first papers to assess the impact of the trade liberalization process on intra-Arab trade is that of Abédini and Péridy (2008). The authors estimate a gravity model using a set of 56 countries, of which 15 PAFTA member countries, over the period 1988–2005. In addition to the usual gravity variables, the model controls for a number of communication, governance and policy factors affecting bilateral trade costs. Several estimators are used and results show that the trade liberalization scheme between PAFTA members has increased intra-members trade between 16 % and 24 %.

Cieslik and Hagemejer (2009) use data for 196 countries over the period 1980–2004 to assess the effect of several bilateral and plurilateral trade agreements on 7 MENA countries' trade.[14] The model includes, along with the typical gravity regressors, variables controlling for cultural and historical linkages between trading partners. Although PAFTA is not included in the model, the authors control for two subregional agreements in the Arab region as well as for bilateral agreements between Arab countries.[15] Panel data estimation techniques are used and results suggest that FTAs among Arab countries were unsuccessful in promoting intra-members' trade.[16]

A recent report of the Center for Social and Economic Research (CASE) (2009) uses a gravity model incorporating variables reflecting cultural, religious and historical proximity of the trading partners. The model is augmented with a set of regional agreements dummies to evaluate the impact of several FTAs in the Euro-Mediterranean region, including PAFTA, on intra-members trade as well as on trade between member countries and non-members. The study uses data for a set of over 100 countries, with 17 Arab countries, from 1970 till 2008. Results show that trade liberalization among PAFTA members has increased intra-regional trade while concomitantly positively impacting PAFTA members' imports from the rest of the world.

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14 The authors run separate regressions for trade in agricultural products and trade in manufactured goods.

15 The Arab Maghreb Union (AMU) includes Algeria, Libya, Mauritania, Morocco and Tunisia; and the Arab Cooperation Council (ACC) includes Egypt, Iraq, Jordan and Yemen.

16 With the exception of AMU.

Parra Robles, Martinez-Zarzoso, and Suarez Burguet (2012) analyze the impact of a number of FTAs on 10 MENA countries' trade in manufactured and agricultural products separately over the period 1990–2010. Using panel data estimators, the authors estimate three different specifications of the gravity equation. In their preferred specification, the authors find an insignificant impact of PAFTA on intra-members' trade. It should be noted, however, that their sample countries include only 8 PAFTA members.

While most of the ex post studies use panel data econometrics, accounting for unobserved heterogeneity across countries and/or country pairs as well as for time shocks, a number of limitations affect the previously cited papers. Some papers use a relatively small sample of MENA countries (Cieslik and Hagemejer 2009; Parra Robles, Martinez-Zarzoso, and Suarez Burguet 2012), while others cover a short time period after the entry into force of PAFTA (CASE 2009; Parra Robles, Martinez-Zarzoso, and Suarez Burguet 2012). This limits the significance of the findings, notably when it comes to assessing the impact of PAFTA on intra-members' trade.

Another drawback of the aforementioned ex-post studies is the fact that they do not control for time-varying country-specific effects.[17] In fact, the country-specific effects are supposed to capture the so-called multilateral trade resistance (MTR) terms of the theoretical gravity equation developed by Anderson and van Wincoop (2003). The MTR terms reflect each of the trading partners' propensity to trade with the rest of the world. As such, the MTR terms need not be constant over time. This could be acute in the case of Arab countries: parallel to their intra-regional trade liberalization, several countries have unilaterally reduced their tariffs and NTBs to speed up their integration into the world economy. Failure to properly account for such time-varying country-specific factors would lead to biased estimates, especially when the covered period is long.[18]

A third issue of concern related to the above-mentioned studies is inference based on ordinary least squares (OLS) estimations in the presence of heteroskedastic errors. Santos Silva and Tenreyro (2006) show that in the latter case, any OLS-based estimation would suffer from inconsistent estimates, whereas pseudo-maximum-likelihood (PML) estimators would be consistent. Further, in their 2011 paper, Santos Silva and Tenreyro show that PML estimators yield consistent estimates in the presence of a large number of zero-trade observations.[19]

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17 The notable exception is Parra Robles, Martinez-Zarzoso, and Suarez Burguet (2012).

18 Specifications including time-invariant country-specific effects and time effects would yield unbiased estimates if the MTR terms share a common trend (Ruiz and Vilarrubia 2007).

19 Discarding observations with zero trade and applying OLS yields biased estimates (Santos Silva and Tenreyro, 2011).

The present study contributes to the prevailing literature in a number of aspects. First, our investigation of the impact of PAFTA on member countries' trade is based on a large number of PAFTA members considered over the period 1998–2012. Our results are thus based on a period of 7 years following the full liberalization of intra-PAFTA trade and should consequently be particularly telling. Second, in addition to the impact of PAFTA on intra-members trade, we examine whether the implementation of PAFTA was accompanied by an increase in member countries' imports from the rest of the world. In particular, we investigate PAFTA's imports dynamics from the EU and Asia throughout the trade liberalization process. Third, we allow for time-varying MTR terms and use a consistent estimator in the presence of a heteroskedastic error term and a relatively large portion of zero-trade observations.

4 Methodology and Data

Our dataset consists of a sample of 76 countries, among which 17 Arab countries, and observations running from 1998 until 2012.[20] The 59 non-Arab countries spread across different regions in the world and constitute a substantial part of Arab countries' imports in manufactured goods.[21]

Our main objective is to examine whether the entry into force of PAFTA has been the source of *gross* trade creation; that is, if PAFTA has increased intra-members' trade. In addition, we also check whether PAFTA was accompanied by *net* trade creation: we examine whether PAFTA's imports from nonmember countries have increased during the intra-PAFTA liberalization process.

To examine if PAFTA generated gross trade creation and whether it was accompanied by net trade creation, we estimate the following gravity equation derived from the theoretical model developed by Anderson and van Wincoop (2003):

20 Arab countries included in the sample are Algeria, Bahrain, Egypt, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, the UAE and Yemen.

21 African countries include Cameroon, Ethiopia, Ghana, Kenya, Nigeria and South Africa; Asian countries include Bangladesh, China, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Thailand and Turkey; Latin American countries include Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela; North American countries include Canada and the United States. These countries represented on average 80.8 % of total PAFTA imports of manufactured goods during 1998–2012.

$$\ln(M_{ijt}) = \beta_0 + \beta_1 \ln(D_{ij}) + \beta_2 \ln(y_{it}) + \beta_3 \ln(y_{jt}) + \beta_4 \text{Intrapafta}_{ijt} + \beta_5 \text{Extrapafta}_{ijt} + \beta_6 \text{Cborder}_{ij} + \beta_7 \text{Col45}_{ij} + \beta_8 \text{Ccol}_{ij} + \beta_9 \text{Clang}_{ij} + \alpha_i + \alpha_j + T + \varepsilon_{ijt} \quad [1]$$

where the subscripts i, j, t, represent countries i and j and time, respectively; M_{ij}, manufactured goods imported by the Arab country i from exporting country j[22]; D_{ij}, the "great circle" distance between the capitals of countries i and j; y_i and y_j, GDP of countries i and j, respectively[23]; Intrapafta_{ijt} is a binary variable equal to 1 when countries i and j are members of PAFTA, and 0 otherwise. Since some Arab countries joined PAFTA after its entry into force in 2005, we let Intrapafta change in time. Extrapafta_{ijt} is a dummy variable whose value is 1 when the exporting country is not a PAFTA member, and 0 otherwise. Reflecting the fact that some exporting countries became PAFTA members after 2005, we let Extrapafta change in time. Cborder_{ij} is a binary variable equal to 1 when countries i and j share a common border. This variable captures the "border effect" enhancing trade opportunities between neighboring countries. Col45_{ij} is a dummy variable equal to 1 when countries i and j have had colonial ties after World War II, and 0 otherwise. Ccol_{ij} is a binary variable taking the value of 1 when both countries have shared a common colonizer after World War II, and 0 otherwise. Col45 and Ccol control for any common historical heritage that might affect bilateral trade. Clang_{ij} is a binary variable equal to 1 when a substantial proportion of the population of the two countries speaks the same language, and 0 otherwise. This variable captures linguistic affinities between trading partners that would facilitate trade.[24] α_i and α_j are country-specific effects reflecting time-invariant characteristics of countries i and j, respectively. These effects capture the MTR terms in the theoretical gravity equation of Anderson and van Wincoop and reflect countries i and j's propensity to trade. T represents time effects controlling for time-varying factors simultaneously affecting the countries of interest; ε_{ijt}, the error term.

The coefficient of Intrapafta measures the impact of PAFTA on intra-Arab trade: a positive coefficient would suggest that the entry into force of PAFTA has

22 Manufactured products are product categories no. 5, 6, 7 and 8 of the United Nations' Standard International Trade Classification, SITC-Rev.1. The source used for trade data is the United Nations' Comtrade database.

23 In current US dollars, we use the International Monetary Fund's World Economic Outlook database.

24 We use the "Centre d'Etudes Prospectives et d'Informations Internationales" (CEPII) gravity dataset for the distance variable, the border dummy, the dummies reflecting past colonial links between trade partners and the common language dummy.

increased intra-Arab trade, inducing gross trade creation. A positive coefficient on Extrapafta would indicate that PAFTA imports from nonmembers increased in parallel to the intra-regional trade liberalization process. In the light of the static theory of regional integration, this should be beneficial as most of the non-PAFTA members are likely to be more efficient than member countries in terms of manufactured goods. In case both coefficients are positive this would suggest that the increase in intra-regional trade is likely to induce net trade creation: the expansion of intra-regional trade would most probably reflect the elimination of nonefficient domestic producers rather than producers from more efficient nonmember countries.

Using the gravity framework, we also investigate the trade dynamics between PAFTA members on one hand and Asian and European countries on the other, throughout the liberalization process and after the completion of the latter in 2005. This is motivated by two trends highlighted in the descriptive analysis. Indeed, the latter revealed that there has been an important rise in PAFTA's imports of manufactured products from Asia starting from 2005. Furthermore, it showed that there has been a decrease in Arab imports of manufactured products from the EU-27 throughout the 2000s, with a recovery starting from 2008. To examine these trends, we run the following two regressions:

$$\ln(M_{ijt}) = \beta_0 + \beta_1 \ln(D_{ij}) + \beta_2 \ln(y_{it}) + \beta_3 \ln(y_{jt}) + \beta_4 \text{Intrapafta}_{ijt} + \beta_5 \text{Europe}_j + \beta_6 \text{Asia}_j + \beta_7 \text{Cborder}_{ij} + \beta_8 \text{Col45}_{ij} + \beta_9 \text{Ccol}_{ij} + \beta_{10} \text{Clang}_{ij} + \alpha_i + \alpha_j + T + \varepsilon_{ijt} \quad [2]$$

and

$$\ln(M_{ijt}) = \beta_0 + \beta_1 \ln(D_{ij}) + \beta_2 \ln(y_{it}) + \beta_3 \ln(y_{jt}) + \beta_4 \text{Intrapafta}_{ijt} + \beta_5 \text{Europe}_{05j} + \beta_6 \text{Asia}_{05j} + \beta_7 \text{Cborder}_{ij} + \beta_8 \text{Col45}_{ij} + \beta_9 \text{Ccol}_{ij} + \beta_{10} \text{Clang}_{ij} + \alpha_i + \alpha_j + T + \varepsilon_{ijt} \quad [3]$$

In eq. [2][25] Europe_j is a dummy variable taking the value of 1 when the exporting country is a European country and 0 otherwise; this variable reflects the imports dynamics of PAFTA from the EU-27 throughout the intra-PAFTA trade liberalization process.[26] Asia_j is a binary variable equal to 1 when the exporting country is from the group of Asian exporters and o otherwise; this variable captures the imports trend of PAFTA member countries from Asian partners throughout the intra-Arab trade liberalization period.

25 The remainder of the variables carry the same definitions as in eq. [1].

26 In our sample, European countries only include members of the EU-27.

In eq. [3][27] $Europe_{05j}$ is a dummy variable taking the value of 1 when the exporting country is a European country and the year considered is 2005 and beyond, and 0 otherwise. This variable reflects the imports dynamics from the EU-27 after the entry into force of PAFTA in relation to the previous years when the trade liberalization process between PAFTA members was still ongoing. $Asia_{05j}$ is a binary variable whose value is 1 when the exporting country is from the group of Asian exporters and the year considered is 2005 and beyond, and 0 otherwise. This variable reflects the imports dynamics from Asia after the entry into force of PAFTA compared to the previous years with ongoing trade liberalization between PAFTA members.

5 Results

We first estimate eq. [1] using OLS with robust standard errors taking into consideration the heteroskedasticity and serial correlation of the error term. Results of this estimation are shown in the second column of Table 2.

Table 2: Results of estimating eq. [1].

Regressor	Estimated coefficients of eq. [1] using OLS	Estimated coefficients of eq. [1] with time-varying country effects using OLS	Estimated coefficients of eq. [1] using Gamma PML estimator
$\ln(D_{ij})$	−0.937***	−0.932***	−0.934***
	(0.07)	(0.07)	(0.06)
$\ln(y_{it})$	0.787***	–	0.677***
	(0.07)		(0.07)
$\ln(y_{jt})$	0.203**	–	0.252***
	(0.08)		(0.08)
$Intrapafta_{ijt}$	0.299***	0.312***	0.184***
	(0.08)	(0.08)	(0.07)
$Extrapafta_{ijt}$	0.317*	0.258	0.384***
	(0.19)	(0.19)	(0.15)
$Cborder_{ij}$	0.936***	0.935***	1.037***
	(0.28)	(0.28)	(0.21)
$Col45_{ij}$	0.817***	0.822***	0.682***
	(0.25)	(0.25)	(0.22)

(*continued*)

27 The rest of the variables have the same definitions as before.

Table 2: (*continued*)

Regressor	Estimated coefficients of eq. [1] using OLS	Estimated coefficients of eq. [1] with time-varying country effects using OLS	Estimated coefficients of eq. [1] using Gamma PML estimator
$Ccol_{ij}$	0.414***	0.415***	0.232**
	(0.13)	(0.13)	(0.11)
$Clang_{ij}$	0.233	0.224	0.339*
	(0.24)	(0.24)	(0.19)
Constant	1.276	−170.401***	2.900
	(3.02)	(17.12)	(2.82)
Number of observations	13730	13742	13730
R^2	0.836	0.834	
Prob. *F* statistic	0.00	0.00	

Notes: (a) We estimate the variance covariance matrix of the coefficient estimators using the cluster robust estimator; the cluster being the country pairs. Thus, the estimator of the variance covariance matrix and standard errors are robust to cross-sectional heteroskedasticity and within-panel serial correlation; (b) numbers between parentheses are standard errors of the estimated coefficients; (c) asterisks (***), (**) and (*) correspond to *p*-values equal to or less than 1 %, 5 % and 10 %, respectively; (d) country-specific effects as well as time-fixed effects are not reported in the table; (e) when we let the country-specific effects vary in time, the (log of the) GDPs of the importing and exporting countries drop out of eq. [1]; (f) when we use the Gamma PML estimator to estimate eq. [1], the dependant variable is no longer in logarithmic form but in levels.

Overall, the model fits well with the data, and all the regressors have the expected signs and are significant at the usual levels.[28] Distance significantly hinders Arab imports: other things equal, an increase in distance by 1 % reduces imports by nearly 0.94 %. The economic "masses" of the trading partners contribute positively to bilateral trade: the imports elasticity with respect to GDP of the importing country is around 0.8 %, while that with respect to GDP of the exporting country is 0.2 %. The "border effect" is substantial and significant: sharing a common border increases trade by a factor of 2.5.[29] Furthermore, past colonial bonds affect rather considerably Arab imports: other things equal, having had a colonial relationship doubles trade, while having shared a common colonizer increases trade by around 50 %.[30]

The full liberalization of trade between PAFTA member countries seems to have significantly affected intra-PAFTA imports, resulting in gross trade creation: the full

28 The common language variable has the expected sign but is insignificant.
29 $e^{0.936} \approx 2.5$.
30 $e^{0.817} \approx 2.2$ and $e^{0.414} \approx 1.5$.

implementation of PAFTA has increased trade between member countries by nearly 30 %.[31] This result suggests that the efforts implemented by member countries to eliminate their tariffs and NTBs on intra-regional trade have been fruitful.

The estimated coefficient on *Extrapafta* is positive and significant, suggesting that the implementation of PAFTA was accompanied with an increase in PAFTA members' imports from non-members. Concomitantly, the positive and significant coefficients on intra-PAFTA and extra-PAFTA variables point to a net trade creation that accompanied the intra-Arab trade liberalization process.

To some extent, this reflects the efforts undertaken by Arab countries during 1998–2012, parallel to liberalizing their intra-regional trade, to integrate into the world economy. Indeed, during this period many Arab countries implemented trade reforms reducing their overall tariff levels, as well as NTBs, affecting both their intra-regional and extra-regional imports (Yousef 2005). In addition, several Arab countries became members of the WTO, thus strengthening their trade relations with well-established trading partners and opening up to new partners.[32] Moreover, a number of Arab countries signed trade and investment agreements with some of their extra-regional trade partners.

As a means of examining the robustness of our results, we run two additional regressions where we estimate: (i) a slightly different specification of eq. [1] with time-varying country effects; and (ii) eq. [1] using a PML estimator, where the dependant variable is the level of imports. The different specification is estimated to take into account potential changes in country-specific characteristics over time that might affect the results obtained. The Gamma PML estimator is used to tackle the eventual limitations of the OLS estimator in a gravity model context, as pointed out recently by a number of authors.[33]

The third column of Table 2 reports the results of the estimates of eq. [1] with time-varying country effects. Except for the variable Extrapafta that loses its significance, results, in terms of magnitude and significance, are similar to those obtained with time-invariant country effects. Given the relatively short period of time covered, this suggests that country-specific characteristics did not change substantially over time.

The last column of Table 2 illustrates the results using the PML estimator. All the regressors have the expected signs and are significant. The estimated

31 $e^{0.299} \approx 1.3$.

32 Jordan and Oman became WTO members in 2000, while Saudi Arabia became a member in 2005.

33 The OLS estimator will be biased in the presence of a large proportion of zero-trade observations and inconsistent in the presence of heteroskedastic errors; the PML estimator being consistent in both cases.

coefficient of distance and the coefficients of the GDP of the importing and exporting countries are relatively close to the ones obtained with the OLS estimator. Although the impact of the colonial links on Arab imports is slightly less than the one estimated by the OLS estimator, it remains important and of comparable magnitude: a past colonial relationship almost doubles trade, while having previously shared a common colonizer increases trade by around 30 %. The estimated impact of the border effect on Arab trade is somewhat stronger than the OLS estimate: a common border would nearly triple trade. The language variable is significant and suggests that sharing a common language would increase imports by 40 %.

The trade liberalization process between PAFTA members seems to have positively and substantially contributed to intra-regional imports: results show that PAFTA has increased trade between member countries by nearly 20 %. In addition, given the positive and significant impact of the coefficient of *Extrapafta*, PML results corroborate the OLS finding of a net trade creation effect.

Before turning to the results of the estimation of eqs [2] and [3], we briefly discuss the potential endogeneity problem of the *Intrapafta* variable. Specifically, one can argue that the conclusion and implementation of a regional trade agreement between a number of countries would be mainly driven by historically high levels of trade between the latter (WTO/UNCTAD 2012). The induced reverse causality would lead to biased and inconsistent estimates. However, in the Arab context, this source of endogeneity is less likely to prevail, as historically intra-Arab trade has been very low when compared to the Arab region's total trade and when compared with intra-regional trade of other blocs worldwide. In fact, earlier studies using gravity analysis have shown that intra-Arab trade falls short of its potential as "predicted" by the gravity regressors.

Even in the absence of reverse causality, the endogeneity might still arise if two countries are more likely to implement a trade agreement due to a set of shared characteristics (WTO/UNCTAD 2012). The error term would thus be correlated with the regional agreement dummy in the model.[34] In this respect, the inclusion of country-specific effects along with a set of variables reflecting historical and cultural links between country pairs should help overcoming this potential problem.

In all cases, we run a modified specification of eq. [1] with the following regressors: the trading partners' GDPs, *Intrapafta* and *Extrapafta*, time effects as

34 The error term will contain both the factors explaining why countries had been trading substantially and why they would implement a trade agreement.

well as country-pair-specific effects.[35] The latter control for factors that are specific to each of the trading partners, notably those affecting their bilateral trade as well as the likelihood of the two partners implementing and adhering to a free trade agreement, such as PAFTA. Thus, in this specification the potential endogeneity issue should be properly accounted for. Results reported in Table 4 in the Appendix show that PAFTA has significantly increased intra-Arab trade.

Table 3 reports the estimated coefficients of the European and Asian regional dummies in eqs [2] and [3]; the coefficients of the rest of the regressors are reported in the Appendix.

Table 3: Results of estimating eqs [2] and [3].

Regional dummies (the first two are from eq. [2], the last two from eq. [3])	Estimated coefficients of the regional dummies in eqs [2] and [3] using OLS	Estimated coefficients of the regional dummies in eqs [2] and [3] with time-varying country effects using OLS	Estimated coefficients of the regional dummies in eqs [2] and [3] using Gamma PML estimator
$Europe_j$	0.097	0.121	0.149
	(0.17)	(0.17)	(0.17)
$Asia_j$	−0.331**	−0.376**	−0.188
	(0.16)	(0.16)	(0.12)
$Europe_{05j}$	0.028	0.017	−0.056
	(0.08)	(0.08)	(0.07)
$Asia_{05j}$	0.241***	0.225***	0.047
	(0.08)	(0.09)	(0.07)

Notes: (a) The estimator of the variance covariance matrix and standard errors are robust to cross-sectional heteroskedasticity and within-panel serial correlation; (b) numbers between parentheses are standard errors of the estimated coefficients; (c) asterisks (***) and (**) correspond to *p*-values equal to or less than 1% and 5%, respectively; (d) when estimated with time-varying country effects, the (log of the) GDPs of the exporting and importing countries drop out of eqs [2] and [3]; (e) when we use the Gamma PML estimator to estimate eqs [2] and [3], the dependant variable is in levels.

The first two cells of the second column of the table show, respectively, the coefficients of the European and Asian regional dummies of eq. [2]. The coefficient of the European dummy is positive but insignificant, whereas the one of the Asian regional dummy is negative and significant. The latter most likely reflects the weight of the pre-2005 period, in relation to the entire period, where Arab imports from Asian countries were somewhat stagnating, as shown in Section 2. The final

35 The rest of the regressors drop out of the equation since they are all country-pair time-invariant variables.

two cells of the same column illustrate the coefficients of the European and Asian regional dummies of eq. [3]. Again, the European regional dummy is positive but insignificant while the Asian regional dummy becomes positive and significant. The interaction between the Asian regional dummy and the post-2005 time period suggests that the completion of the intra-Arab trade liberalization process coincided with a substantial increase of PAFTA's imports from Asia in relation to the previous years.

Estimated coefficients of eqs [2] and [3] with time-varying country-specific effects are reported in the third column of Table 3. The first two cells illustrate the estimated coefficients of the regional dummies in eq. [2] while the last two cells show the estimated coefficients of the regional dummies of eq. [3]. Again, there is some evidence that PAFTA's imports from Asia raised substantially after 2005, as compared to the 1998–2004 period. This should not be surprising as it mainly reflects the rise of China in the global economic relations, notably in international trade in manufactured products. In fact, the increase in Arab imports from Asia, notably after 2005, has been so important that it substantially lifted Asia's share of total Arab imports of manufactured products: from 16.8 % in 1998 to 27 % in 2008.

The final column of Table 3 illustrates the results of estimating eqs [2] and [3] using the PML estimator. Pertaining to the estimates of the regional dummies of eq. [2], the European regional dummy is positive and insignificant, while the Asian one is negative and insignificant. The estimate of the European regional dummy of eq. [3] is negative while remaining insignificant, whereas the Asian regional dummy becomes positive but insignificant. Thus, the Asian regional dummy exhibits the same change in sign detected using OLS but remains insignificant when estimated by the PML estimator.

In sum, while there is no statistical conclusive evidence of a substantial change in the pattern of PAFTA's imports from the EU-27 after 2005, there seems to be some evidence of an important increase of PAFTA's imports from Asia after 2005 in relation to the period 1998–2004.

To unfold the dynamics of PAFTA's imports from the EU-27 and Asia on a yearly basis we estimated four additional equations. Examining the yearly evolution of PAFTA's imports from Asia, we estimated two equations similar to eq. [2] where, instead of the Asian regional dummy, we added (i) interaction terms between Asia and time effects for every year over the period 1998–2004 in the first equation, and (ii) interaction terms between Asia and time effects for every year over the period 2005–2012 in the second equation. Focusing on the yearly development of PAFTA's imports from Europe, we estimated two equations that are similar to eq. [2] where we replace the European regional dummy with (i) interaction terms between Europe and the time effects for every year

during 1998–2004 in the first equation, and (ii) interaction terms between Europe and time effects for every year during 2005–2012 in the second equation.

We estimated each of the above-mentioned equations using OLS, OLS with time-varying importer and exporter effects, as well as PML estimators.[36] Due to space constraints we do not report the results here but highlight the most important findings.[37] It appears that the pre-2005 period was accompanied with significant yearly changes of PAFTA's imports from Asia: specifically, results reveal a decrease of PAFTA's imports from Asia over all the years, although not all the interaction terms are statistically significant. The results of the post-2005 period show that PAFTA's imports from Asian countries were increasing over 7 out of the 8 years of the 2005–2012 period.[38]

Pertaining to the yearly evolution of PAFTA's imports from the EU-27 during 1998–2004, our results point to a yearly increase of the latter (although not all the interaction terms are significant) during 6 out of the 7 years of the considered period.[39] As for the post-2005 period, most of the years witnessed a decrease in PAFTA's imports from the EU-27 (only some of them are statistically significant). Interestingly, results reveal a statistically significant decrease of PAFTA's imports from the EU-27 in 2008 and 2009. This might reflect the consequences of the international financial crisis that hit many European countries at that time.

6 Implications of Our Results

Our key findings point to an increase in intra-Arab trade after the full implementation of PAFTA and to an increase in the importance of Asian partners in PAFTA's imports. We first explore the implications of the first finding in terms of the integration process among PAFTA members. We then look at the possible inferences related to our second result as far as PAFTA's trade with Europe and Asia is concerned.

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36 When using time-varying country effects, the log of the GDPs of the trading partners drop out of the equations; when using the Gamma PML estimator the level of the dependent variable is used.

37 We only report the main findings of the estimations where the interaction terms between *Asia* and *Europe* and the time effects were found jointly significant.

38 Only in the case of the OLS estimator were the interaction terms between the time effects and *Asia* jointly statistically significant.

39 Only in the case of the Gamma PML estimator were the interaction terms between the time effects and *Europe* jointly statistically significant.

Despite the persistence of many impediments to Arab regional integration, such as an overall lack of stability in the region that gained in magnitude since 2011, burdensome NTBs and weak trade-related infrastructures, our results suggest that the elimination of tariffs on manufactured products among PAFTA members has induced a gross trade creation. It can thus be argued that a potential for an additional increase in intra-Arab trade exists, once these obstacles are appropriately dealt with. The complete removal of NTBs is expected to yield additional benefits to the region: overcoming technical and administrative barriers does not only serve regional integration, but it also facilitates trade flows originating from third countries, reducing thereby possible trade diversion costs (Hoekman and Zarrouk 2009; ESCWA 2014). In addition to the elimination of NTBs, PAFTA member countries have agreed on extending integration efforts to encompass trade and investment in services (ESCWA 2014). In particular, enhancing transport services such as the establishment of road networks and railways between Arab countries as well as establishing regional shipping lines is highly recommended to enhance intra-regional and extra-regional trade. Furthermore, the harmonization of technical standards as well as the simplification of the rules of origin should enhance intra-PAFTA trade.

The descriptive statistics presented as well as the empirical analysis undertaken provide little evidence on the role of the Euro-Mediterranean partnership agreements in enhancing integration between south Mediterranean countries and the EU.[40] This seriously questions the degree of success of the partnership agreements and suggests that a thorough overhaul of the Euro-Mediterranean integration process might be needed: widening the scope of the liberalization process, eliminating NTBs and enhancing deeper integration through the liberalization of services trade as well as the harmonization of regulations and standards are only a few of the required steps in order to boost the Euro-Mediterranean trade.

The rising importance of Asia as a trading partner of PAFTA opens a well of questions worthy of a more detailed investigation in future research. A possible investigation would examine the extent to which Arab imports from the EU-27 have been substituted with imports from Asia. It would help answering the following questions: is the reorientation of PAFTA's imports of manufactured goods from European to Asian countries mainly due to the shortcomings of the partnership agreements as well as in the European Neighborhood Policy whose objectives were, among others, to strengthen and consolidate economic ties

40 Among PAFTA members covered in this study the following countries have signed "Association Agreements" with the EU: Algeria, Egypt, Jordan, Lebanon, Morocco and Tunisia.

between the EU and its partners? Does it mirror a growing interest of European exporters to markets other than their southern partners' markets? Or does it chiefly reflect a greater Asian competitiveness coupled with a more active cooperation between a number of Arab countries and some Asian countries[41]?

7 Conclusion

This paper investigated Arab trade dynamics during the trade liberalization process between PAFTA member countries and after the full implementation of PAFTA. This was done reverting to a gravity model and panel data estimation techniques. One component of the investigation looked at the impact of PAFTA on intra-Arab trade and showed a significant contribution of the latter to intra-regional imports. It also revealed that, parallel to the rise in intra-regional imports induced by the implementation of PAFTA, the intra-Arab trade liberalization process was accompanied with an increase in PAFTA's imports from nonmember countries.

In addition, we examined whether there was a significant change in the dynamics of PAFTA's imports from Europe and Asia after the entry into force of PAFTA in relation to the period where PAFTA members were gradually reducing their tariffs on their intra-regional trade. In this regard, there is some evidence pointing at a substantial increase in imports originating from Asia after 2005 in relation to the period 1998–2004.

At least three areas of investigation are potential candidates for future research. When we assessed the impact of PAFTA on intra-regional trade, we considered aggregate figures of trade in manufactured goods. One possible extension is to consider a product-specific approach where, for a given product category (within the class of manufactured goods), a regression would be run to examine the effect of PAFTA on intra-Arab trade in that particular category. This would yield more specific results as to the impact of PAFTA on intra-regional trade, possibly identifying product categories where the liberalization process is trade creating and others where it is trade diverting.

The descriptive section of the paper highlighted some difficulties pertaining to the liberalization of trade in agricultural products within PAFTA. Another area

41 For instance, the implementation of the Arab–Chinese forum in 2004 that aims, among other things, to consolidate trade and investment relations between the two parties. Also, a memorandum of understanding was signed between Arab League of States members and India in 2008 in order to implement a forum encouraging ties between the two parties (AMF 2009).

worthy of investigation would be to test the impact of PAFTA on intra-Arab trade in agricultural products. The gravity framework could a priori be used, probably with the inclusion of additional variables that are specific to trade in agricultural goods.

As mentioned in the previous section, examining the extent to which PAFTA's imports from its European trade partners have been substituted by imports from Asia constitutes a third possible extension of this paper.

Appendix

Table 4: Results of estimating eq. [1] with country-pair-specific effects.

Regressors	Estimated coefficients (using OLS)
$\ln(y_{it})$	0.817***
	(0.07)
$\ln(y_{jt})$	0.273***
	(0.08)
Intrapafta_{ijt}	0.173***
	(0.06)
Extrapafta_{ijt}	0.137
	(0.15)
Constant	–11.163***
	(2.76)
Number of observations	13,730

Notes: (a) The estimated equation is eq. [1] (i) excluding all country-pair time-invariant regressors, as well as country-specific effects and (ii) adding country-pair-specific effects; (b) the estimator of the variance covariance matrix and standard errors are robust to cross-sectional heteroskedasticity and within-panel serial correlation; (c) numbers between parentheses are standard errors of the estimated coefficients; (d) asterisks (***) correspond to p-values less than or equal to 1%.

Table 5: Results of estimating eq. [2].

Regressors	Estimated coefficients of eq. [2] using OLS	Estimated coefficients of eq. [2] with time-varying country effects using OLS	Estimated coefficients of eq. [1] using Gamma PML estimator
$\ln(D_{ij})$	−0.921***	−0.918***	−0.919***
	(0.07)	(0.07)	(0.06)
$\ln(y_{it})$	0.773***	–	0.662***
	(0.07)		(0.07)
$\ln(y_{jt})$	0.199**	–	0.255***
	(0.08)		(0.08)
Europe_j	0.097	0.121	0.149
	(0.17)	(0.17)	(0.17)
Asia_j	−0.331**	−0.376**	−0.188
	(0.16)	(0.16)	(0.12)
Intrapafta_{ijt}	0.186***	0.22***	0.041
	(0.07)	(0.07)	(0.06)
Cborder_{ij}	0.958***	0.954***	1.06***
	(0.28)	(0.28)	(0.21)
Col45_{ij}	0.817***	0.822***	0.681***
	(0.25)	(0.25)	(0.22)
Ccol_{ij}	0.433***	0.431***	0.248**
	(0.13)	(0.13)	(0.11)
Clang_{ij}	0.228	0.218	0.337*
	(0.24)	(0.24)	(0.19)
Constant	1.681	−171.056***	3.246
	(3.02)	(17.16)	(2.84)
Number of observations	13,730	13,742	13,730
R^2	0.836	0.834	

Notes: (a) The estimator of the variance covariance matrix and standard errors are robust to cross-sectional heteroskedasticity and within-panel serial correlation; (b) numbers between parentheses are standard errors of the estimated coefficients; (c) asterisks (***), (**) and (*) correspond to *p*-values less than or equal to 1 %, 5 % and 10 %, respectively; (d) when we let the country-specific effects vary in time, the (log of the) GDPs of the importing and exporting countries drop out of eq. [1]; and (e) when we use the Gamma PML estimator to estimate eq. [2], the dependant variable is in levels.

Table 6: Results of estimating eq. [3].

Regressors	Estimated coefficients of eq. [2] using OLS	Estimated coefficients of eq. [2] with time-varying country effects using OLS	Estimated coefficients of eq. [1] using Gamma PML estimator
$\ln(D_{ij})$	−0.921***	−0.919***	−0.920***
	(0.07)	(0.07)	(0.06)
$\ln(y_{it})$	0.771***	–	0.659***
	(0.07)		(0.07)
$\ln(y_{jt})$	0.207**	–	0.254***
	(0.08)		(0.08)
Europe_{05j}	0.028	0.017	−0.056
	(0.08)	(0.08)	(0.07)
Asia_{05j}	0.241***	0.225***	0.047
	(0.08)	(0.09)	(0.07)
Intrapafta_{ijt}	0.245***	0.272***	0.026
	(0.09)	(0.09)	(0.08)
Cborder_{ij}	0.958***	0.954***	1.058***
	(0.28)	(0.28)	(0.21)
Col45_{ij}	0.815***	0.82***	0.679***
	(0.25)	(0.25)	(0.22)
Ccol_{ij}	0.434***	0.431***	0.249**
	(0.13)	(0.13)	(0.11)
Clang_{ij}	0.230	0.221	0.340*
	(0.24)	(0.24)	(0.19)
Constant	1.531	−163.118***	3.341
	(3.02)	(19.79)	(2.82)
Number of observations	13,730	13,742	13,730
R^2	0.836	0.834	

Notes: (a) The estimator of the variance covariance matrix and standard errors are robust to cross-sectional heteroskedasticity and within-panel serial correlation; (b) numbers between parentheses are standard errors of the estimated coefficients; (c) asterisks (***), (**) and (*) correspond to *p*-values less than or equal to 1 %, 5 % and 10 %, respectively; (d) when we let the country-specific effects vary in time, the (log of the) GDPs of the importing and exporting countries drop out of eq. [1]; and (e) when we use the Gamma PML estimator to estimate eq. [3], the dependant variable is in levels.

References

Abédini, J., and N. Péridy. 2008. "The Greater Arab Free Trade Area (GAFTA): An Estimation of Its Trade Effects." *Journal of Economic Integration* 23 (4):848–72.

Al Atrash, H., and T. Yousef. 2000. "Intra-Arab trade: Is It Too Little?" International Monetary Fund, working paper no. 10, 20.

Anderson, J., and E. Van Wincoop. 2003. "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review* 93 (3):170–92.

Arab Monetary Fund. 2006. "The Joint Arab Economic Report", 139–52 (in Arabic).

Arab Monetary Fund. 2009. "The Joint Arab Economic Report", 135–50 (in Arabic).

Arab Monetary Fund. 2010. "The Joint Arab Economic Report", 165–81 (in Arabic).

Arab Monetary Fund. 2011. "The Joint Arab Economic Report, 147–63 (in Arabic).

Arab Monetary Fund. 2012. "The Joint Arab Economic Report", 165–83 (in Arabic).

Bolbol, A., and A. Fatheldin. 2005. "Intra-Arab Exports and Direct Investment: An Empirical Analysis." Arab Monetary Fund, AMF Economic Papers no. 12, 46.

Center for Social and Economic Research. 2009. "Economic Integration in the Euro-Mediterranean Region." CASE- CSER Report no. 89, 185.

Cieslik, A., and J. Hagemejer. 2009. "Assessing the Impact of the EU-Sponsored Trade Liberalization in the MENA Countries." *Journal of Economic Integration* 24 (2):344–69.

Dennis, A. 2006. "The Impact of Regional Trade Agreements and Trade Facilitation in the Middle-East and North Africa Region." World Bank, Policy Research working paper no. 3837, 24.

Harb, G. 2008. "Trade Facilitation and Intra-Arab Trade (1996–2002): An Empirical Assessment." *Journal of International Trade and Diplomacy* 2 (2):135–70.

Hoekman, B., and J. Zarrouk. 2009. "Changes in Cross-Border Trade Costs in the Pan Arab Free Trade Area, 2001–2008." World Bank, Policy Research Working Paper no. 5031, 33.

Nugent, J. B., and T. Yousef. 2005. "Does MENA Defy Gravity? How MENA Has Performed in Its Intraregional, EU and Other Trade: Implications for EU and Intra-MENA Trade Arrangements." European University Institute, EUI working paper no. 26, 33.

Parra Robles, M. D., I. Martinez-Zarzoso, and C. Suarez Burguet. 2012. "The Impact of FTAs on MENA Trade." Ibero America Institute for Economic Research, discussion paper no. 217, 31.

Ruiz, J., and J. Vilarrubia. 2007. "The Wise Use of Dummies in Gravity Models: Export Potentials in the EUroMED Region." Bank of Spain, working paper no. 07020, 34.

Santos Silva, J., and S. Tenreyro. 2011. "Further Simulation Evidence on the Performance of the Poisson-PML Estimator." *Economics Letters* 112 (2):220–2.

Santos Silva, J., and S. Tenreyro. 2006. "The Log of Gravity." *Review of Economics and Statistics* 88 (4):641–58.

United Nations Economic and Social Commission of Western Asia. 2003. "Trade Facilitation of Goods Transit by Land and Sea Between Jordan, Lebanon and Syria." ESCWA, 127 (in Arabic).
United Nations Economic and Social Commission of Western Asia. 2014. "Arab Integration: A 21st Century Development Imperative." ESCWA, 328.
World Trade Organization, United Nations Conference on Trade and Development. 2012. "A Practical Guide to Trade Policy Analysis." WTO/UNCTAD, 236 p.
Yousef, T. 2005. "Structural Reforms, the Investment Climate, and the Private Sector Development in the Arab World." In *The Arab Competitiveness Report*, edited by A. Lopez-Claros and K. Schwab, 21–32. New York: Palgrave Macmillan.
Zarrouk, J. 2004. "Trade Facilitation Needs and Priorities: A Regional Perspective." Paper presented at the WTO/ESCWA regional workshop on trade facilitation for Arab and Middle-East countries, June.