Assessing the Trade Creation Effect of EU Bilateral Trade Agreements

Sébastien Jean (INRA, UMR INRA-AgroParisTech, and CEPII, Paris) and JC Bureau (AgroParisTech and CEPII, Paris)

Work in progress, incomplete draft – Please do not quote

1 Introduction

Those who connect to the European Union's external tariff schedule website, the TARIC,[i] immediately find out that, for a given agricultural tariff line, EU imports are typically subject to 10 to 20 different tariffs, depending on the country of origin. This illustrates how much the EU is involved in a complex mix of trade agreement and participates to the "spaghetti bowl". In addition to the *erga omnes* tariff, many countries benefit from tariff reductions or exemptions. It is noteworthy, however, that very few tariff lines actually correspond to custom unions and bilateral free trade agreements. This reflects the trade policy followed by the EU during the last decades.

The EU trade policy has been thus far mostly characterized by two main orientations. The first one has been multilateralism. The EU strongly played the card of multilateral negotiations, and had implemented a de facto memorandum on bilateral agreements in the 1990s. Even though it is perhaps not that obvious for those who observe negotiations in the agricultural sector, the World Trade Organisation has been a cornerstone of EU trade policy; only recently did things changed.

The other major feature of EU's trade policy, and the main exemption to multilateralism, has been the ambitious set of preferences granted to developing countries. In this area, the EU has long played the card of non-reciprocal preferences, with a strong bias towards former colonies of some EU member states and LDCs. This has resulted in special tariffs for overseas territories, for African-Caribbean and Pacific countries under the Cotonou agreement and into the Generalized System of Preferences (GSP). For a long time, agreements with North African countries also fell into this category (they have now been turned into reciprocal agreements). GSP tariffs apply to all developing and transition countries, but they differ a lot between LDCs (whose exports do not face

any tariff), Central American and Andean states (who face tariffs that are quite similar to the ones faced by ACP countries under the "GSP+") and between most other developing and transition countries (mostly Asia and Mercosur) who enjoy only limited tariff reductions under the regular GSP. Finally, the EU uses tariff reduction as a way to support troubled states in attempt to help stabilization (Balkans, Palestinian states).

As a result of these two orientations, many different tariffs regimes coexist, but actually few tariffs are actually specific to a single country. Indeed, with the exception of a few micro states (Andorra, Faroe islands, Vatican, San Marino), only Turkey is part of a custom union with the EU. There are also only a limited number of bilateral trade concessions, most of them under association agreements with neighboring countries or former colonies. It is noteworthy that EU's policy recently experienced an inflexion and that several bilateral trade agreements have been signed in the 2000s. Several bilateral and regional negotiations, as well as discussions engaged by the Commission (i.e. without a formal negotiating mandate from the Council) are also ongoing.

In this paper, we focus on the trade impact of bilateral EU agreements. It is obviously difficult to measure this impact in a satisfactory way, given that several of these agreements have only been implemented recently (even though they were sometimes signed a few years earlier). In addition, some agreements follow earlier schemes that had sometimes granted tariff concessions for a subset of products since the 1960s. Finally, isolating the effect of bilateral trade agreements is difficult given that, over the recent period, erga omnes tariffs have gone down following the 1994 Marrakesh Agreement (Uruguay Round) and that bilateral agreements interfere with non-reciprocal schemes such as the GSP.

Table 1.1 : The EU Agreements including tariff concessions

Type of preferences	Country
EU Custom Unions	• San Marino; Vatican ; Andorra ; Feroe Islands, • Turkey*

EU Free Trade Agreements	• Norway, Iceland and Lichtenstein under the Espace Economique Européen
	• Trade agreement with Switzerland and Licthenstein
	• Ceuta and Mellila
	• Interim trade agreement with Croatia (2005)
	• Association agreement with Former Yougoslavian Republic of Macedonia (2004)
	• Albania (signed in 2006)
	• Montenegro (signed in 2007)
	• Bosnia Herzegova
	
	• Agreements under the Barcelona process
	    • Algeria (2001)
	    • Egypt (2004)
	    • Lebanon (2002)
	    • Jordan (1997, major extension in 2006)

	• Tunisia (1995, arrangements since 1956) • Morocco (1996) • Israël (pre-existing agreements since 1964) • Palestinian authority (1997) • Syria • Mexico (2000) • South Africa (1999 but partially delayed until 2002) • Chile (2003) Note: the dates are those of actual implementation, not signature
Other concessions	• GSP, including the Everything But Arms component for LDCs and GSP+ (mainly Central America and Andean countries). • Cotonou agreement with ACP countries • Overseas territories

2 EU bilateral agreements

The bilateral agreements of the EU include a series of association agreements with South Mediterrannean countries, which were signed at the end of the 1990s or in the 2000s. Some of them followed pre-existing trade concessions, most of the time non-reciprocal, that dated back from the independence of these countries from colonial powers in the 1950s and the 1960s. Tariffs concessions and other trade related measures are part of the Barcelona process, which encompasses broader issues than trade, with policies that include cooperation and assistance, and has the objective of constituting a large free trade area among Southern Mediterranean countries. Even though it is also part of the Barcelona process, the tariff concessions granted to Turkey are a bit different, since Turkey is a candidate to EU accession, and because Turkey has concluded a free trade agreement which earlier form dates back to 1963, but which become a custom union in 1996. It is noteworthy that agricultural products are formally not covered by the custom union (even though processed food products are included) but that a series of tariff concessions actually provide very large tariff exemptions for Turkish exports to the EU including in the agricultural sector.

A free(er) trade agreement with Israël, signed in 1995 was enforced in 2000, as part of a larger association agreement. It followed a series of tariff concessions since the 1960s. The EU association agreement with Jordan, signed in 1997 and enforced in 2000 included tariff concessions, which were extended to practically all tariff lines in 2006. Tunisia benefited from non-reciprocal tariff concessions since 1976, but the association agreement was signed in 1995 and enforced in 1998, with a protocol for agricultural products included in 2000. The EU association agreement with Morocco signed in 1996 was enforced in 2000. Like most of the agreements with Mediterrannean countries, it includes a progressive liberalization of trade, over a

transition period and, in the longer run, a free trade area. For agricultural goods, however, there are many remaining tariffs. It is only in the case of Jordan that the EU has waived practically all tariffs. The lack of progress in agricultural trade liberalization with other countries is not due to the EU only, since countries such as Tunisia and Morocco are also reluctant to liberalize their agricultural sector.

While most EU-Mediterranean agreements are recent, they generally follow up on a longer process that was initiated in the 1960s or 1970s. In addition, they are mostly association agreements with at their core a policy of cooperation or stabilization, with a broader agenda such as promoting peace or economic growth with goals such as reducing incentives for illegal immigration in the EU. The situation is fairly different for a new generation of bilateral agreements including South Africa, Chile and Mexico. While, in the case of South Africa, there is also a stabilization component, and in the background the fact that this country was not granted the non-reciprocal preferences that were enjoyed by other sub-Saharan countries, trade considerations are more central than with the Mediterranean agreements. Clearly, the EU sees bilateral agreements as broad association with a cultural and cooperation dimension, opposing a model of "deep integration" compared to the US "shallow integration", but one objective is clearly the constitution of a genuine common market in the long run. The agreement with Chile, for example, with its trade rules, is presented as a reference for future agreements by the Commission.

The *Trade Development and Cooperation Agreement* with South Africa concluded in 1999 took several years before being fully implemented because of disagreements including on intellectual property and appellations. The "Global Agreement" with Mexico, signed in 1997 and implemented in 2000 has many dimensions, including trade. The association agreement with Chile also has a broader cooperation and political dimension but is particularly ambitious in the trade area. Not only does it include tariff concessions, investments, public procurement, intellectual property, competition policy provisions, but also a large dimension of trade facilitation, with custom procedures, sanitary and phtyosanitary provisions.

Agricultural goods are only partially covered by the trade arrangements of all these bilateral agreements. In agreements with Mediterranean countries liberalization of agricultural goods is mentioned as a long term objective. The EU granted tariff exemptions to practically all agricultural exports from Jordan in 2006. Successive extensions of the coverage of agricultural products have also led to large concessions regarding Turkey exports. But in general, the coverage of agricultural goods is only

partial and many products that are subject to a common market organization are excluded from tariff concessions. One should not conclude, however, that agriculture is left untouched. First, there is a significant coverage of tariff reductions in several agreements (we mentioned Turkey and Jordan, but it is also the case of some other Maghreb countries). When coverage is limited, as it is the case with Israël, large quotas are open for some exports of particular interest (grapefruits, avocados, etc.). In some key sectors such as fruits and vegetables, even though tariff concessions are granted with calendar restrictions, some Mediterranean countries also benefit from concessions in the entry price, which is a significant trade barrier in the EU (Emlinger, 2008). In the agreements with South Africa, Chile and Mexico, there is a clear agenda with schedules for tariff reductions over time, and revision clauses that make it possible to accelerate the convergence towards a genuine free trade area.

Table 2.1. Main tariff concessions granted under major bilateral agreements

Type of concession	Products
TURKEY	
Tariff exemption	Some dairy products (cheese), eggs, onions, some vegetables (salads, asparagus, mushrooms, etc.), dried nuts and dried fruits, some fresh fruits (melons), prepared fruits, coarse grains, potato products, oilseeds, animal fat, , vegetable oils, meat preparations, molasses, chocolate, sugar preparations, some pasta, cassava, starch products, some preparations of fruits and vegetables, drinks, feedstuffs. For most vegetables, tariffs are set to zero but an entry price remains.
Reduced duty	Live bovines, beef, sheepmeat, goat meat, poulty, citrus, malt, some dried fruits, sugar products, chocolate and pastry, jams and prepared fruits.
Tariff quota or tariff threshold	Some sheepmeat, poultry cuts, some cheese, some fruits (strawberries), olive oil, some tomato preparations and fruit preparations, some pasta.
TUNISIA	
Tariff exemption	Sheep and goat meat, roses, peppers, preparations of vegetables, of mushrooms, of olives. For tomatoes, artichokes, wine, there is not duty but price restrictions
Reduced duties	Cut flowers, olives, courgettes, grapefruits, grapes, asparagus, orange juice, other fruit juice, preparations of vegetables
Tariff quota or tariff threshold	Potatoes, garlic, carrots, cucumbers, peas, lemons, oranges, melons, strawberries, tomato paste, some mushroom preparations, fruits and vegetables preparations
ISRAEL	
Tariff exemption	Animal by products, peppers, margarine, animal and vegetable fat, preparations with sugar, malt, processed citrus, alcohol, some tobacco products, some food preparations.
Reduced duties	Some dairy products, including yogurts and butter, some fresh and processed fruits, citrus, chocolate and other preparations containing sugar, some cereal preparations, pasta, fruits juice, ice cream, vinegar, processed vegetables.

Tariff quota or tariff threshold	Some poultry products, babeurre, eggs, flowers, potatoes, tomatoes, onions, carrots, other vegetables, citrus, grapes, food preparations, wine.
MOROCCO	
Tariff exemption	Goat meat, dried vegetables, dattes, lemons, condiments.
Reduced duties	Asparaus, eggplants, dried fruits, durum, pectin, processed fruits and vegetables, bran, fishmeal. Reduction in the entry price of tomatoes, courgettes, artichokes, cucumber, clementines, oranges..
Tariff quota or tariff threshold	Horses, horse meat, plants, roses, cut flowers, potatoes, tomatoes, onions, salads, celery, cucumber, tangerines, oranges, grapefruits, grapes, melons, apricots, olive oil, some processed fruits, fruit juice, wine.
SOUTH AFRICA	
Tariff exemption	Immediate list in the agreement : includes horses, offals, plants, some vegetables (onions), portatoes, grapes, apricots, preparations of fruits, condiments, animal fat, oil, molasses, processed fruits and vegetables. A list for progressive liberalisation over 10 years includes a large set of products, including dairy products, some fruits, fruit juice, tobacco, most veretables and fruits, some citrus, starch products, cereals, fruit juice and meat except beef. So far, there is no liberalization schedules for beef, for cirtrus, pears, appeles, bananas, ethanol, and some products subject to a tariff rate quota.
Tariff quotas or thresholds	Cut flowers, strawberries, fruit juices, canned fruits
MEXICO	
Tariff exemptions	Over a 10 year transitio period, most agricultural tarifs should be dismantled, except for products subject to a tariff quotas, and those of a particular list in the agreement, whose liberalization is mentioend as a longer term objective. This list incluides beef, poultry, pigmeat, most dairy products, some fruits (strawberries, pears, bananas, grapes) some vegetables (asparagus, beans), rice, barley, rye, starch sugar, apple juice, tomato juice, ethanol, vinegar.
Tariff quotas or thresholds	Eggs, honey, flowers, some vegetables, molasses, some preparation of ftruits, orange and grapefruit juice.
CHILE	
Tariff exemptions and reductions	Immediate dismantling includes live animals, offals, some dairy products, some egg products, drired fruits, apples and some pears (with calendar restrictions), some raisins, and tropical fruits, oilseeds, fat, some processed products including with a zero additional duty for sugar, some alcohol, liquors, feedstuffs. Over a transition period between 4 and 10 years depending on the products, tariffs will be dismantled on all agricultural products except those that are included in a list for which the objective is more longer term. The list includes meat (beef, sheep, poultry, pork), some dairy products, some mushrooms, cassava, some cereals, sugar, some alcohol, ethanol, vinegar
Quota tarifaire ou seuils tarifaires	Des viandes, bovins, ovins, porcins, volaille (avec une progression en volume de 10 pour cent par an, mais des quantités initiales faibles,les œufs, des fromages et autres produits laitiers, des champignons, des céréales transformées. Certains produits font l'objet d'une progression en volume de 5 pour cent par an.

Tariff concessions and quotas are not the only products that matter for explaining trade flows. It is well known that many regulatory obstacles can limit the effectiveness of tariff concessions. In particular, issues regarding rules of origin have been largely invoked for explaining the limited impact of generous tariff concessions such as the ones granted by the EU to LDCs, even though there is now evidence that in the food sector, these rules of origin play a lesser role than standards (and in particular private

standards) and supply side constraints (Bureau and Gallezot, 2005). From this point of view, recent agreements include ambitious provisions for trade facilitation.

The agreement with Mexico stresses the need to lift institutional and administrative obstacles to trade. There are joint committees that deal with sanitary aspects and more generally to trade facilitations (Title III) as well as procedures to reduce administrative costs (Title VI, art 19). This includes exchange of information, simplification of custom procedure, training and exchanges of employees. The agreement with Chile is perhaps even more ambitious regarding trade facilitations. It includes provisions regarding custom procedures, collaborations on procedures, data sharing so as to limit export and import inspections, and whenever possible, common agencies (Art 79.1c), common electronic procedures and the use of recent evaluations and audits of firms (Art 79.3.c). More generally, cooperation aims at integrating international recommandations such as those of the World Custums Organisations and World Trade Organisation for trade facilitation.

In this paper, we use recent data on preferential tariffs and trade in order to assess the trade creation impact of recent bilateral agreements, and to isolate whether tariffs reductions, tariff quotas or non tariff measures such as trade facilitation procedures have resulted in a significant increase in trade flows.

3 Methodology

The trade impact of FTAs is traditionally is traditionally assessed based on gravity models. The extended literature about these models, since Tinbergen (1962), not only showed that gravity models allow rather accurate representation of trade flows; when duly amended, they are also consistent with a variety of international trade theoretical framework (see inter alia Anderson, 1979 ; Bergstrand, 1989 ; Deardorff, 1998 ; Anderson et van Wincoop, 2003 ; Chaney, 2005).

While the usefulness and relevance of gravity models to study the determinants of international trade flows are established, a number of methodological issues are still pending. A generic gravity model for trade flows between two given partners, for a given sector, can be written as follows:

(1) $x_{ijk} = G_k S_{ik} M_{jk} \phi_{ijk}$

where x stand for exports from country i to country j, in sector k. The time dimension is omitted for the sake of simplicity. G is a factor invariant across countries (although possibly time-varying), S is an index of the exporter's characteristics, M refers to the importer's characteristics. Φ is an index of determinants of the bilateral intensity of trade flows. In the simplest form of the gravity model, S and M stand for each country's GDP, Φ for inverse distance. While more often used at the aggregate level, this equation can also be used at the product level.

In such a relationship, the purely bilateral dimension of trade flows is described through ϕ. Accordingly, any impact of trade agreements on partner countries should be looked for in this variable's changes. Distance, contiguity, common language and colonial links, between others, are usually accounted for among the determinants of ϕ, but the influence of bilateral specificities on bilateral trade flows is difficult to control fully. Hence the interest of introducing pairwise fixed effect, controlling for any factor specific to a pair of country and (quasi-)constant over time.

Even in this context, though, identification stumbles over the difficulty to control correctly for multilateral determinants of trade (S and M). Anderson and van Wincoop (2003) show that these "multilateral resistance factors" not only depend upon each country's characteristics, but also upon the nature of their relationship with its trade partners. This hurdle can be sidestepped when considering, instead of trade flows, ratios of bilateral trade flows across partners. Dividing term-by-term equation (1) written for to partners i and i':

$$(2) \qquad R_{ii'jk} = \frac{x_{ijk}}{x_{i'jk}} = \frac{S_{ik}}{S_{i'k}} \frac{\phi_{ijk}}{\phi_{i'jk}}$$

Where R is the ratio of country j's imports in product k, from respectively provider countries i and i'. This expression washes out both the general term G and the importer-specific index M. If exporter-specific characteristics are assumed constant over time (or varying evenly across products), then this equation allows cross-partner relative changes in ϕ to be identified.

When exporters characteristics are assumed to vary over time (for instance due to demand changes resulting from a FTA), then the changes in these characteristics can be controlled for by focusing in the relative level on markets j and j' of the import ratio from provider countries i and i'. This "ratio of ratios" (noted BR) is obtained by dividing term-by-term equation (2), written for market j and j':

$$
(3) \qquad BR_{ii'jj'k} = \frac{R_{ii'jk}}{R_{ii'j'k}} = \frac{\dfrac{x_{ijk}}{x_{i'jk}}}{\dfrac{x_{ij'k}}{x_{i'j'k}}} = \frac{\dfrac{\phi_{ijk}}{\phi_{ij'k}}}{\dfrac{\phi_{i'jk}}{\phi_{i'j'k}}}
$$

Romalis (2007) shows that this equation allows the impact of a bilateral FTA upon trade flows between partners to be identified.[1] Indeed, under standard assumptions (including perfect competition and differentiated good according to country of origin) and assuming that transport costs can be written as the product of a time- and a product-fixed effect, the bilateral term of trade flow intensity can be written:[2]

$$
(4) \qquad \phi_{ijkt} = a_{ij} b_t c_k \tau_{ijkt}^{\sigma_k}
$$

Where τ-1 is the ad valorem custom duty applied by country j over imports of good k from country i at date t. σ is the elasticity of substitution between product k varieties. Estimating this elasticity then allows the impact on bilateral trade of a given cut in tariff duties to be assessed, in comparison to trade flows with other partners. Now, substituting (4) into (3):

$$
(5) \qquad BR_{ii'jj'k} = \frac{\dfrac{a_{ijk}}{a_{ij'k}}}{\dfrac{a_{i'jk}}{a_{i'j'k}}} \left(\frac{\tau_{ijkt}}{\tau_{i'jkt}} \right)^{\sigma} \left(\frac{\tau_{ij'kt}}{\tau_{i'j'kt}} \right)^{-\sigma}
$$

Following the method applied by Romalis (2007) to the trade-creation effect of NAFTA, equation (5) thus paves the way for estimating the elasticity of substitution between varieties σ for EU FTAs. In order to do so, let us consider that index j refers to the EU-15 (j = U), and i to a partner with which an agreement has been signed (i = P). j' refers to a control market (j' = M), a set of representative developed countries whose trade policy with regards to the partner studied did not change over the period under study. Finally, i' is a control group of exporters (i' = X), including partners which did not face, during the period under study, any specific change in the trade policy applied to them by the EU and the control market. In these conditions, the ratio of tariff duties applied by the control market M to the partner P and the control group of exporters X does not

---

[1] In a different context, Head et al. (2007) apply a comparable method to aggregate trade flows.

[2] Such an expression can for instance be obtainde based on Romalis' (2007) model.

vary over time. Assuming the elasticity of substitution σ to be constant across products, equation (5) can then be re-written as:

$$(5') \qquad BR_{PXUMkt} = \lambda_k \gamma_t \left(\frac{\tau_{PUkt}}{\tau_{XUkt}} \right)^{\sigma}$$

This type of equation is usually estimated under a log-linear form:

$$(6) \qquad \ln(BR_{PXUMkt}) = \alpha_k + \beta_t + \sigma \ln \left(\frac{\tau_{PUkt}}{\tau_{XUkt}} \right) + u_{kt}$$

Where u is the error term. However, Santos-Silva and Tenreyro (2006) have pointed out the bias inherent to such estimating approach, linked to both heteroskedasticity and to unsuited treatment of zero flows. They find preferable estimating gravity models under their multiplicative form, using a Poisson quasi-maximum likelihood estimator (QMLE). The estimating equation is then:

$$(7) \qquad BR_{PXUMkt} = \exp \left(\alpha_k + \beta_t + \sigma \ln \left(\frac{\tau_{PUkt}}{\tau_{XUkt}} \right) \right) \times v_{kt}$$

Equations (6) and (7) are estimated in what follows at the product level. These estimating equations require trade data not only between the EU and its partner, but also between the partner and the control market, and between the control export group and the two markets (EU, control market). These data can be put together at the HS6 product level for the period 1999-2004 (for which the above-described tariff data are available) using Cepii's BACI database (providing harmonized data based on UN's Comtrade database). This involves two signficant constraints, however: the analysis cannot be carried out at the EU's tariff line level (CN8); and only those product-year pairs for which the ratio-of-ratios is defined are taken into account, which requires exports from the export control group toward both market, as well as exports from the partner toward the control market, to be non-zero.

The theoretical advantages of analysing ratios-of-ratios thus go together with practical drawbacks limiting the sample potentially used for estimation purposes. Accordingly, it is also worth carrying out the assessment based on equation (2), where the dependent variable is the ratio of EU imports, respectively from the partner and from the reference group of exporters; since it only requires European data, such estimation can be conducted at the NC8 level, and its definition is not contingent on the non-zero import conditions mentioned above. This method does not control for output price changes potentially spurred by the agreement, though: if additional demand on the European

10

market drives the price of the partner's exporters up (either through increased production cost, or through higher margins), then the estimate of the elasticity of substitution σ would be biased downward. The tradeoff between theoretical properties and empirical convenience is thus unclear, making this approach based on import ratios a useful complement to the one based on ratio-in-ratios.

In this case, the estimating equation is, in its log-linear form:

$$(8) \qquad \ln\left(R_{PXUkt}\right) = \alpha'_k + \beta'_t + \sigma \ln\left(\frac{\tau_{PUkt}}{\tau_{XUkt}}\right) + u'_{kt}$$

In the multiplicative form, the equation writes:

$$(9) \qquad R_{PXUkt} = \exp\left(\alpha'_k + \beta'_t + \sigma \ln\left(\frac{\tau_{PUkt}}{\tau_{XUkt}}\right)\right) \times v'_{kt}$$

Results below combine both approaches.

4 Results

The method described above requires control groups to be defined. The exporters' control group is exclusively composed of countries which continuously faced either the MFN or the GSP scheme over the whole period, in the EU market (without shifts across these two schemes). When the ratio-of-ratios is the dependent variable, the control group of exporters is further restricted to countries vis-à-vis which the trade policy applied by countries of the control market did not change. The control market, i.e. the control group of importers, is composed of rich countries since their import demand is bound to be more comparable to the EU's one. In each case, TRQ products are excluded from the analysis.

Introducing product-level fixed effects would be theoretically preferable; time-invariant product characteristics would thus be controlled for, and identification would only rely upon changes over time in tariffs and trade flows. However, such specification would dramatically reduce the information upon which the relationship is identified. This is particularly true in the present case, where the period under study is rather short (1999-2004), and where changes in the relative level of tariff duties are actually of limited magnitude. In order to strike the right balance between model and data constraints, the

estimates below are presented with product fixed defined at the different levels of aggregation.

Estimations are first carried out without product fixed effects (Table 1). These results thus reflect not only changes over time in product-level tariff duties, but also differences in level. They may reflect long-term effect of tariff duties, but this specification does not account for possible product-specific characteristics. In particular, an endogeneity bias cannot be dismissed, since the preference margin offered to a partner is not necessarily independent from its export capacity for the product; depending on the logics underlying to this possible correlation (favouring partner's exports in goods for which it is best equipped vs. protecting European producers from most competitive exporters), estimates may be either downward of upward biased. The descriptive analysis above showed that partners' market share tends to be higher on products covered by the agreements, suggesting that agreements would tend, on average, to prioritize products for which the partner is more competitive, in which case elasticities' estimates would be biased upward.

Table 3.1: Estimated imports elasticity of substitution, without product fixed effects

	Chile	Israel	Jordan	Morocco	Mexico	Tunisia	Turkey	South Afr.	All
Estimating equation									
(6) - ratios-in-ratios, OLS on log-linearized									
Sigma	30.33 ***	14.33 ***	40.56	24.00 ***	1.71	12.99 **	9.77 **	14.27 **	12.28 ***
(t-stat.)	(3.59)	(2.82)	(1.28)	(4.45)	(0.36)	(2.42)	(2.42)	(2.10)	(7.12)
R2 adj.	0.043	0.043	-0.007	0.157	-0.002	0.02	0.044	0.027	0.307
Observations	654	684	53	286	737	136	1,017	932	4,499
(7) - ratios-in-ratios, Poisson QMLE									
Sigma	8.69	0.39	2.76	10.03 ***	-94.69	7.5 **	7.2 ***	7.63 ***	7.05 ***
(t-stat.)	(1.24)	(0.08)	(0.77)	(3.35)	(-1.44)	(2.43)	(3.59)	(2.63)	(5.70)
Observations	963	982	144	364	2,148	182	1,138	1,326	7,247
(8) - ratios, OLS on log-linearized									
Sigma	18.67 ***	15.93 ***	18.49 **	19.86 ***	2.96	7.39 **	10.30 ***	2.53	11.54 ***
(t-stat.)	(3.83)	(4.20)	(2.38)	(5.26)	(0.71)	(2.09)	(7.17)	(0.87)	(10.24)
R2 adj.	0.02	0.041	0.036	0.117	-0.001	0.018	0.051	-0.001	0.082
Observations	1,701	1,889	239	1,363	1,330	756	3,310	2,353	12,941
(9) - ratios, Poisson QMLE									
Sigma	8.75 **	8.64 ***	11.62 ***	13.87 ***	-33.00	1.01	4.16 *	3.17	9.05 ***
(t-stat.)	(2.12)	(4.81)	(9.78)	(8.45)	(-1.64)	(0.12)	(1.70)	(1.40)	(4.45)
Observations	8,179	7,860	7,849	7,894	8,250	8,130	8,242	8,186	64,590

Source: Authors' calculation, based on TARIC, DBTAR, TARAGRO, Comext, Comtrade (ONU) and BACI (CEPII).

Champ: HS, Chapter 1 to 24, except TRQ products. Years 1999 to 2004.

Note: Estimates are based on equations (6) to (9) above, using yearly data. They are estimated using OLS for (6) and (8), and Poison QMLE for (7) and (9). Year fixed effects are included in each equation. *, **, *** denote significance at the 1%, 5% and 10% level.

As a matter of fact, estimates deliver large numbers (significant in a majority of case):[3] estimated elasticities most often lie between 7 and 20, whatever the estimation method. The only country for which no significant result is found is Mexico. The analysis based on ratios-in-ratios is insignificant for Jordan, probably due to the limited number of observations, as this country only exports a small number of products. More generally, the weak volume and strong concentration of Jordanian exports makes estimates especially fragile for this country.

Taking into account four-digit level product fixed effects gives less significant results when estimating ratios-in-ratios, for which the lesser number of observations further restricts the identification basis (Table 2). As a whole, and in particular as far as estimates based on import ratios are concerned, these estimates are consistent with the previous ones, delivering in most cases significant, high estimates of the elasticity of subsitution across providers. Despite HS4-position fixed effects, estimates are comparable –although often slightly lower- in order of magnitude to those obtained previously.

Noteworthily, the highest and most robust estimates are found for the three countries for which the graphical analysis of exports of products covered or not by the agreement is most convincing, namely Chile, Israel and Morocco.

Tableau 3.1 : Estimated imports elasticity of substitution, with HS4-position fixed effects

	Chile	Israel	Jordan	Morocco	Mexico	Tunisia	Turkey	South Afr.	All
Estimating equation									
(6) - ratios-in-ratios, OLS on log-linearized									
Sigma	20.95 *	10.16 **	42.46	28.32 ***	1.61	-3.92	2.80	7.72 **	5.10 ***
(t-stat.)	(1.78)	(2.10)	(1.09)	(2.77)	(0.26)	(-0.74)	(0.66)	(2.10)	(2.91)
R2 adj.	0.409	0.549	0.770	0.534	0.460	0.722	0.538	0.535	0.623
Observations	654	684	53	286	737	136	1,017	932	4,314
(8) - ratios, OLS on log-linearized									
Sigma	9.48 ***	13.60 ***	4.87	12.26 ***	5.91 **	8.95 ***	10.84 ***	6.78 ***	10.29 ***
(t-stat.)	(2.63)	(5.62)	(0.85)	(4.68)	(1.99)	(3.14)	(7.98)	(3.66)	(7.03)
R2 adj.	0.371	0.450	0.705	0.356	0.310	0.464	0.303	0.392	0.449
Observations	1,701	1,889	239	1,363	1,330	756	3,310	2,353	12,941

---

[3] The ajusted R-squared is very small in most esitmations. This stems from the way the dependent variable is defined: except tariff duties, it already accounts for all usual determinants of gravity equations.

Source : Authors' calculation, based on TARIC, DBTAR, TARAGRO, Comext, Comtrade (ONU) and BACI (CEPII).

Champ : HS, Chapter 1 to 24, except TRQ products. Years 1999 to 2004.

Note : Estimates are based on equations (6) to (9) above, using yearly data. They are estimated using OLS for (6) and (8), and Poison QMLE for (7) and (9). Year fixed effects, and fixed effect by HS4 position, are included in each equation. Imports lower than 5,000$ are disregarded in computing logarithms and ratios. *, **, *** denote significance at the 1%, 5% and 10% level.

Although these two sets of estimates may suffer from an endogeneity bias, likely upward, they consistently suggest that the elasticity of substitution between provider countries is large at the product level. This is consistent with Romalis' (2007) estimates of the trade creation effect of NAFTA. Estimate controlling fully for product-level specificities, at the most detailed level, do not allow more robust evidence to be uncovered, though, due to the sharp reduction in the identification basis implied by such specification (see Table A.1); South Africa is the only exception. This is not surprising given the relatively short period studied and the limited variance in tariff duties faced by FTA partners compared to other trading partners.

References

Anderson, J.E. and E. van Wincoop (2003), "Gravity With Gravitas: A Solution to the Border Puzzle," *American Economic Review*, 93(1), 170–192.

Anderson, J.E. (1979), "A Theoretical Foundation for the Gravity Equation," *American Economic Review* 69(1), 106-116.

BACI, Cepii's database, available at http://www.cepii.fr/francgraph/bdd/baci.htm.

Bergstrand, J. H. (1989), "The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade." *Review of Economics and Statistics* 71(1): 143-153.

Bureau J.C. and Gallezot J. (2005). "The Utilization of Trade Preferences: The Case of Agricultural and Food Products in the EU and the US", Organisation for Economic Co-operation and Development, Paris.

Chaney, T. (2005), "Distorted gravity: Heterogeneous Firms, Market Structure and the Geography of International Trade," University of Chicago, Mimeo.

Deardorff, A.V. (1998) 'Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?', in J.A. Frankel (ed.), *The Regionalization of the World Economy*, Chicago: The University of Chicago Press.

Emlinger C. (2008). "Accords euroméditerrannéens et libéralistion des échanges agricoes : quel accès au marché européen pour les fruits et légumes méditerrannéens ? " Thèse de doctorat, Université de Montpellier.

Gallezot J. (2002), "Accès au marché agricole et agro-alimentaire de l'UE: Le point de vue du négociateur a l'OMC et celui du douanier", *Economie Rurale*. Jan. Feb. (267):56-66.

Gallezot J. (2005), "DBTAR database". Tradeag Working Paper, 2005-8, Project co-funded by DG Research.

Gallezot J. and M. Harel, (2002), "TARAGRO , software for the analysis of the European tariffs applied on agricultural and food products". INRA-INAPG.

Head, K., T. Mayer and J. Ries (2007), "The erosion of colonial trade linkages after independence", mimeo.

Romalis J. (2007), "NAFTA's and CUSFTA's Impact on International Trade," *Review of Economics and Statistics*.

Santos Silva, J.M.C. et S. Tenreyro (2006), "The Log of Gravity," *Review of Economics and Statistics* 88(4), 641–658.

Tinbergen J. (1962), New York: The Twentieth Century Fund.

Appendix

Definition of control groups

Importers' control groups (control market): Australia, Canada, Japon, New Zealand, South Korea, Taiwan, Usa.

Exporters' control group: Bahrein, Brunei, Indonesia, Iran, Macao, Malaysia, Oman, Paraguay, Philippines, Saudi Arabia, Thailand, United Arab Emirates, Uruguay, Vietnam.

For estimations through ratios-in-ratios, countries in the importers' reference group are also included in the exporters' reference group, so as to maximize sample size. However, the US are not included in the control group for Jordan, and the US and Korea are not included in the one for Chile, because of the agreements entered into force between these countries during the period studied.

Table A.1: Estimated imports elasticity of substitution, with product fixed effects (defined at the HS6 or CN8 level)

	Chile	Israel	Jordan	Morocco	Mexico	Tunisia	Turkey	South Afr.
Estimating equation								
(6) - ratios-in-ratios, OLS on log-linearized								
Sigma	1.20	-4.48	54.97	-1.34	1.02	38.57	0.59	4.64 *
(t-stat.)	(0.20)	(-1.17)	(1.67)	(-0.13)	(0.38)	(1.48)	(0.27)	(1.90)
R2 adj.	0.765	0.822	0.796	0.873	0.832	0.774	0.854	0.776
Observations	654	684	53	286	737	136	1,017	932
(8) - ratios, OLS on log-linearized								
Sigma	0.55	4.40	-3.13	-0.31	-0.12	-1.32	2.13	6.47 ***
(t-stat.)	(0.16)	(0.77)	(-0.91)	(-0.10)	(-0.04)	(-0.43)	(1.17)	(2.72)
R2 adj.	0.881	0.881	0.939	0.906	0.857	0.891	0.891	0.854
Observations	1,530	1,696	157	1,219	1,162	631	3,087	2,138

Source : Authors' calculation, based on TARIC, DBTAR, TARAGRO, Comext, Comtrade (ONU) and BACI (CEPII).

Champ : HS, Chapter 1 to 24, except TRQ products. Years 1999 to 2004.

Note : Estimates are based on equations (6) to (9) above, using yearly data. They are estimated using OLS for (6) and (8), and Poison QMLE for (7) and (9). Year fixed effects, and fixed effect by HS4 position,

are included in each equation. Imports lower than 5,000$ are disregarded in computing logarithms and ratios. *, **, *** denote significance at the 1%, 5% and 10% level.

[ii] TARIC stands for Tarif Intégré des Communautés Européennes. The acronym dates back from happy times when French was the Community's main language. It is noteworthy that official tariffs are defined at the 10 digit level of the EU Combined nomenclature (a subdivision of the UN Harmonized sysem).