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2007

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Documentos de Trabajo
N.º 0720

BANCO DE ESPAÑA
Eurosistema

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(*) This document is best viewed in color. The opinions expressed herein are those of the authors and not necessarily those of Banco de España. We are very grateful to Teresa Molina, who provided invaluable research assistance. We also thank Carmen Broto, George Syrichas and an anonymous referee for many detailed suggestions to improve this paper, as well as Matilde Machado for her invaluable help dealing with many of the econometric issues. Of course, any remaining errors are our own.

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Documentos de Trabajo. N.º 0720
2007

ISSN: 0213-2710 (print)
ISSN: 1579-8666 (on line)
Depósito legal: M.32838-2007
Unidad de Publicaciones, Banco de España

Abstract

In this paper, we estimate a gravity equation properly accounting for omitted exporter and importer's overall trade resistance, through country-yearly dummies for exporter and importer countries. We find that the omission of time-varying multilateral trade resistance terms in the estimation of a gravity equation introduces important biases in the results, although correcting them means we can only compute differences between actual and predicted export shares, instead of levels, as usually done. An application to the calculation of trade potentials in the Euromed region (Southern and Eastern Mediterranean countries) shows that the omission of time-varying multilateral trade resistance terms greatly influences the computation of export potentials as well as the estimated effect of signing a free trade agreement. Overall, we find that, except for Algeria, Jordan and Lebanon, Euromed countries' share of exports to the EU as a whole is at, or slightly above, those predicted by a correctly-specified gravity model, although the share of exports to some individual EU countries is significantly below the predictions of the gravity model. Except for those three countries, we find significant opportunities for export growth to the US, instead.

JEL classification: F12, F14, F15.

Keywords: Gravity model, trade potentials, export shares, Euromed.

1 Introduction

International trade economists have been studying the determinants of international bilateral trade flows since Tinbergen (1962) introduced the so-called gravity equation and Anderson (1979) laid out its theoretical foundation. The theory behind gravity equations includes a supply and demand system that leads to the volume of trade between any two countries to be directly proportional to their economic mass. It is also inversely related to other characteristics that might hamper trade such as distance, the absence of a free trade agreement, or other types of bilateral costs, usually referred to as bilateral trade resistance. Nevertheless, as Anderson and van Wincoop (2003) rightly point out, the volume of trade between any two countries depends not only on their level of bilateral trade resistance but also on how difficult it is for each of them to trade with the rest of the world —what they term multilateral resistance. Higher levels of multilateral resistance should be associated, *ceteris paribus,* with higher bilateral trade volumes.

In this paper, we argue that the time-varying nature of the multilateral resistance terms for different countries should be properly addressed when using panel data to estimate a gravity equation. We suggest the inclusion of country-year fixed effects in the estimation, in an extension of the methodology proposed by Feenstra (2002) for cross-sectional data. We then use the estimated gravity equation to estimate export potentials as the divergence between the actual level of exports and that predicted by the model. The standard measure of export potential used in the literature, the ratio between actual and predicted trade, becomes meaningless in our context. Specifically, including country-year fixed effects in the estimation, which solves the potential bias stemming from omitted variables, also implies that we fit perfectly each country's total exports (and imports) in any given year, and thus the ratio of actual to predicted *total* trade in any period is identically equal to 1. This motivates us to introduce the concept of export share potential: the ratio of actual to predicted *shares* of a country's exports to a given destination. Our measure, thus, captures those export destinations that are over- or under-represented in a country's external trade, with the idea that the bilateral volume of exports is more likely to increase towards those destinations that exhibit an actual export share below those predicted by our model, something that is confirmed by the data.[1] Another by-product of our approach is that it only allows the estimation of in-sample trade potentials, in spite of Egger's (2002) critique, which calls for the correction of as many sources of misspecification as possible.

In our estimation of the determinants of bilateral export flows, we find that the estimated coefficients of explanatory variables that change over time are quite sensitive to the inclusion of country-year dummies, which points to the potential bias introduced by not including them in the gravity equation. This variability of estimated coefficients is also reflected in export potentials that might, in some cases, change dramatically across different specifications, and even reverse sign in a few occasions —that is, predicting that export shares are higher than the model would predict in one specification, and the opposite in a different estimation. Even if export potentials were not to be significantly affected by omitting multilateral resistance to trade in the estimation, a proper specification of the gravity equation is crucial to correctly capture and understand the marginal effect of time-varying independent variables on the volume of bilateral trade. This becomes especially relevant given that the

1. Of course, the definition of an export share implies that the increase in exports vis-à-vis a particular country, which leads to the increase of that particular export share, comes at the expense of the shares of the rest of the world.

variables whose coefficients are more sensitive to the proper specification of the model are policy variables such as those that capture the effect of the various trade agreements and currency unions on bilateral trade flows.

We apply this general setup to the estimation of export share potentials in Euromed countries —countries in the southern and eastern rim of the Mediterranean.[2] According to a number of policy reports [see e.g. World Bank (2003)], one of the most important development challenges in the region is the creation of enough jobs for a rapidly growing work force. Among the possible policy actions to achieve this goal, higher trade integration has been put forward as one of the most sustainable, given insufficient domestic and regional demand in most cases. Indeed, many countries in the region have sought to strengthen their trade with the European Union (EU), their largest export market, through the Euro-Med trade agreements, while intraregional trade is being promoted through the Greater-Arab Free Trade Area (GAFTA) and the Agadir Agreement. Jordan and the United States have signed a free trade agreement, and more such agreements may be forthcoming.

In the empirical exercise, we pay special attention to the impact of the Barcelona process, an effort started in the 90s by the European Union (EU) and a number of these countries to create a Euro-Mediterranean free trade area. The main instruments used to advance towards the creation of such an FTA are bilateral association agreements with the EU (AAEUs) which have come into force with the Palestinian Authority (1997), Tunisia (1998), Morocco (2000), Israel (2000), Jordan (2002), Egypt (2004), Algeria (2005), and Lebanon (2006).

Supported by the evolution of trade in Euromed countries, one of the main criticisms of the association agreements with the EU is that aggregate trade volumes of these countries have not increased as much as it was expected at the time of their signing. From our previous discussion about the effect of introducing country-year dummies, we know that, unfortunately, our estimated total export volumes will be always equal to actual total exports for each country. Thus, our model cannot say whether total exports in Euromed countries are above or below what one would expect. However, we are still able to analyze whether the geographical composition of these countries' exports differs from the one predicted by a well-specified empirical model, and thus provide an idea which destinations might provide higher opportunities for future export growth without any policy change (among the ones already considered as an explanatory variable, such as signing a free trade agreement).

This paper finds two important results with respect to exports from Euromed countries. First, the impact of Euromed association agreements on their exports to the EU depends on whether the specification includes time-varying fixed effects. Estimations with country fixed effects or with country dummies that only change over long periods typically find a significant negative effect of these agreements on bilateral exports. However, in our preferred specification, which includes country-triennial fixed effects, Euromed association agreements have not had any statistically significant effect on bilateral trade volumes with the EU. The second finding, which does not necessarily follow from the former, is that the Euromed agreements have not led to an increase in the share of trade of these countries vis-à-vis the European Union. Actually, our findings seem to suggest that, for most Euromed countries, the biggest unexploited export market is the United States, rather than the EU as a

2. More specifically, we focus on Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Jordan, Lebanon and Syria.

whole, although individual EU countries still represent a share of exports significantly below that implied by the model.

The rest of the paper is structured as follows: section 2 sets up the model and justifies the introduction of country-year dummies in the estimation of the gravity equation, and discusses the construction of export share potentials from estimated export levels. Section 3 describes the data and the estimation results, focusing on export share potentials for the Euromed region. Section 4 concludes.

2 Theory and methodology

2.1 Theoretical derivation of the gravity equation

First, we turn to the standard underlying model of the gravity equation, as derived in Anderson and van Wincoop (2003). Each country produces a fixed quantity of a unique bundle of goods. On the demand side, consumers have a CES utility function. Letting x_{eit} denote the exports from country e to country i in period t, the consumer in country i (the importer country) maximizes the utility function

$$U(x_{eit}) = \left(\sum_e \beta_{et}^{\frac{1-\sigma}{\sigma}} x_{eit}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

subject to the budget constraint

$$\sum_e p_{eit} x_{eit} = y_{it} , \tag{2}$$

where $\beta_e^{(1-\sigma)/\sigma}$ can be interpreted as a measure of the number of goods within the bundle produced by country e; σ is the elasticity of substitution between goods from different countries and the assumption $\sigma>1$ implies that consumers in country i have a preference to consume the biggest possible number of varieties; p_{eit} is the c.i.f. import price from country e to country i at time t, and y_{it} is nominal income in country i at time t.

International trade is costly and these costs take the so-called "iceberg" form, meaning that, at time t, t_{eit} units of good from country e need to be shipped in order for one unit to reach country i. In this setting, these transportation costs augment country e's export price so that $p_{eit}=p_{et}\cdot t_{eit}$ where p_{et} is the export producer price and $(t_{eti}-1)$ is the amount (paid in terms of the good) lost to shipping, which can be interpreted as trade costs.

The solution to country i's consumer optimization problem gives rise to an import demand equation:

$$x_{eit} = \left(\frac{\beta_{et} p_{et} t_{eit}}{P_{it}} \right)^{1-\sigma} y_{it} , \tag{3}$$

where P_{it} is the ideal price index of country i at time t, given by

$$P_{it} = \left(\sum_e \left(\beta_{et} p_{et} t_{eit} \right)^{1-\sigma} \right)^{\frac{1}{1-\sigma}} . \tag{4}$$

Imposing market clearance ($y_{et}=\sum_i x_{eit}$), Anderson and van Wincoop (2003) show that the expression for the bilateral trade flow between country e and country i, can be written as

$$x_{eit} = \frac{y_{et} y_{it}}{y_{wt}} \left(\frac{t_{eit}}{P_{et} P_{it}} \right)^{1-\sigma}, \tag{5}$$

where y_{wt} is world income. The main insight of Anderson and van Wincoop (2003) is to point out the presence of P_{et} and P_{it} in the denominator of (5). They imply that what matters for the size of bilateral trade flows is not the absolute level of trade barriers (t_{eit}) but bilateral barriers between trading partners *relative* to those they have with respect to the rest of the world, captured by their respective overall price indices. Taking logs of equation (5), we obtain the following linear relationship:

$$\ln x_{eit} = \beta_0 + \beta_1 \ln t_{eit} + \beta_2 \ln y_{et} + \beta_3 \ln y_{it} + \beta_4 \ln y_{wt} + \beta_5 P_{et} + \beta_6 P_{it} + \eta_{eit}\ , \tag{6}$$

where η_{eit} is a white noise term. The presence of the unobserved price indices P_{et} and P_{it} implies that the estimation of the gravity equation (6) without taking them into account incurs severe biases, as they would be included in the error term which would, then, be correlated with t_{eit}, according to equation (4). Therefore, in order to properly estimate equation (6), three strategies have been suggested: (i) the use of price index data directly, to approximate the price indices [as in Baier and Bergstrand (2001)]; (ii) the estimation of P_{et} and P_{it} using a multi-step procedure as proposed by Anderson and van Wincoop (2003), or (iii) the inclusion of exporter and importer dummies in the regression as suggested by Feenstra (2002). The problem with the first approach is that published price indexes may not accurately reflect all trade costs and they are not available for all countries or for all the time periods in our sample. The second approach is rather involved and computationally costly, requiring a customized nonlinear-least-squares procedure, so most empirical work has tried to follow Feenstra's suggestion and include country dummies for exporters and importers to account for P_{et} and P_{it}. We, therefore, implement equation (6) in the following way:

$$\ln x_{eit} = \beta_0 + \beta_1 \ln t_{eit} + d_{et} + d_{it} + \varepsilon_{eit}\ , \tag{7}$$

where d_{et} and d_{it} are time-varying exporter and importer dummies, which also capture the effect of importer and exporter's GDP (y_{et} and y_{it}) and world GDP (y_{wt}) in equation (6).[3]

We approximate the bilateral trade resistance variable t_{eit} as:

$$\ln t_{eit} = \boldsymbol{\alpha}\mathbf{Z}_{ei} + \boldsymbol{\gamma}\mathbf{Z}_{eit} + \nu_{eit}\ , \tag{8}$$

where $\mathbf{Z}_{ei}$ represents a vector of explanatory variables which depend on the specific ei country pair but which are constant over time, and $\mathbf{Z}_{eit}$ represents a vector of time-and-country-pair varying explanatory variables. We test different specifications of (8) that include, among the $\mathbf{Z}_{ei}$ variables, distance between trading partners, dummies for a common land border, a common language, a common colonizer, a current colonial relationship, a past colonial relationship, and an index of religious similarity (see data appendix for details on the construction of these variables). Among the $\mathbf{Z}_{eit}$ variables, we include dummies for membership in the same free trade area and the same currency union as well as dummies to account for the trade creation and trade diversion effects of trade agreements and currency unions on non-member countries.[4] Notice that, once we introduce country-year dummies d_{et} and d_{it}, these capture all the effect of any exporter-time or importer-time specific

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3. Notice that, although equation (5) would imply that $\beta_2=\beta_3=1$, Anderson (1979) shows that the presence of non-tradables would imply coefficients lower than unity. In those cases where we illustrate the effect of excluding the country-year dummies d_{et} and d_{it}, we estimate β_2 and β_3 instead of imposing the above restriction.

4. In particular for each free trade agreement we analyze, we consider a dummy when both countries are in the same FTA, another dummy when only the exporter is a member of that FTA and a third one when only the importer belongs to that FTA.

components included in equation (6), such as their respective GDPs and world income, but also other variables that have traditionally been introduced in the specification of (8) such as land area, and their landlocked or island status as well as other factors which are harder to account for such as the importance of the tradable sector and the degree of home bias in each country.

Substituting equation (8) into (7), the gravity equation we take to the data is given by:

$$\ln x_{eit} = \mathbf{bZ}_{ei} + \mathbf{cZ}_{eit} + d_{et} + d_{it} + \varepsilon_{eit} \, . \qquad (9)$$

It is worthwhile pointing out that, unlike most empirical studies, that focus exclusively on the average volume of trade between any two countries and where, therefore, each country pair is only represented by one observation, we consider directional bilateral trade flows. In other words, for every country pair, e and i, we consider not only exports from country e to country i (x_{eit}) but also exports from country i to country e (x_{iet}). This approach allows us to avoid a possible misspecification error stemming from taking the logarithm of the average of two highly asymmetrical trade flows between two countries (as it might be the case for those bilateral relationships that exhibit a large trade deficit or surplus). Another advantage of considering directional flows is that they allow us to estimate potential trade creation and trade diversion effects arising from the creation of free trade areas and currency unions.

2.2 Computation of trade potentials

The literature on trade potentials usually defines bilateral export potentials as the difference between actual exports and the level of exports that would be expected given the characteristics of the country pair, that is, the level of trade predicted by a properly specified empirical gravity model. Following our notation, the traditional definition of export potential $X_{eit}{}^{P}$ could be [see e.g. de Benedictis and Vicarelli (2005)]

$$X_{eit}{}^{P} = \frac{e^{\ln x_{eit}}}{e^{\overline{\overline{\ln x_{eit}}}}} \, , \qquad (10)$$

where $\overline{\overline{\ln x}}$ is the predicted log of (the level of) exports, from the estimation of the gravity equation (9). Values of $X_{eit}{}^{P}$ below 1 would imply that observed exports from country e to country i are below what one should expect given their individual and bilateral characteristics.

Constructing an analog measure of export potential for total trade for a given exporter e is not straightforward. Given that in our estimation we obtain the predicted log of exports ($\overline{\overline{\ln x_{eit}}}$) and not the predicted level of exports, we could construct the analog of (10) for total exports for country e to the rest of the world:

$$X_{eWt}{}^{P} = \frac{e^{\ln \sum_i x_{eit}}}{e^{\ln \sum_i e^{\overline{\overline{\ln x_{eit}}}}}} \qquad (11)$$

However, a conceptual paradox arises with the use of this measure. The inclusion of country-year exporter dummies (d_{et}) in our estimation implies that the sum (across all partners) of predicted log of exports $\left(\sum_i \overline{\overline{\ln x_{eit}}}\right)$ should necessarily be equal to the sum of the log of actual exports $\left(\sum_i \ln x_{eit}\right)$. Thus, in the context of our estimated gravity model (9), we should expect an index of export potentials with respect to all partners (i.e. the world) to be equal to one. Note, however, that we fit the log of exports and not exports when estimating (9). Jensen's inequality implies that $\sum_i e^{\ln x_{eit}} < e^{\sum_i \ln x_{eit}}$, thus, the estimated measure of export potential with respect to the world ($X_{eWt}{}^{P}$) in equation (11) is, in general, different from one, even when the presence of exporter-year dummies (d_{et}) should, in theory, allow us to perfectly predict total exports for each origin country e every year t:

$$X_{eWt}{}^{P} = \frac{e^{\ln \sum_i x_{eit}}}{e^{\ln \sum_i e^{\overline{\overline{\ln x_{eit}}}}}} \neq \frac{e^{\sum_i \ln x_{eit}}}{e^{\sum_i \overline{\overline{\ln x_{eit}}}}} = 1 \tag{12}$$

Given this shortcoming, and the fact the use of exporter-year dummies only allows us to predict deviations from average exports, we still estimate the gravity equation (9) in log-levels but modify our index of trade potentials to show deviations from predicted *shares* of destination market i on total exports of country e. Given that we consider departures from predicted shares and not from levels of exports, we find it more meaningful to compute the difference between the actual share of exports to destination country i minus the predicted share of exports:

$$X_{eit}{}^{PS} = \frac{e^{\ln x_{eit}}}{e^{\ln \sum_i x_{eit}}} - \frac{e^{\overline{\overline{\ln x_{eit}}}}}{e^{\ln \sum_i e^{\overline{\overline{\ln x_{eit}}}}}} = \frac{x_{eit}}{\sum_i x_{eit}} - e^{\left(\overline{\overline{\ln x_{eit}}} - \ln \sum_i e^{\overline{\overline{\ln x_{eit}}}}\right)} \tag{13}$$

where $\overline{\overline{\ln x}}$ is still the predicted log of (the level of) bilateral exports, which is used to construct predicted export shares $e^{\overline{\overline{\ln x_{eit}}}} \Big/ e^{\ln \sum_i e^{\overline{\overline{\ln x_{eit}}}}}$. Notice that now the export share potential to the world is always equal to 0 (i.e. actual share of exports to the world and the predicted share are both equal to one) as would be expected:

$$X_{eWt}{}^{PS} = \frac{e^{\ln \sum_i x_{eit}}}{e^{\ln \sum_i x_{eit}}} - \frac{e^{\ln \sum_i e^{\overline{\overline{\ln x_{eit}}}}}}{e^{\ln \sum_i e^{\overline{\overline{\ln x_{eit}}}}}} = 0 \tag{14}$$

When computing trade potentials as in equation (10) or (13) one could, in principle, use an in-sample or an out-of-sample prediction of trade flows. Although the use of in-sample predictions for trade potentials is criticized by Egger (2002), we use them instead of out-of-sample predictions for two reasons. First, given that the econometric specification calls for the use of country-year dummies, it would be obviously impossible to perform an out-of-sample estimation. Second, as pointed out by de Benedictis and Vicarelli (2005), the use of out-of-sample estimates of trade could also be biased if the gravity equation estimated with the benchmark countries is misspecified, so there is no obvious advantage to the use of out-of-sample predictions.

3 Data and estimation results

3.1 Trade in Euromed countries

In the empirical exercise, we conduct the estimation of the gravity equation (9) for a large number of countries but we concentrate on the evolution of export potentials for Euromed countries —countries in the southern and eastern rim of the Mediterranean. What are the main characteristics of the evolution of trade for these countries? In the last 30 years it has been broadly characterized by a relative stagnation of their trade openness and a continued reliance on the EU as the main destination for their exports.

Figure 1: Trade integration in emerging regions

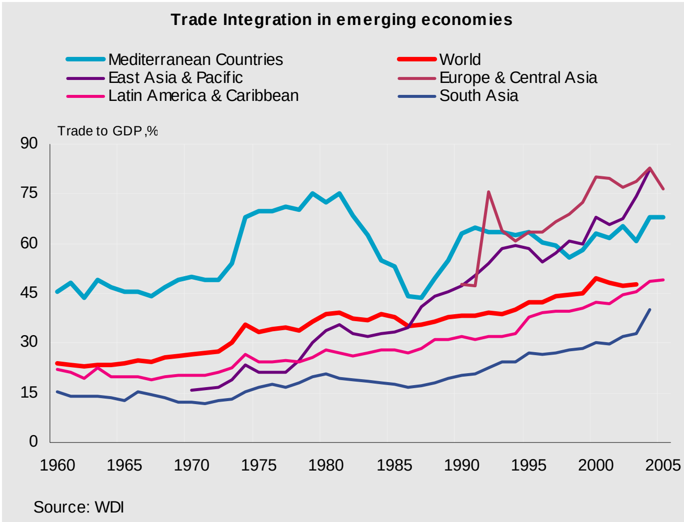


Figure 2: Trade integration of Mediterranean countries

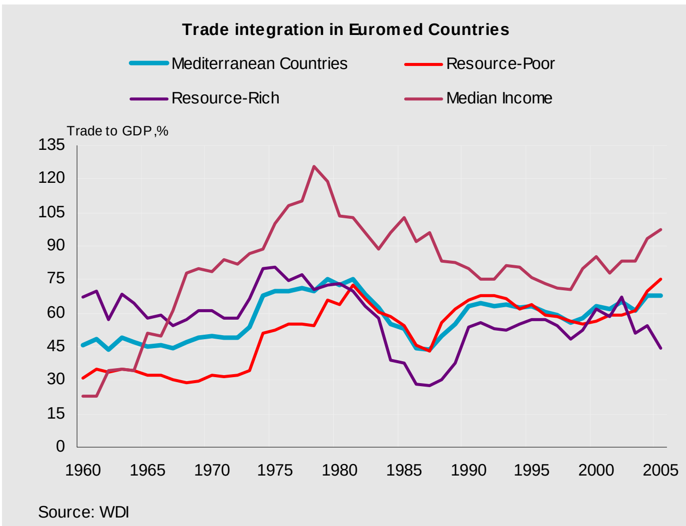
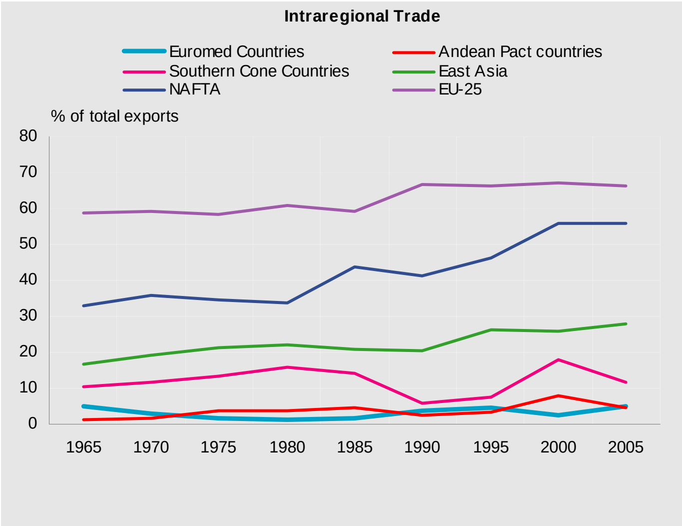


Figure 3: Intraregional Trade



Despite some policy initiatives geared towards increasing their trade with the EU and fostering intraregional trade, figure 1 shows that trade integration (measured as the sum of exports and imports as percentage of GDP) of the Euromed region has remained stable while in the rest of emerging regions has increased throughout the sample (especially more so in East Asia). Figure 2 decomposes the evolution of this ratio for Euromed countries by dividing them into three categories: resource-rich countries (Algeria, Libya, and Syria), resource-poor countries (Egypt, Jordan, Lebanon, Morocco, and Tunisia) and high income countries (Israel). For these countries, trade integration increased in the early 70's mostly thanks to the increase in oil prices that raised the value of exports as well as the volume of imports of resource-rich countries in the group, even though resource-poor countries also followed a similar pattern. After a pronounced fall in the beginning of the 80s, only resource-poor countries seem to have returned to the openness levels of the end of the 70s. Even if we consider intraregional trade, it has not increased beyond the levels reached in the 60s, as opposed to the advance of intraregional trade in the EU, the Americas and East Asia (see figure 3), perhaps in part due to the earlier creation of free trade agreements in those regions. There has been, however, some advance in trade integration with other countries in the Middle East outside Euromed countries (see table 1 below).

Trade in Euromed countries is also characterized by its geographic concentration. Table 1 shows the geographic destination of exports from the main emerging regions in 1976 and 2005. Two facts stand out from that table. First, industrial countries in Europe (mostly the EU) are the main destination of exports from the region, purchasing around half of them. This puts the Euromed region as one of the emerging areas more dependent on the EU for foreign demand, only behind Eastern and Central Europe. Second, in the last 30 years, the region has even slightly increased its reliance on the EU as export destination (with the exception of Israel, which has diversified away from Europe to the US) in a process similar to other emerging economies, which have also increased its reliance on an area as destination for its exports. As opposed to the Euromed region, however, most of the other emerging areas have switched the main destination of their exports to a different region in the last 30 years.

Table 1

Geographic Destination of exports in 1976 and 2005
Share of total exports, unless otherwise specified.

	1976										
Destination		**Industrial Countries**				**Emerging Economies**					
Country	WORLD (USD mill.)	All Industrial Countries	Industrial Europe	North America	Asia and Pacific	Africa	Asia	Europe	Middle East	Latin America	Area not specified
Euromed Countries	3217	66.99	46.50	18.53	1.95	1.97	2.58	14.32	4.33	2.23	1.52
Resource- Poor	1171	46.86	40.45	4.00	2.41	2.87	2.97	25.03	6.63	2.38	2.79
Resource- Rich	5641	87.82	53.15	33.81	0.85	0.66	0.65	5.99	1.67	1.91	0.56
High Income	2415	69.84	45.96	19.73	4.12	3.19	7.99	3.03	5.00	2.80	0.07
Eastern and Central Europe 4	5666	36.80	31.93	4.09	0.79	0.86	1.37	29.70	4.98	0.73	5.66
East Asia 5	3103	33.05	6.78	11.91	14.32	0.65	7.37	0.39	1.80	1.49	0.02
Latin America 4	6678	67.53	31.62	29.75	6.14	2.22	1.38	6.89	2.57	16.56	1.47
All developing Countries	251516	66.05	32.85	20.65	12.39	2.12	8.24	7.31	3.85	7.96	1.18
	2005										
Destination		**Industrial Countries**				**Emerging Economies**					
Country	WORLD (USD mill.)	All Industrial Countries	Industrial Europe	North America	Asia and Pacific	Africa	Asia	Europe	Middle East	Latin America	Area not specified
Euromed Countries	168548	66.57	50.06	17.60	0.93	3.53	6.40	4.46	12.14	2.68	0.14
Resource- Poor	41783	60.89	56.00	10.15	0.94	5.33	6.80	3.71	14.65	1.73	0.02
Resource- Rich	84252	74.25	53.28	20.85	0.11	1.63	2.01	4.64	13.09	3.98	0.39
High Income	42514	69.30	20.18	37.58	2.85	1.42	15.47	6.83	0.49	3.11	0.00
Eastern and Central Europe 4	302881	65.93	60.07	4.53	0.63	1.80	2.06	21.13	6.44	0.83	0.01
East Asia 5	1383377	51.31	17.01	20.97	13.38	2.10	35.65	4.37	3.31	2.98	0.18
Latin America 4	417071	60.16	16.05	41.12	2.85	2.32	10.78	2.68	3.03	19.53	0.19
All developing Countries	4435360	51.94	26.04	20.13	8.40	2.20	28.37	7.55	3.84	4.33	0.10

Euromed countries:
Resource-Poor: Morocco, Tunisia, Egypt, Jordan and Lebanon; Resource-Rich: Algeria, Libya and Syria; Median Income: Israel
Note: East Asia 4: China, Indonesia, Malaysia, Republic of Korea and Thailand.
Eastern and central Europe 4: Czech Republic, Hungary, Poland and Turkey.
Latin America 4: Argentina, Brazil, Chile and Mexico.
Source: DOTS, IMF 2006.

3.2 Data and estimation of the gravity equation

Our original dataset includes bilateral trade flows for a total of 205 countries from 1948 to 2005 (although with many missing observations). Unfortunately, the use of country-year dummies in our specification makes it computationally unfeasible to include all countries and all years. We therefore restrict our sample to include a subset of the top 100 exports (by total exports) in 2004, as well as the Euromed countries that are the subject of our study. This implies that our dataset contains 102 countries that, together, cover over 98.4% of reported world trade for 2004.[5] For computational purposes, we also shorten the time dimension of the panel to the last 30 years of data, that is, from 1976 to 2005. The data is described in more detail in the data appendix.

A number of studies [e.g. Nugent (2002); Péridy (2005a and b), and Soderling (2005)] have tried to ascertain the trade potential of the Euromed region. Unfortunately, to our knowledge, none of them have properly accounted for the possible bias introduced by the potential omission of P_{et} and P_{it} through the use of country-year dummies, as we do in this paper. Most studies introduce time dummies (d_t), together with country dummies (d_e and d_i), which, of course, fail to capture the (potentially diverging) evolving nature of total trade resistance captured by the exporter and importer price indexes. This potential bias presumably becomes larger the longer the time span used by the study.

Another feature of our estimation of the gravity equation (9) is the inclusion in the set of bilateral characteristic that change over time ($\mathbf{Z}_{eit}$) of a large array of dummy variables for

5. Lebanon and Cyprus are not among the world's top 100 exporters but they are included in our sample. The former is one of the Euromed countries, the focus of out study, whereas the latter is an important trading partner for some of the countries in the group. In some regressions presented later, as a robustness check, we restrict the sample even further, to the 70 top exporters plus Euromed countries. Even with that further restriction to 70 countries, we still cover well over 96% of total world trade for 2004.

different trade agreements.[6] The potential trade creation and trade diversion effects following the creation of free trade areas (FTAs) is something stressed by the literature on the formation of free trade areas. There are three possible effects to be considered: trade creation inside the newly created FTA, trade diversion from outside the FTA and also a possible trade creation outside the FTA. In the first case, trade increases among members of an FTA as the mutual import tariffs fall to zero, the usual trade creation effect. Second, it could be the case that the increase in trade within the agreement could come at the expense (act as a substitute) of trade with countries outside the free trade area depending on specialization patterns, absolute and comparative advantage, and the different elasticities of substitution among goods produced in different countries. This second effect corresponds to what has been termed as the trade diversion effect. Finally, if by entering a FTA a country is forced to adopt a common external tariff that is lower than his current tariff to a non-member of the FTA, we could also observe trade creation not only inside an FTA, but outside as well.[7] Therefore, from a global perspective, the total trade creation and welfare effects of a free trade area hinges on the combined importance of all three effects. With these effects in mind, we make an attempt to capture both trade creation and trade diversion effects by including three dummy variables for each agreement. The first dummy variable takes a value of 1 when both trading partners have signed a free trade agreement and it captures the trade creation effects inside an FTA. The second binary variable takes a value of one when only the exporter is in an FTA, to capture the trade diversion effect of its creation. Finally, a third dummy variable takes value of 1 if only the importer is in an FTA, to measure the possible trade creation effect for a partner outside an FTA. Notice that previous studies that attempted to capture trade creation or trade diversion effects of Euromed association agreements with the EU could not capture these three different effects as they aggregated bilateral exports and imports for each country pair [e.g. Nugent (2002)] whereas we keep two observations (exports in each direction) for every country-pair and year.

One way to assess the potential bias of not considering multilateral trade resistance terms in the estimation of a gravity equation is to compare its parameter estimates with the case of a properly specified model. To this end, we present in tables 2 and 3 the estimated coefficients for gravity equations that do not include multilateral trade resistance terms, in a similar way to Nugent (2002), Péridy (2005a and b) and Soderling (2005). More formally, table 2 displays the results of estimating a pooled OLS regression (we use the term pooled to refer to regressions that do not include any kind of fixed effects). Table 3, in turn, shows the coefficients of an OLS regression including only exporter, importer and time dummies (d_e, d_i and d_t). In other words, tables 2 and 3 report, respectively, the estimation of the following gravity equations:

$$\ln x_{eit} = \mathbf{a_1 Z}_e + \mathbf{a_2 Z}_i + \mathbf{a_3 Z}_{et} + \mathbf{a_4 Z}_{it} + \mathbf{bZ}_{ei} + \mathbf{cZ}_{eit} + \varepsilon_{eit} \qquad (15)$$

$$\ln x_{eit} = \mathbf{a_3 Z}_{et} + \mathbf{a_4 Z}_{it} + \mathbf{bZ}_{ei} + \mathbf{cZ}_{eit} + d_e + d_i + d_t + \varepsilon_{eit} \qquad (16)$$

where $\mathbf{Z}_e$ and $\mathbf{Z}_i$ include exporter and importer's time invariant characteristics (such as land area, coastline length, and whether they are an island or landlocked) and $\mathbf{Z}_{et}$ and $\mathbf{Z}_{it}$ include exporter and importer time-varying characteristics, such as GDP or population. The inclusion

6. The complete list of trade agreements together with its members and its signing date are available in the data appendix.

7. Countries forming a FTA could also experience an increase in their imports from non-members if trading costs are mostly sunk: once an exporter has incurred the expenses associated with satisfying common regulations for one of the members of the FTA it automatically can start exporting to other members of the FTA as well.

of the exporter and importer dummies in equation (16) means that we cannot include exporter and importer characteristics ($\mathbf{Z}_e$ and $\mathbf{Z}_i$) as we did in the pooled regression model described by equation (15).

In both tables 2 and 3, the left half (regressions 1 to 4) estimate a gravity model with 30 years of data and different number of countries included in the sample (70, 100, 150 or 205).[8] The right half of both tables (regressions 5 to 8) repeats these estimations, with different number of countries, for a longer time span, from 1948 to 2005.

Table 2. Estimates from a pooled OLS regression without fixed effect (equation 15)

OLS regressions

Pooled regression, without fixed effects

Dependent variable: Log of exports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance (log)	-0.943***	-1.056***	-1.094***	-1.111***	-0.827***	-0.964***	-1.006***	-1.028***
	(0.091)	(0.029)	(0.025)	(0.022)	(0.026)	(0.027)	(0.024)	(0.021)
Common border dummy	-0.280	0.451***	0.601***	0.600***	0.468***	0.428***	0.576***	0.573***
	(0.334)	(0.113)	(0.099)	(0.090)	(0.114)	(0.107)	(0.092)	(0.084)
Common country dummy	excluded	excluded	0.034	-0.066	excluded	excluded	0.307	0.294
			(0.371)	(0.350)			(0.308)	(0.287)
Ever in colonial relationship dummy	0.762***	1.044***	1.210***	1.393***	0.999***	1.136***	1.306***	1.446***
	(0.277)	(0.101)	(0.093)	(0.085)	(0.116)	(0.100)	(0.092)	(0.083)
Common language dummy	0.035	0.338***	0.390***	0.370***	0.377***	0.361***	0.437***	0.433***
	(0.176)	(0.055)	(0.044)	(0.040)	(0.065)	(0.052)	(0.042)	(0.038)
Common colonizer dummy	0.053	0.778***	0.584***	0.629***	0.580***	0.717***	0.550***	0.596***
	(0.297)	(0.102)	(0.071)	(0.060)	(0.159)	(0.098)	(0.068)	(0.057)
Exporter's GDP (log)	1.491***	1.005***	0.976***	0.976***	0.947***	1.022***	0.989***	0.975***
	(0.087)	(0.024)	(0.017)	(0.015)	(0.027)	(0.022)	(0.016)	(0.015)
Importer's GDP (log)	1.061***	0.785***	0.799***	0.805***	0.726***	0.799***	0.814***	0.810***
	(0.101)	(0.022)	(0.016)	(0.014)	(0.023)	(0.020)	(0.015)	(0.014)
Exporter's Popul. (log)	-0.434***	-0.124***	-0.096***	-0.115***	-0.121***	-0.168***	-0.137***	-0.136***
	(0.085)	(0.024)	(0.018)	(0.016)	(0.026)	(0.022)	(0.017)	(0.015)
Importer's Popul. (log)	-0.352***	-0.023	-0.030*	-0.063***	-0.023	-0.048**	-0.057***	-0.075***
	(0.094)	(0.021)	(0.016)	(0.015)	(0.023)	(0.020)	(0.015)	(0.014)
Both countries in EU	-2.579***	2.854***	2.567***	2.191***	2.368***	3.181***	2.949***	2.614***
	(0.706)	(0.205)	(0.195)	(0.190)	(0.207)	(0.201)	(0.192)	(0.187)
Only exporter in EU	-1.478***	1.571***	1.373***	1.160***	1.064***	1.699***	1.552***	1.371***
	(0.496)	(0.148)	(0.133)	(0.124)	(0.145)	(0.147)	(0.132)	(0.124)
Only importer in EU	-1.712***	0.790***	0.743***	0.678***	0.476***	1.070***	1.070***	1.031***
	(0.474)	(0.145)	(0.136)	(0.130)	(0.152)	(0.142)	(0.133)	(0.128)
Both countries are members of an EU association agreement	3.383***	0.233*	0.458***	0.696***	0.775***	0.010	0.187*	0.414***
	(0.521)	(0.120)	(0.116)	(0.112)	(0.119)	(0.116)	(0.112)	(0.109)
Only exporter is a member of an EU association agreement	1.862***	0.321***	0.480***	0.526***	0.817***	0.217**	0.345***	0.381***
	(0.405)	(0.090)	(0.080)	(0.075)	(0.077)	(0.090)	(0.079)	(0.074)
Only importer is a member of an EU association agreement	1.994***	0.215**	0.349***	0.367***	0.515***	0.037	0.128	0.136*
	(0.344)	(0.091)	(0.084)	(0.080)	(0.096)	(0.087)	(0.081)	(0.077)
Both countries are members of an EU - Euromed agreement	-0.080	-1.516***	-1.348***	-1.156***	-1.449***	-1.648***	-1.514***	-1.306***
	(0.243)	(0.128)	(0.123)	(0.122)	(0.136)	(0.129)	(0.125)	(0.124)
Only exporter is a member of an EU - Euromed agreement	0.303	-0.747***	-0.649***	-0.574***	-0.767***	-0.823***	-0.751***	-0.675***
	(0.191)	(0.090)	(0.083)	(0.078)	(0.104)	(0.091)	(0.083)	(0.079)
Only importer is a member of an EU - Euromed agreement	0.692***	0.030	0.031	-0.016	0.014	-0.060	-0.099	-0.149*
	(0.195)	(0.086)	(0.082)	(0.080)	(0.095)	(0.087)	(0.082)	(0.080)
Both countries in Euro Area	-0.552***	0.395***	0.377***	0.344***	0.393***	0.386***	0.372***	0.345***
	(0.134)	(0.121)	(0.121)	(0.123)	(0.116)	(0.123)	(0.122)	(0.122)
Only exporter in Euro Area	-0.214*	0.376***	0.360***	0.281***	0.392***	0.324***	0.294***	0.213***
	(0.122)	(0.050)	(0.045)	(0.042)	(0.057)	(0.052)	(0.046)	(0.042)
Only Importer in Euro Area	0.165	0.295***	0.297***	0.237***	0.290***	0.197***	0.195***	0.133**
	(0.161)	(0.060)	(0.056)	(0.053)	(0.071)	(0.062)	(0.058)	(0.054)
Constant	-33.249***	-23.980***	-23.812***	-23.018***	-22.734***	-24.265***	-23.981***	-23.150***
	(1.801)	(0.490)	(0.392)	(0.339)	(0.519)	(0.455)	(0.373)	(0.329)
Observations	6940	172732	254117	314942	141694	212581	311570	381228
R-squared	0.73	0.60	0.60	0.60	0.58	0.59	0.59	0.59
Initial year in sample	1976	1976	1976	1976	1948	1948	1948	1948
Final year in sample	2005	2005	2005	2005	2005	2005	2005	2005
Number of countries	70	100	150	205	70	100	150	205

Also included dummies for other free-trade agreements:
US-Israel, US-Chile, NAFTA, CARICOM, MERCOSUR, EFTA, CAN, CACM, CER and AFTA
Robust standard errors (clustering by country pair) in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

8. In this case we can include up to 205 countries (the maximum number in our sample) given that the number of dummies is significantly reduced by considering country dummies (fixed over time).

Table 3. Estimates from a OLS regression with exporter, importer, and time dummies (equation 16)

OLS regressions

Including exporter and importer fixed effects and time dummies

Dependent variable: Log of exports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance (log)	-1.316***	-1.307***	-1.321***	-1.378***	-1.170***	-1.156***	-1.169***	-1.226***
	(0.027)	(0.035)	(0.026)	(0.022)	(0.025)	(0.030)	(0.023)	(0.020)
Common border dummy	0.042	0.350***	0.562***	0.697***	0.036	0.282***	0.461***	0.582***
	(0.110)	(0.107)	(0.089)	(0.082)	(0.099)	(0.099)	(0.082)	(0.075)
Common country dummy	excluded	excluded	0.809*	1.827***	excluded	excluded	0.711	1.631***
			(0.481)	(0.556)			(0.536)	(0.556)
Ever in colonial relationship dummy	0.785***	1.057***	1.193***	1.435***	1.050***	1.259***	1.377***	1.567***
	(0.115)	(0.103)	(0.091)	(0.081)	(0.123)	(0.104)	(0.094)	(0.083)
Common language dummy	0.519***	0.418***	0.380***	0.308***	0.418***	0.335***	0.337***	0.285***
	(0.060)	(0.051)	(0.039)	(0.035)	(0.053)	(0.046)	(0.036)	(0.032)
Common colonizer dummy	0.550***	0.811***	0.867***	0.862***	0.477***	0.775***	0.851***	0.873***
	(0.123)	(0.078)	(0.056)	(0.047)	(0.111)	(0.074)	(0.053)	(0.045)
Both countries in EU	0.333*	0.377**	0.105	0.008	1.030***	1.236***	0.750***	0.559***
	(0.174)	(0.173)	(0.166)	(0.167)	(0.168)	(0.158)	(0.155)	(0.157)
Only exporter in EU	0.137	0.282***	0.166*	0.099	0.605***	0.868***	0.655***	0.553***
	(0.109)	(0.099)	(0.089)	(0.090)	(0.109)	(0.104)	(0.092)	(0.090)
Only importer in EU	-0.098	0.138	0.137	0.133	0.054	0.366***	0.298***	0.270***
	(0.120)	(0.106)	(0.098)	(0.095)	(0.120)	(0.106)	(0.102)	(0.097)
Both countries are members of an	-0.215*	-0.069	-0.026	-0.009	-0.316***	-0.255***	0.057	0.096
EU association agreement	(0.112)	(0.114)	(0.108)	(0.109)	(0.099)	(0.089)	(0.087)	(0.088)
Only exporter is a member of an	0.119*	0.102	0.190***	0.166***	0.151**	-0.003	0.195***	0.164***
EU association agreement	(0.072)	(0.066)	(0.059)	(0.058)	(0.066)	(0.065)	(0.056)	(0.054)
Only importer is a member of an	0.223**	0.093	0.058	0.053	0.023	-0.107	-0.031	-0.021
EU association agreement	(0.088)	(0.077)	(0.069)	(0.066)	(0.082)	(0.068)	(0.065)	(0.061)
Both countries are members of an	-0.131	-0.340***	-0.167**	-0.021	-0.356***	-0.445***	-0.102	0.070
EU - Euromed agreement	(0.093)	(0.087)	(0.081)	(0.080)	(0.101)	(0.094)	(0.089)	(0.088)
Only exporter is a member of an	0.109	0.039	0.081	0.153***	-0.028	-0.069	0.041	0.106*
EU - Euromed agreement	(0.073)	(0.065)	(0.058)	(0.057)	(0.079)	(0.071)	(0.064)	(0.062)
Only importer is a member of an	0.126**	0.011	0.015	-0.006	0.093	0.026	0.055	0.033
EU - Euromed agreement	(0.064)	(0.058)	(0.054)	(0.053)	(0.074)	(0.067)	(0.063)	(0.061)
Both countries in Euro Area	0.188**	0.080	0.161	0.177	0.539***	0.513***	0.679***	0.655***
	(0.087)	(0.096)	(0.107)	(0.111)	(0.085)	(0.090)	(0.097)	(0.101)
Only exporter in Euro Area	0.155***	0.155***	0.188***	0.161***	0.361***	0.385***	0.438***	0.375***
	(0.038)	(0.032)	(0.027)	(0.025)	(0.042)	(0.035)	(0.030)	(0.027)
Only Importer in Euro Area	0.118***	0.068*	0.066*	-0.040	0.168***	0.159***	0.218***	0.092**
	(0.044)	(0.039)	(0.036)	(0.034)	(0.053)	(0.045)	(0.040)	(0.038)
Observations	126941	206686	336701	427421	199262	307342	480513	588643
R-squared	0.98	0.97	0.96	0.96	0.98	0.97	0.96	0.96
Initial year in sample	1976	1976	1976	1976	1948	1948	1948	1948
Final year in sample	2005	2005	2005	2005	2005	2005	2005	2005
Number of countries	70	100	150	205	70	100	150	205

Also included dummies for other free-trade agreements:
US-Israel, US-Chile, NAFTA, CARICOM, MERCOSUR, EFTA, CAN, CACM, CER and AFTA
Robust standard errors (clustering by country pair) in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

From the previous discussion, we know that the coefficients presented in tables 2 and 3 are biased because of omitted variables —the price indices, P_{et} and P_{it}— which capture the effect of multilateral resistance and which are, by definition, correlated with bilateral trade resistance (t_{eit}). This bias is likely to be more acute for the coefficients presented in table 2 where no effort is made to control for it, at least with time-invariant country dummies as in table 3 and in the previous literature. However, given that the theory predicts that these multilateral resistance terms are time-variant, even the coefficients presented in table 3 remain subject to potential biases. To be precise, a necessary condition for the results presented in table 3 to be biased is that the price indices of the different countries do not share a common time trend. If they did, no bias would result from the use of separate exporter, importer and time dummies since the first two would capture differences in the absolute levels of multilateral resistance while the third would capture their common time trend. Looking at the difference between coefficients in the same column in table 2 and 3 seems to imply that the multilateral resistance terms are indeed relevant, and their exclusion (at least as a country fixed effect) leads to significant bias.

The coefficients from table 3 are largely consistent with previous estimates of the determinants of bilateral trade flows. In a paper that also studies the trade performance of Middle East and North African countries, Soderling (2005) finds very similar coefficients for the main variables such as distance, border (adjacency), and language. Likewise, Feenstra (2002) finds an estimate for the effect of distance and of a land border on bilateral trade flows very similar to the ones we report in table 3.

Given that we know that coefficients obtained from the estimation of equations (15) and (16) suffer from potential biases, we return to attempting a proper estimation of equation (9). Unfortunately, the use of 100 countries and 30 years of data would require the inclusion of over 6,000 dummies for the estimation, virtually making it computationally unfeasible.[9] Therefore, we choose to keep 30 years of data and restrict the number of countries to the top 70 exporters in 2004, including all Euromed countries (even if they do not satisfy this criterion). An alternative specification we consider is the inclusion of country-time dummies defined alternatively as country-triennial or country-quinquennial dummies. These specifications have the advantage of reducing the number of dummy regressors to less than one third of those used in the original estimation. This allows us to increase our panel in both dimensions either with the inclusion of more countries or with the extension of the period considered. While these alternative specifications do not exactly capture the effect of exporter and importer time-varying price indexes (P_{et} and P_{it}), the associated estimation bias will presumably be much smaller than that of considering a single non-time-varying country dummy over the 30 years of the sample as we did when estimating equation (16).

Table 4 presents a comparison of the parameter estimates for $\mathbf{b}$ and $\mathbf{c}$ in (9) using different samples and time spans for the definition of the country-time dummies. The first five columns in table 4 show the estimation of a gravity model for 70 countries using country-time dummies where these dummies remain fixed in intervals of one, three, five, six, and ten years, respectively. The next four columns increase the sample to 100 countries and show the results of the estimation with country-time dummies where these dummies remain fixed over three, five, six, and ten-year intervals.

We can now return to our discussion about the effect of omitting the multilateral resistance effects on the estimation of a gravity equation. We have seen from the comparison of tables 2 and 3 that at least the inclusion of country fixed effects is warranted. If we compare tables 3 and 4 we can go even further and point to the importance of including time-varying multilateral resistance terms (i.e. country-year time dummies) to avoid estimation biases that appear to be especially relevant for time-varying regressors. It seems that the coefficients of country-pair-and-time-varying explanatory variables such as membership of an FTA or the euro area are very sensitive to the inclusion or not of time-varying multilateral resistance terms. For instance, the coefficient on both countries having signed an Euromed agreement is significantly negative in column 2 in table 3 (a regression with exporter and importer fixed effects for 100 countries over 30 years) implying a decline in trade of around 29%.[10] However, the analog coefficients in columns 6 to 9 of table 4, which properly estimate the gravity equation (9) in a regression with the same sample but with exporter-year and importer-year dummies, are not statistically different from zero. Similar changes in parameter estimates are observable for other free trade agreements that we do not report in tables 2 through 4 since they are not the focus of this paper but that are available upon request.

Turning to the different estimations in table 4, if we compare the first five columns, a few regularities emerge which deserve our attention. When comparing the coefficients of the exporter-importer characteristics ($\mathbf{Z}_{ei}$) such as distance, the presence of a land border, or colonial relationships, we find that they are extremely robust across specifications. However, as we expected, the coefficients of those variables that capture exporter-importer characteristics that evolve over time ($\mathbf{Z}_{eit}$), namely free trade areas and currency unions, are

9. 100 countries and 30 years of data imply the use of 3,000 dummies for exporters and another 3,000 for importers.

10. The coefficient is -0.340 meaning that the impact on trade will be: $e^{-0.340} - 1 = 28.81\%$.

quite sensitive to the type of specification that we use. Most coefficients have the expected signs and magnitudes, which are comparable to those previously found in the literature with the exception of the border effect, which is not significant in any of the specifications. However, when observing the coefficients for the 100-country sample in the last four columns of table 3, we observe the same regularities in terms of the robustness of coefficients on dynamic and static country-pair characteristics but the coefficient on the dummy for countries sharing a common border has a positive and significant sign.

Table 4. Comparison of OLS regressions with country-period dummies for different period lengths (equation 9)

OLS regressions

Including exporter-period and importer-period dummies

Dependent variable: Log of exports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Distance (log)	-1.328***	-1.327***	-1.326***	-1.326***	-1.326***	-1.318***	-1.316***	-1.316***	-1.315***
	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.036)	(0.035)	(0.035)	(0.035)
Common border dummy	0.003	0.001	0.002	0.002	0.007	0.321***	0.324***	0.323***	0.328***
	(0.113)	(0.112)	(0.111)	(0.111)	(0.110)	(0.109)	(0.109)	(0.109)	(0.108)
Ever in colonial relationship dummy	0.795***	0.795***	0.795***	0.795***	0.797***	1.059***	1.062***	1.062***	1.064***
	(0.115)	(0.114)	(0.114)	(0.114)	(0.113)	(0.102)	(0.102)	(0.102)	(0.101)
Common language dummy	0.516***	0.517***	0.517***	0.518***	0.515***	0.422***	0.421***	0.422***	0.419***
	(0.061)	(0.060)	(0.060)	(0.060)	(0.060)	(0.051)	(0.051)	(0.051)	(0.051)
Common colonizer dummy	0.572***	0.570***	0.569***	0.569***	0.564***	0.811***	0.811***	0.809***	0.806***
	(0.125)	(0.124)	(0.123)	(0.123)	(0.123)	(0.079)	(0.078)	(0.078)	(0.078)
Both countries in EU	3.079***	0.528**	0.535**	0.350*	0.495***	0.400*	0.406*	0.224	0.455***
	(0.702)	(0.220)	(0.212)	(0.184)	(0.163)	(0.234)	(0.222)	(0.199)	(0.176)
Only exporter in EU	0.763	0.135	0.077	0.066	0.207**	0.318***	0.201*	0.154	0.315***
	(0.583)	(0.118)	(0.114)	(0.097)	(0.086)	(0.121)	(0.115)	(0.099)	(0.087)
Only importer in EU	2.030***	0.123	0.177	0.010	-0.057	0.120	0.233**	0.107	0.105
	(0.488)	(0.120)	(0.118)	(0.101)	(0.099)	(0.123)	(0.116)	(0.102)	(0.095)
Both countries are members of an EU association agreement	-0.404***	-0.294**	-0.341***	-0.185*	-0.251**	-0.272*	-0.250*	-0.101	-0.149
	(0.152)	(0.121)	(0.117)	(0.106)	(0.098)	(0.154)	(0.143)	(0.134)	(0.119)
Only exporter is a member of an EU association agreement	-2.837***	0.171**	0.174**	0.202***	0.107**	0.002	0.076	0.114*	0.046
	(0.403)	(0.071)	(0.069)	(0.061)	(0.054)	(0.081)	(0.075)	(0.068)	(0.059)
Only importer is a member of an EU association agreement	3.016***	0.107	0.058	0.180***	0.218***	0.024	-0.032	0.074	0.103
	(0.413)	(0.074)	(0.072)	(0.063)	(0.064)	(0.087)	(0.078)	(0.072)	(0.065)
Both countries are members of an EU - Euromed agreement	-0.238	-0.072	0.048	0.147	0.093	-0.157	-0.056	0.047	-0.020
	(0.377)	(0.178)	(0.155)	(0.130)	(0.094)	(0.162)	(0.141)	(0.117)	(0.088)
Only exporter is a member of an EU - Euromed agreement	0.466	0.163*	0.250***	0.296***	0.246***	0.122	0.220***	0.278***	0.221***
	(0.288)	(0.098)	(0.087)	(0.074)	(0.058)	(0.090)	(0.081)	(0.068)	(0.054)
Only importer is a member of an EU - Euromed agreement	-0.347	0.108	0.142*	0.193***	0.237***	0.123	0.128*	0.169***	0.205***
	(0.334)	(0.093)	(0.084)	(0.071)	(0.055)	(0.084)	(0.075)	(0.063)	(0.051)
Both countries in Euro Area	1.975***	-0.021	0.037	0.348***	0.306***	-0.114	-0.072	0.265**	0.191**
	(0.565)	(0.140)	(0.079)	(0.100)	(0.076)	(0.139)	(0.089)	(0.119)	(0.087)
Only exporter in Euro Area	1.265**	0.089	0.047**	0.210***	0.206***	0.053	0.052***	0.185***	0.216***
	(0.588)	(0.061)	(0.019)	(0.050)	(0.021)	(0.069)	(0.018)	(0.066)	(0.020)
Only Importer in Euro Area	0.801**	-0.015	0.088***	0.235***	0.277***	-0.007	0.044	0.243***	0.217***
	(0.317)	(0.107)	(0.030)	(0.056)	(0.029)	(0.091)	(0.027)	(0.059)	(0.026)
Observations	126941	126941	126941	126941	126941	206686	206686	206686	206686
R-squared	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.97	0.97
Initial year in sample	1976	1976	1976	1976	1976	1976	1976	1976	1976
Final year in sample	2005	2005	2005	2005	2005	2005	2005	2005	2005
Number of countries	70	70	70	70	70	100	100	100	100
Dummy length in years	1	3	5	6	10	3	5	6	10

Also included dummies for other free-trade agreements (US-Israel, US-Chile, NAFTA, CARICOM, MERCOSUR, EFTA, CAN, CACM, CER and AFTA)
Robust standard errors (clustering by country pair) in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

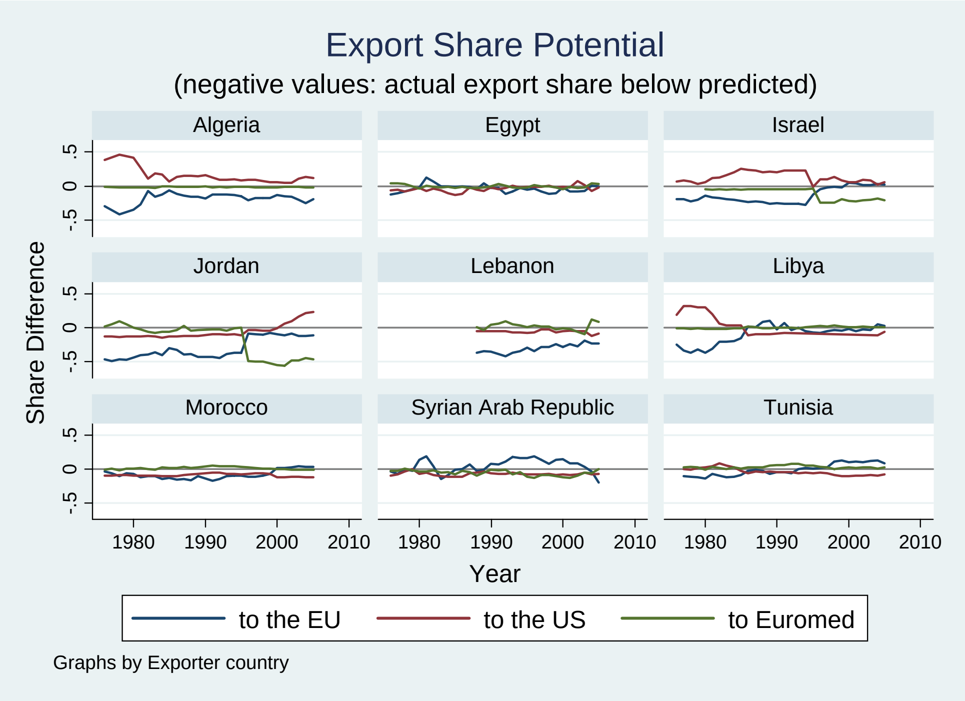
Given the sensitivity of the results to our choices of sample and length of the periods over which the dummy variable remains constant, we select the specification with 100 countries and country-triennial dummies (column 6 in table 4) as our preferred specification since it maximizes our sample while retaining time-varying multilateral resistance terms. In this specification, the coefficients on the time-constant determinants of bilateral trade flows are largely consistent with previous literature: the elasticity of trade volume to distance is around -1.3, the presence of a land border increases trade by about 38%, an effect quite close to that of sharing a common language. The existence of a past colonial relationship or sharing a common colonizer raises trade by about 188% and 125%, respectively. Turning our attention to our variables for regional free trade agreements, we find that accession to the EU significantly increases country flows among member countries albeit this does not seem to come at the expense of trade with other trading partners. Using the terminology described earlier in this section, we would say that the EU has created trade for their members without causing any trade diversion. It has actually created trade also for those countries outside the EU.

With respect to the Euromed agreements, we do not find evidence that they have increased the trade volumes of those countries that have signed them. We find, however, slightly significant evidence of exports originating in Euromed countries increasing as a result of the signing of the agreement. As one would expect given the absence of clear trade creation effects, we do not observe any trade diversion effects either. A perhaps surprising result in this specification is that the introduction of the Euro and its successive adoption by the rest of countries has not significantly increased trade among countries in the Euro area, beyond the positive trade effect of the EU. These results, however, need to be taken with caution, as there have been only a few years in our sample for which the Euromed agreements have been in place, and presumably there might be a lag between the signing of the agreement and its effect on trade volumes. A similar criticism could be applied to the effect of the euro on trade.

3.3 Estimating export potentials in Euromed countries

Once we have the parameter estimates from our preferred estimation (column 6 in table 4), we can compute the predicted value of exports for each country vis-à-vis the rest of countries in the sample, and compute the export share potential X_{eit}^{PS}, as specified in (13). We depict the evolution of export share potentials of the nine Euromed countries vis-à-vis the European Union, the United States and the rest of Euromed countries in figure 4. Table 5 provides more detailed information reporting the most positive and most negative export share potential (averaged over 2000-2005) for every Euromed exporter as a percentage of its total exports identifying, respectively, the lowest and the highest potentials for export growth.

Figure 4: Export share potentials index



Note: These export share potentials are constructed using equation (13) and the results from our preferred specification with 100 countries and exporter-, importer-triennial dummies, from 1976 to 2005 (column 6 of table 4).

Table 5: Largest and smallest export share potentials by country

Difference between actual and predicted share of exports. Average 2000-2005
(in percentage of total exports)

Algeria		**Egypt**		**Israel**	
Top 5 countries (actual trade share above that predicted by gravity model)					
Italy	7.67	Italy	7.29	United States	6.15
United States	7.36	Spain	2.21	Belgium	6.04
Brazil	5.49	Syria	1.78	Hong Kong	3.10
Canada	5.29	India	1.68	Netherlands	1.53
Turkey	3.49	Saudi Arabia	1.68	Brazil	1.12
Bottom 5 countries (actual trade share below that predicted by gravity model)					
Morocco	-1.28	France	-1.82	Turkey	-0.38
Spain	-1.30	Germany	-2.46	Italy	-1.01
United Kingdom	-3.88	United States	-2.64	Egypt	-3.69
Germany	-6.75	Israel	-5.92	United Kingdom	-4.14
France	-12.72	United Kingdom	-7.45	Jordan	-18.78

Jordan		**Lebanon**		**Libya**	
Top 5 countries (actual trade share above that predicted by gravity model)					
Iraq	18.93	United Arab Emirates	10.56	Spain	7.44
United States	12.10	Switzerland	8.50	Germany	6.32
India	9.14	Saudi Arabia	5.15	Turkey	5.79
Saudi Arabia	5.31	Iraq	2.64	Switzerland	2.39
United Arab Emirates	3.17	Kuwait	2.48	Tunisia	1.41
Bottom 5 countries (actual trade share below that predicted by gravity model)					
Turkey	-0.57	Italy	-3.15	Japan	-1.41
Germany	-1.67	Germany	-4.20	Belgium	-2.05
Italy	-1.78	Syria	-7.30	Italy	-3.35
United Kingdom	-4.08	United States	-8.19	Netherlands	-3.38
Israel	-53.92	France	-11.29	United Kingdom	-5.19

Morocco		**Syria**		**Tunisia**	
Top 5 countries (actual trade share above that predicted by gravity model)					
France	6.15	Germany	9.02	France	11.26
United Kingdom	3.22	Italy	7.69	Libya	3.86
India	2.93	Saudi Arabia	3.01	Belgium	2.57
Brazil	1.51	Turkey	2.97	Germany	2.01
Singapore	1.12	United Arab Emirates	2.80	Italy	1.46
Bottom 5 countries (actual trade share below that predicted by gravity model)					
Belgium	-1.02	Japan	-2.15	Japan	-1.22
Algeria	-1.58	Jordan	-2.21	Netherlands	-1.45
Germany	-2.09	France	-5.41	Algeria	-1.61
Portugal	-2.63	Lebanon	-7.41	United Kingdom	-1.90
United States	-12.35	United States	-8.07	United States	-10.41

Source: author's calculations based on OLS regression with 100 countries and exporter-, importer-triennial dummies from 1976 to 2005 (column 6 of Table 4).

As explained in section 2.2, given our use of country-triennial dummies, we are unable to make assertions about the absolute level of trade since our country-time dummies capture perfectly each country's aggregate trade volume every year (both as an exporter and as an importer). However, we believe that the computation of the export share potentials may give us an idea where a country could find it easier to increase its exports, especially if they are underrepresented relative to what the gravity model would predict.

Figure 4 reveals some very interesting patterns. First, we observe that, among the Euromed countries, Algeria, Jordan and Lebanon's share of exports to the European Union as a whole are below the predictions of our empirical model, although for Lebanon, the gap between actual and predicted export shares has been closing fast in the last 15 years. For the other countries in the Euromed group, export shares to the EU in the last 5 years have been at, or above, the predictions of the model, implying that fast export growth probably has to be found elsewhere or should, probably, come from *individual* EU countries with highly negative export share potential indices, as shown in table 5. Second, we observe that the actual export share to the United States is, in general, below the predictions of our empirical model, with few notable exceptions (Jordan, Algeria and Israel).[11] Trade with the rest of Euromed countries does not seem to show a clear pattern neither above nor below our predictions with the exception of Israel and Jordan where the lack of trade with Euromed countries can be attributed almost entirely to the low level of their bilateral trade with each other. Finally, although not reported in figure 4 but apparent from table 5, those countries for which the US has an export share below the predicted one (and the EU's actual export share is similar to the predicted one), the counterpart (that is, countries with an export share above that predicted by the model) seem to be concentrated on other Middle East countries outside the Euromed region, India, and Brazil.

We find the results on the estimation of this export share potentials to be highly dependent on the estimation method used, since the estimated export share potentials can even reverse sign. We believe this points to the importance of properly identifying the gravity equation not only from an academic point of view but also from a policy-maker's view as the policy implications derived in each case could even go in opposite directions.

After examination of these export share potentials one natural question to ask is whether actual export shares below those predicted by our empirical model are a good indicator of the direction in which trade is more likely to increase in the near future. To answer this question, we regress the growth rate of each country's bilateral exports on several controls as well as on (different lags of) our measure of export share potential. Formally, we estimate:

$$\frac{\ln x_{eit} - \ln x_{ei,t-T}}{T} = \delta X_{eit-T}{}^{PS} + \mathbf{bZ}_{ei} + \mathbf{cZ}_{eit} + d_e + d_i + d_t + \varepsilon_{eit} \,. \tag{17}$$

11. Péridy (2005b) also finds weak trade integration between the US and Middle East and North African countries, especially those in the Maghreb. Soderling (2005) goes a step further and, besides finding sizeable trade potentials of selected Euromed countries vis-à-vis the US, he also finds that exports to the EU are mostly in line with the predictions of a gravity model. Although their methodology does not fully take into account the aforementioned multilateral resistance effects, the coincidence of results with those in this section is striking.

A negative estimate of δ, the coefficient of export share potential, would indicate the existence of convergence meaning that a share of exports below that predicted by the gravity model is associated with higher future growth of exports precisely in that direction.

We turn to the data and, indeed, find a negative and statistically significant coefficient for our measure of export share potential (upper part of table 6). The negative sign is robust across different specifications as well as to the use of different lags for the estimation of this effect. Thus, our evidence suggests that those bilateral relationships in which a country is trading below the predictions of a well-specified gravity model present the best opportunities to increase its aggregate volume of trade.

Table 6: Regressions of export volume growth over export share potentials (equation 17)

OLS Regressions

Dependent variable is annualized growth rate of bilateral volume of exports (over different lengths of time)

	(1) Annualized export growth over one year	(2) Annualized export growth over 2 years	(3) Annualized export growth over 3 years	(4) Annualized export growth over 4 years	(5) Annualized export growth over 5 years
Export Share potential (lagged 1 year)	-0.830***				
	(0.095)				
Export Share potential (lagged 2 years)		-0.615***			
		(0.055)			
Export Share potential (lagged 3 years)			-0.442***		
			(0.043)		
Export Share potential (lagged 4 years)				-0.370***	
				(0.038)	
Export Share potential (lagged 5 years)					-0.318***
					(0.033)
Distance (log)	0.004	0.028***	0.018***	0.013***	0.010***
	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Common border dummy	0.003	0.001	0.005	0.002	0.003
	(0.008)	(0.006)	(0.005)	(0.004)	(0.004)
Ever in colonial relationship dummy	-0.032***	-0.040***	-0.033***	-0.029***	-0.028***
	(0.006)	(0.007)	(0.005)	(0.004)	(0.004)
Common language dummy	-0.001	-0.014***	-0.006**	-0.001	0.000
	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)
Common colonizer dummy	-0.022***	-0.040***	-0.029***	-0.022***	-0.018***
	(0.007)	(0.006)	(0.005)	(0.004)	(0.004)
Constant	0.382***	0.154***	0.056*	0.096***	0.018
	(0.064)	(0.039)	(0.034)	(0.032)	(0.026)
Observations	190760	165799	155951	146779	138141
R-squared	0.01	0.08	0.09	0.10	0.11
Initial year in sample	1976	1976	1976	1976	1976
Last year in sample	2005	2005	2005	2005	2005
Number of countries	102	102	102	102	102
Dummy length in years	3	3	3	3	3

Also included (but not reported) are dummy variables for trade creation and diversion following trade agreement and currency unions as well as exporter, importer, and year dummies.
Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

4 Conclusions

In this paper, we have estimated trade potentials stemming from a gravity equation, taking into account and correcting for the potential bias resulting from the omission of exporter and importer countries' price levels, which capture trade resistance with respect to all its trading partners, as pointed out by Anderson and van Wincoop (2003). We find that accounting for the potentially diverging evolution of these price indices for each country in our sample could lead to severe biases if these time-varying price indices were not taken into account. Due to computational limitations, we perform a gravity estimation using country-triennial dummies, instead of country-year dummies, which allow us to maximize our sample while retaining the country-specific time-varying component of the price indices. However, the use country-time dummies allows only for the estimation of in-sample trade potential, in spite of Egger's (2002) critique and, more importantly, it limits our assessments about trade potentials to the geographic distribution of a country's exports (export shares), instead of being able to make statements about their absolute levels, as it has usually been done in the literature.

We find that the coefficient estimates of time-changing variables specific to a country pair (such as membership in various trade agreements or membership in a currency union) are quite sensitive to the inclusion of time-varying fixed effects. For instance, one of our coefficients of interest —the one for membership in an Euromed association agreement— which is negative in the specification with time-constant fixed effects turns non-significant when the proper (time-varying) fixed effects are used. We find this difference to also be important for the estimation of trade potentials which can differ significantly, even in their time trend, when comparing gravity models with or without country-time dummies, which account for overall trade resistance for each partner in a country pair. Even if overall trade potentials were not to change significantly across specifications that include country-time dummies (which they do), the correction of biases is crucial in order to correctly understand the marginal effects of the independent variables on the volume of trade, and thus be able to correctly advice on the best policy to promote trade in a particular country.

With respect to Euromed countries, we find that previous analysis, which did not properly take into account overall multilateral trade resistance have tended to overestimate trade potentials for the region, leading to the conclusion that most countries in the area export too little, and should, therefore, promote trade. We show that these estimates are likely to be biased, and would thus be risky to use them for policy making. Our alternative approach, looking at export shares instead of levels, does not suffer from omitted variable bias and it is still able to offer some guidance on where it would be easier to increase exports: to those countries where actual export shares are below those predicted by the (correctly specified) gravity model. Our results show that most countries in the Euromed region (except Algeria, Jordan and Lebanon) seem to trade with the EU as a whole at or slightly above the predictions of the model, so that export growth is likely to come from other destinations or would probably come from *individual* EU countries with highly negative export share potential indices. The share of exports to the US, on the other hand, is below the predictions of our empirical model, with few notable exceptions (Jordan, Algeria and Israel). Intraregional trade among Euromed countries seem close to the predictions of the model, except for Israel and Lebanon, precisely for their relatively low bilateral trade among them.

In our empirical exercise, we also find that Euromed association agreements have not had a significantly positive effect on exports of signatory countries. We believe there might be two possible and complementary reasons for this. While it is true that Euromed agreements have gone a long way towards the liberalization of trade between both shores of the Mediterranean, it is also true that its implementation has been very gradual and that several restrictions are still in place, which might point to a relatively small effect so far. The other reason is that the exporting sector of these countries might only be slowly reacting to the opening of the new markets and that it might take a few years for the full effect to be observed. To address the first explanation, we would need to use a sectoral-level dataset to be matched with the actual decline in tariffs for each sector, which is in our future research agenda. For the second explanation, we would need to test the importance of hysteresis in trade flows, which would require the use of a dynamic model as well as some more years of data, to allow the potentially positive effects of Euromed association agreements on exports to be fully realized.

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Data Appendix

For this project, we have put together a dataset from a variety of different sources. The goal of this appendix is to describe this dataset. The dataset contains directional bilateral trade flows between for every country pair between 1948 and 2005 as well as characteristics that are specific to each country (GPD, area, etc.) or to the country pair (distance, presence of a common border, etc.). It is important to note that in this dataset, we use the term country a bit loosely since it refers to any possible trade origin or destination which reports their trade statistics to the IMF even if these entities are not formally defined as countries. For instance, Martinique and Guadeloupe correspond to countries in our dataset despite being two overseas departments of France.

The dataset puts together data from very different sources and while every effort has been made to ensure its completeness and consistency, it is necessary to acknowledge that the quality and quantity of data available varies enormously across countries and time. Table 7 at the end of this appendix summarizes the sources and coverage of each variable.

Trade Data. Unlike previous datasets, the one we have constructed uses **directional** bilateral trade flows. This means that for every country pair, we report at most two trade flows, one in each direction. We combine export and import data from the Direction of Trade Statistics (DOTS) put forth by the IMF in order to maximize data availability. The value of exports from a given country (e) to another given country (i) is, thus, given by the average of reported exports from e to i and reported imports by i from e. Those observations for which either one of the values are missing are assigned the alternative (non-missing) value.

Distance Data. We follow the approach in the literature and compute the bilateral distance using each country's latitude and longitude[12] and computing the great circle distance according to the formula:

$$dist_{ei} = r \cdot \arccos\left\{\sin(lat_e)\cdot\sin(lat_i) + \cos(lat_e)\cdot\cos(lat_i)\cdot\cos(long_e - long_i)\right\}$$

where r is the earth radius which is taken to be 6,356.75 km, lat_e and $long_e$ correspond to the latitude and the longitude of the exporter and lat_i and $long_i$ are defined analogously. The latitude and longitude data were obtained from the CIA World Factbook and they correspond to the coordinates of the capital city in each country.

Border Data. The border information was obtained from Glick and Rose (2002) and it is static in the sense that it does not change over time. This is due to the fact that, in most cases, changes in borders are associated with the creation of new countries.

GDP Deflator. The GDP Deflator corresponds to the CPI as was obtained as the average of the four quarters in every given years from the chained series put forth by the St. Louis Federal Reserve's FRED.

GDP Data were obtained from the International Financial Statistics published by the IMF and complemented with data from the World Development Indicators published

12. These data are not reported in the final dataset but are available from the authors.

by the World Bank. All GDP data are converted to USD using market exchange rates and deflated to constant 2000 US dollars using the CPI deflator.

Population Data were obtained from the World Development Indicators (WDI) published by the World Bank. GDP and Population in the dataset are combined to generate the data on GDP per capita.

Area and Coastline Data. These data were obtained from the CIA World Factbook. The data on the length of the coastline was adjusted as to not include coastline on the Arctic Ocean or to interior seas.

Island and landlocked data. Other studies and datasets define these variables as the sum of the number of countries which meet said criterion for each country pair. Instead, we define two dummy variables, one for those cases in which the exporter meets the corresponding criterion and analogous variables for the importer.

Language and Colonial Data. The data on colonial relationships was obtained from Glick and Rose (2002) and entails a dummy variable for whether the two countries (entities) were ever in a colonial relationship, a dummy variable for whether the two countries had the same colonizer, a dummy for whether the duration of the colonial relationship (in those case in which existed during the relevant sample), and a dummy to indicate entities which belong to the same country. The dummy for countries sharing a common language was also obtained from Glick & Rose.

Religion Data. The index for religious similarity for the countries in each pair is similar to the one used by Helpman, Melitz and Rubinstein (2007) and indicates the probability that a random person in the first country is the same religion as a random person in the second country in the pair. To construct this variable, we obtained the share of each of the major religious groups from the CIA World Factbook (Christian, Muslim, Jewish, Hindu, Buddhist, and Agnostic/Atheist) and computed said probability by combining the percentages of each of these groups for each country. Mathematically:

$$\begin{aligned}\text{religsimil}_{ei} &= \text{christ}_e \cdot \text{christ}_i + \text{muslim}_e \cdot \text{muslim}_i + \text{jewish}_e \cdot \text{jewish}_i + \\ &+ \text{hindu}_e \cdot \text{hindu}_i + \text{buddhist}_e \cdot \text{buddhist}_i + \text{agnostic}_e \cdot \text{agnostic}_i\end{aligned}$$

where each name of a religion followed by subscript e or i indicate the proportion of followers of that religion in the exporting (e) and the importing (i) country respectively.

Free Trade Area (FTA) Data. We have constructed several variables to reflect the membership of countries to the main free trade areas. For each agreement, we have defined three variables which allow us to discern the trade creation and trade diversion effects of free trade areas. For instance, we have generated the variable FTA11 which takes a value of 1 if both countries in the pair are in the same free trade agreement. We have also generated the variables FTA10 and FTA01 which are dummy variables that take a value of 1 when only the exporter or the importer (respectively) belong to a given trade agreement. Thus, we have defined three variables (XXX11, XXX10, and XXX01) for each free trade agreement:

- EEC: Austria (1995), Belgium (1958), Cyprus (2004), Czech Republic (2004), Denmark (1973), Estonia (2004), Finland (1995), France (1958), Germany (1958), Greece (1981), Hungary (2004), Ireland (1973), Italy (1958), Latvia (2004), Lithuania (2004), Luxembourg (1958), Malta (2004), Netherlands (1958), Poland (2004), Portugal (1986), Slovak Republic (2004), Slovenia (2004), Spain (1986), Sweden (1995), and United Kingdom (1973).

- US-Chile (coded as USChile): United States (2004) and Chile (2004).
- US-Israel (coded as USIsr): United States (1985) and Israel (1985).
- NAFTA: United States (1994), Canada (1994), and Mexico (1994).
- CARICOM: Antigua & Barbuda (1974), Bahamas (1983), Barbados (1973), Belize (1974), Dominica (1974), Grenada (1974), Guyana (1973), Haiti (2002), Jamaica (1973), Trinidad & Tobago (1973), and Suriname (1995), as well as some countries which are not in our sample due to lack of data: Montserrat, St. Kitts & Nevis, St. Lucia, and St. Vincent & The Grenadines.
- PATCRA: Australia (1977) and Papua New Guinea (1977).
- Mercosur: Argentina (2001), Brazil (2001), Paraguay (2001), and Uruguay (2001).
- EFTA: Iceland (1970), Norway (1960), Switzerland (1960), United Kingdom (1960-1973), Portugal (1960-1986), Austria (1960-1995), Finland (1961-1995), Denmark (1960-1973), and Sweden (1960-1995), as well as Liechtenstein which is not in our sample due to lack of data.
- CAN: Bolivia (1993), Colombia (1993), Ecuador (1993), Peru (1993), and Venezuela (1993-2006).
- CACM: Costa Rica (1963-1969; 1991-), El Salvador (1960-1969; 1991-), Guatemala (1960-1969; 1991-), and Honduras (1960-1969; 1991-), Nicaragua (1960-1969; 1991-).
- CER: Australia (1983) and New Zealand (1983).
- AFTA: Brunei Darussalam (1992), Cambodia (1999), Indonesia (1992), Laos (1997), Malaysia (1997), Myanmar (1997), Philippines (1992), Singapore (1992), Thailand (1992), and Vietnam (1995).

We have also included other free trade agreements which generally occur between a country and an existing free trade area and which generate hub-and-spoke relationships which need to be taken into account. For instance, despite Switzerland having signed a free trade agreement with the European Economic Community in 1973, and Mexico having signed a similar treaty in 2000, this does not mean that there is a free trade agreement between Switzerland and Mexico. This hub-and-spoke system is generally sustained thanks to the presence of rules of origins in goods that are subject to the free trade agreement. The agreements we have included in our dataset are:

- Agreements with the EEC (coded as EEC_AA): Chile (2003), Croatia (2002), FYR Macedonia (2001), South Africa (2001), Mexico (2000), Bulgaria (1994), Faroe Islands (1997), Romania (1993), Turkey (1996), Switzerland (1973), and Iceland (1973).
- Agreements with the EFTA (coded as EFTA_AA): Tunisia (2005), Chile (2004), Singapore (2003), Jordan (2002), Croatia (2002), Mexico (2001), Morocco (1999), Bulgaria (1993), Romania (1993), Israel (1993), Turkey (1992), and the FYR of Macedonia (2001).

In the same structure as before, we have included the Euromediterranean agreements between the EEC and a group of Euromed countries (the so-called Barcelona Agreements):

- Euromed (coded as EEC_EM): Egypt (2004), Morocco (2000), Jordan (2002), Israel (2000), Tunisia (1998), Lebanon (2003), and Algeria (2005).

Currency Unions Data. The original data on currency unions was obtained from Glick and Rose (2002), which included data up to 1997, and extended to 2005. We also include three dummy variables constructed in a similar fashion as the dummy variables for free trade areas to account for the Euro currency union, the so-called Eurozone. The three variables are Euro11 which is equal to 1 when both countries are members of the Eurozone in that given year, Euro10 which is equal to 1 when the exporter is but the importer is not a member of the Eurozone and Euro01 which is defined symmetrically.

Table 7. Sources and coverage of dataset

Variable	Code	Description	Source	Countries.	Period
Value	value	Value of trade from exporter to importer (thousands of 2000 USD)	DOTS	205	1948-2005
Distance	distance	Distance from exporter to importer (km)	Own construction / CIA World Factbook	227	Static
Border	border	= 1 if both countries share a land border	Glick & Rose (2002)	259	Static
GDP Deflator	GDPDeflator	US CPI GDP deflator (2000 = 100)	FRED	Common	1948-2005
GDP	egdp	GDP of exporter (e)/importer (i) (in thousands of 2000 USD)	IFS / WDI	188	1948-2005
GDP per capita	egdppc	GDP per capita of exporter/importer (in thousands of 2000 USD)	IFS / WDI	188	1960-2005
Population	epop	Population of exporter or importer country (in thousands)	WDI	199	1960-2005
Area	earea	Area of exporter/importer (in km2)	CIA World Factbook	202	Static
Coastline	ecoastlinekm	Length of exporter/importer's coastline (in km)	CIA World Factbook	202	Static
Island	eisland	= 1 if exporter/importer is an island	Glick and Rose (2002)	259	Static
Landlocked	elandl	= 1 if exporter/importer is landlocked	Glick and Rose (2002)	259	Static
Common country	comctry	= 1 if exporter and importer are in the same country	Glick and Rose (2002)	259	Static
Colony	colony	= 1 if exporter and importer were ever in a colonial relationship	Glick and Rose (2002)	259	Static
Common colonizer	comcol	= 1 if exporter and importer had the same colonizer	Glick and Rose (2002)	259	Static
Current colony	curcol	= 1 if exporter and importer are currently in a colonial relationship		259	1948-2005
Common language	Comlang	= 1 if exporter and importer have a common official language	Glick and Rose (2002)	259	Static
Religious similarity	religsimil	Probability that a random person from exporter and a random person from importer have the same religion	CIA World Factbook	163	Static
FTA11	FTA11	= 1 if exporter and importer are in the same free trade area in the given year	Own Construction / WTO	205	1948-2005
FTA10	FTA10	= 1 if exporter does belong to a given free trade area but importer does not.		205	1948-2005
FTA01	FTA01	= 1 if exporter does not belong to a given free trade area but importer does.		205	1948-2005
CU	Cu	= 1 if exporter and importer belong to the same currency union	Own Construction / Glick and Rose (2002)	205	1948-2005
Euro11	CU_euro11	= 1if exporter and importer have the Euro as their common currency	Own Construction	205	1948-2005
Euro10	CU_euro10	= 1 if exporter does belong to the Eurozone but importer does not	Own Construction	205	1948-2005
Euro01	CU_euro01	= 1 if exporter does not belong to the Eurozone but importer does	Own Construction	205	1948-2005
% Oil	Eoil	Share of oil in exporter's total exports	WDI	196	1960-2005
% Ores	Eore	Share of ores and other ferrous materials in exporter's total exports	WDI	196	1960-2005
% Manuf.	Emfg	Share of manufacturing in exporter's total exports	WDI	196	1960-2005

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