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ABSTRACT

Trade in the Triad: How Easy is the Access to Large Markets?*

We identify in this paper the level of trade integration between the three largest economic powers of the world, often called the Triad: The United States, the EU and Japan. We focus on measuring possible asymmetries in market access between members of the Triad using border effects between each of those partners. We investigate trends of bilateral trade openness and show notably that there has been a deterioration of the relative access of Japanese exporters on both the American and EU markets in the 1990s. Results also show which industries have the most asymmetric market access among the different combinations of those partners. We finally provide explanations for the estimated border effects using proxies for bilateral observed protection (tariffs and NTBs), home bias of consumers, product differentiation and levels of FDI. Tariffs still matter in shaping trade patterns even in cases where those tariffs are low in magnitude. The explanations related to actual protection, home bias and substitutability of goods put together explain a large part of the border effect between blocs of the Triad, although they do not explain the whole of the border effect puzzle.

JEL Classification: F12 and F15
Keywords: Border Effects, Gravity, Market Access, European Union, United States, Japan

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1 Introduction

The debate over the measurement of the "true" level of the protection in Europe, in comparison with the one of its main trading partners has recently been fueled by diverging empirical evidence. According to Messerlin (2001), Europe has a high level of protection which translates into a sizeable efficiency cost, estimated to represent one year of Spanish GDP. In contrast, recent work conducted by Bouët et al. (2002) presents a very different picture. Relying on applied tariffs and having properly calculated tariff equivalents of tariff quotas and specific tariffs, added anti-dumping duties and taken into account the intricate EU preference schemes, they do not find Europe to be more protectionist than the United States. The reason for this is quite simple: The EU has developed a myriad of preferential schemes with a vast number of partners in the world (mostly developing countries), and enforces MFN tariffs only towards a limited number of trade partners, among which Japan and the United States are primarily concerned.

However, this evidence associated with a direct measure of protection remains questionable. First, average tariff figures mask a reality plagued with numerous tariff peaks (Hoekman et al., 2002). The associated dispersion in tariffs has led to the diagnosis of "unfinished business" concerning market access reached by the WTO in a recent report (WTO, 2002). Second, tariffs applied to different exporters by a given importer can vary widely: This is another dimension of the dispersion in tariffs. Being less protectionist on average can hide a highly distortive trade policy, in which exports of "non-preferred" efficient trade partners are deterred. Lastly, even limited tariffs can be protective if the price elasticity of imports is sufficiently large.

Considering this background of large and persistent difficulties in the *direct* measurement of protection, an *indirect* assessment of protection policies can be contemplated. As detailed in the recent survey on trade costs proposed by Anderson and van Wincooop (2004), international price differentials/distortions and deviations from expected trade patterns are two alternative research strategies to measure those trade costs.

Among the recent studies using the first strategy, Bradford (2003) relies on a detailed comparison of prices within the OECD (associated with Purchasing Power Parity calculations by the OECD) in order to derive price differentials between domestic and world markets. He concludes that protection levels revealed by this method are very large and disproportionately larger than those suggested by the simple measurement of tariffs.

The second strategy based on deviations from expected trade patterns uses different versions of the gravity equation as the benchmark of what trade volumes "should be". There is a large and old empirical literature on this topic, which has been focused in particular on assessing the impact of regional integration on trade flows (Frankel, 1997 is an example of such a study with very large coverage of regional agreements). This type of work has been recently renewed in two related respects: First through a narrowing of the gap between the empirical investigations and its theoretical foundations (see notably Feenstra, 2003, for one of the most complete overview of the theoretical foundations of the gravity equation). Second, through the emergence of the border effect literature. This methodology inverses the logic in the measurement of international commodity markets' integration. Let us take the example of two countries supposed to be highly integrated, the United States and Canada for instance. How can one assess precisely the level of this integration? The border effect literature initiated by Mc Callum (1995), Helliwell (1996) and Wei (1996) does so by comparing their bilateral trade with the volume of trade taking place within their own borders and not with trade flows occurring between other pairs of countries chosen as a reference group, as was done traditionally in gravity equation approaches. The results have consistently shown strikingly low levels of international integration. Even the latest work by Anderson and van Wincoop (2003), focused at correcting an upward bias in the original McCallum estimate, shows that the USA-Canada border makes 1993 trade between Canadian provinces 10 times larger than trade with US states, everything else equal. This figure of impeding factor of national borders inside the European Union in the mid nineties was still estimated to be between 6 (Chen, 2004) and 13 (Head and Mayer, 2000). Nitsch (2000) provides an intermediate estimate of 10, still a very high figure for a supposedly perfectly integrated market since 1993.

Our paper's first addition to the literature is the provision of estimates of reciprocity in market access for multiple bilateral combinations of trade partners that constitute a very significant part of world trade.[1] We assess in more detail the current level of integration of international markets and its evolution. We use trade flows between and within countries of the Triad (the United States, Japan and each member state of the European Union) to evaluate the overall effect of national borders for those partners, and most importantly, whether we can observe some significant asymmetries in this (inverse) measure of integration. This question of symmetry in market access has been the subject of numerous concerns, specially among policy makers, with probably the most famous case being the recurrent claims by US officials in the end of the 1980's of high protection restricting access of American exporters to the Japanese market for several industries. A newly available dataset of compatible bilateral trade and production enables a rigorous analysis of those and related claims over the period 1976-1999 and for 26 industries.

A second point of this paper is to sort out between the possible explanations of border effects estimated across country pairs and industries. Several causes of the border effects have been designated in the literature. The first obvious one relates to actual protection, should it be through tariffs or more subtle border-related trade hindrances. National borders can also coincide with delimitations of important differences in tastes among consumers, resulting in a *home bias* that can give insights concerning the observed fall of trade volumes at the border. Another possible explanation that has not been very much tested yet is the importance of foreign direct investment. European countries usually import very little volumes of American cars (even those cars that have the size and fuel consumption characteristics that actually make them suitable for European streets and fuel prices). Those "missing imports" can alternatively result from actual protection by EU countries or from a home bias of EU consumers. However, it can also be argued that the important

[1] A calculation using United Nations' COMTRADE database shows that our sample (all trade flows combinations between the EU12 countries, the United States and Japan) represented 42% of world trade in manufactured goods in 2001.

production of cars taking place within Europe in plants owned by American firms limits the actual "need" for important trade flows. It is also likely that this last explanation is not independent from the two formers: The theoretical and empirical literature on FDI/export decision suggests that American firms may have decided to produce on the European soil because of a combination of high trade protection and the imperative adaptation of American cars to local tastes and needs.

Distinguishing between alternative explanations of border effects is an important public policy issue in that actual tariffs and other protective devices' cuts can be negotiated in the multilateral arena, whereas differences in tastes and bilateral FDI patterns are less subject to such negotiations.

Apart from the border effects literature, our paper is also very related to the set of articles providing rigorous measures of symmetry in bilateral openness on the one hand and to the papers measuring the impact of protection and most notably tariffs on trade patterns. Both sets of papers are growing but still rather small. Concerning symmetry, Harrigan (1996) estimates bilateral difficulties in market access and finds some asymmetry for the countries we analyse here: Overall, the EU seems more closed to Japan and US imports than the reverse. Harrigan and Vanjani (2003) focus on Japanese trade flows and give insightful results about the long term patterns for this country often considered as an outlier in international trade. Using a framework, a dataset and a specification very comparable to ours, their results notably point out that the United States are structurally more closed to Japanese exports than the reverse (specially since the beginning of the 1990's). They do not however provide much empirical explanations for this finding. Head and Mayer (2002a) investigate a potential "fortress Europe" effect during the European trade integration process. Using the border effects methodology, they measure the extent of additional difficulty in European markets access faced by Japanese and American producers. The authors find little evidence of a fortress Europe effect with respect to American exporters, but more suspicion seems warranted for imports of some specific Japanese goods. Here again, there is no second step that would explain the variance in border effects across country pairs and industries with protection-related variables.

Concerning papers that estimate the impact of observed measures of protection on trade patterns, Harrigan (1993) is an early example who finds that tariffs still matter: Tariffs are found to have a large import-reducing effect (much larger than non tariff barriers) for OECD countries in 1983. More recently, Lee and Swagel (1997) use a simultaneous equation approach to study the reciprocal interaction between trade flows and trade barriers. They find mixed results for the impact of both tariffs and NTBs on trade flows but use total industry-level imports rather than bilateral flows. Hummels (2001), Head and Ries (2001), Lai and Trefler (2002) and Romalis (2004) are examples of recent papers that use information on bilateral tariff rates at a detailed industry level to estimate price elasticities. The revealed effects of tariff protection on trade are large, with an implied elasticity of substitution in the underlying CES demand structure at 5.3 for Lai and Trefler (2002), 5.6 for Hummels (2001), 7.9 for Head and Ries (2001) and between 8 and 10 for Romalis (2004). Those results point to the empirical relevance of a simple solution to the border effect puzzle suggested by Obstfeld and Rogoff (2000): Even low levels of protection at the border can have large trade dampening effects if price elasticities are sufficiently large. We investigate this claim further here by using tariffs and NTBs as potential explanations for the border effect in our sample of countries.

The rest of the paper is structured as follows: Theoretical underpinnings and related methodological issues are detailed in Section 2. Section 3 gives results of our estimations, with Section 3.1 presenting the results pooled over all industries. Detailed results at the industry level are examined in Section 3.2. Finally, the respective impact of tariffs and other obstacles to trade are disentangled in Section 4.

2 Measuring international market openness with border effects.

2.1 The model and estimable equation

Our empirical work consists of bilateral trade volumes estimations with a gravity-like specification derived (originally by Wei, 1996, and thereafter followed by many others) from the now standard monopolistic competition trade model of Krugman (1980). It has been demonstrated recently by Anderson and van Wincoop (2003) that a proper derivation of the gravity equation from theory is crucially important for the validity of empirical results, specially in the case of border effects estimation. Monopolistic competition is not the only available model that can be used to derive the gravity equation (see Evenett and Keller, 2003 for a global overview of conditions giving rise to the gravity equation), but it seems the more natural in our case that focuses on trade between some of the most industrialized countries in the world. This model combines CES utility with iceberg trade costs and non strategic price setting behavior by firms. It is straightforward to show that this model yields the following compact characterization of trade patterns between country i and country j for a given industry (Head and Mayer, 2000):

$$\frac{m_{ij}}{m_{ii}} = \left(\frac{a_{ij}}{a_{ii}}\right)^{\sigma-1} \left(\frac{p_j}{p_i}\right)^{-\sigma} \left(\frac{\tau_{ij}}{\tau_{ii}}\right)^{1-\sigma} \left(\frac{v_j}{v_i}\right), \tag{1}$$

where m_{ij} denotes imports of i from j and a_{ij} represent i's consumers' preferences with respect to varieties produced in j. During trade, the mill price in country j, p_j, is shifted up by a transaction cost τ_{ij}, giving delivered price $p_{ij} = \tau_{ij} p_j$. Finally, v_i is the value of production of the considered industry in i. Functional forms for delivered prices (p_{ij}) and preferences (a_{ij}) have to be specified in order to obtain an estimable equation.

Trade costs are a function of distance (d_{ij}, which proxies for transport costs) and the level of protection of i, which can consist of an ad valorem tariff t_{ij} and the ad valorem equivalent of non-tariff barriers ntb_{ij} (intended to incorporate all protectionist measures that are not the direct ad valorem tariffs we observe in the empirics).

$$p_{ij} = \tau_{ij} p_j \equiv d_{ij}^{\delta}(1 + t_{ij})(1 + \text{ntb}_{ij})p_j.$$

The structure of protection varies across all partners' (EU countries, Japan and the United States) pair and depend on the *direction* of the flow for a given pair. Let us specify this protection structure as follows: $(1 + t_{ij})(1 + \text{ntb}_{ij}) \equiv \exp[\eta \text{EU}_{ij} + \varphi \text{EU-USA}_{ij} + \psi \text{USA-EU}_{ij}]$. In this specification, EU_{ij} is a dummy variable set equal to 1 when $i(\neq j)$ and j belongs to EU. EU-USA_{ij} is a dummy variable set equal to 1 when $i(\neq j)$ belongs to the EU and j is the United States. USA-EU_{ij} is a dummy variable set equal to 1 when $j(\neq i)$ belongs to the EU and i is the United States.[2]

Preferences have a random component e_{ij}, and a systematic (and importer specific) preference for goods produced in the home country, β_i. Sharing a common language is assumed to mitigate this *home bias*.

$$a_{ij} \equiv \exp[e_{ij} - (\beta_i - \lambda L_{ij})(\text{EU}_{ij} + \text{EU-USA}_{ij} + \text{USA-EU}_{ij})].$$

L_{ij} is set equal to one when two different countries share the same language. When L_{ij} switches from 0 to 1, home bias changes from β_i to $\beta_i - \lambda$.

We obtain an estimable equation from this monopolistic competition model of trade with home bias:

$$\begin{aligned} \ln\left(\frac{m_{ij}}{m_{ii}}\right) &= \ln\left(\frac{v_j}{v_i}\right) - (\sigma-1)\delta \ln\left(\frac{d_{ij}}{d_{ii}}\right) + (\sigma-1)\lambda L_{ij} - \sigma \ln\left(\frac{p_j}{p_i}\right) \\ &\quad -(\sigma-1)[\beta_i + \eta]\text{EU}_{ij} - (\sigma-1)[\beta_i + \varphi]\text{EU-USA}_{ij} - (\sigma-1)[\beta_i + \psi]\text{USA-EU}_{ij} \\ &\quad +\epsilon_{ij}, \qquad (2) \end{aligned}$$

with $\epsilon_{ij} = (\sigma - 1)(e_{ij} - e_{ii})$. Each of the dummy variables' (exponentiated) coefficients gives the border effect of the corresponding combination. For instance $\exp((\sigma - 1)[\beta_i + \eta])$ is the multiplying factor of *intra*-national trade with respect to international trade among the group of EU member countries. It includes *both* the average level of protection of the importing country (only the NTB-related one η because tariffs have been nil in this case since 1968) and the home bias of consumers (β_i). The coefficient on EU-USA_{ij} indicates the difficulty for American exporters in their access to EU markets (also including both a preference and a protection component). Symmetrically, USA-EU_{ij} indicates the difficulty faced by the average European exporter when selling its product to American consumers. The level of each of those two latter coefficients reveals the market access problems for each specified trade flow. Comparing the coefficients permits identification of possible asymmetries in market access. Whether this indirect evidence confirms the claims and grievances of officials or public opinion on market access reciprocity can be assessed at the global level or alternatively at the industry level.

Most papers estimating border effects recognize the fact that the overall effect of national borders can be the result of a combination of home biased preferences and / or trade policy, but very few actually try to empirically assess which part of the explanation is more dominant. In

[2] In order to stay compact in exposition, we present the model with only one combination (the EU-USA pair), the empirics will consider all combinations (EU-EU, EU-USA, EU-Japan and USA-Japan pairs).

particular, no paper (to date) incorporates the level of bilateral tariffs in the equation. It is clear from equation (2), that the part of "missing trade" caused in reality by tariffs is attributed to the impact of crossing national borders (the ones where there are tariffs implemented) and therefore included in the coefficients on EU-USA$_{ij}$ and USA-EU$_{ij}$ in this equation.

We are interested here in giving a first assessment of the different explanations to the border effects. Our approach is to start with "usual" border effects equation estimation of equation (2) *without* including protection or other explanatory variables in section 3.1. Industry level results will also be presented without including protection measures in section 3.2 in order to highlight the goods and partners' combinations for which market access is particularly difficult, independently of the causes of the difficulty. We then include in a second step the tariff variable within a broader set of explanatory variables incorporating proxies for NTBs and home-biased preferences in order to see how border effects coefficients are affected. This provides us with an measure of the weight of each class of determinant in usually estimated border effects. This is done in section 4.

2.2 Data requirements

We estimate equation (2) in order to capture border effects characterizing each of the possible bilateral combinations of trade partners: intra-EU trade, US to EU flows and reciprocal, Japan to EU flows and reciprocal, US to Japan flows and reciprocal. The needed data involves primarily bilateral trade and production figures in a compatible industry classification. Those come from the Trade and Production 1976-1999 database made available by Alessandro Nicita and Marcelo Olarreaga at the World Bank, which compiles this data for 67 developing and developed countries at the ISIC rev2 3-digit industry level over the period 1976-1999. The original data comes principally from United Nations statistical sources, COMTRADE database for trade and UNIDO industrial statistics for production. The World Bank files have a lot of missing values for production figures in recent years. We have largely extended the database on this aspect using more recent versions of the UNIDO CD-ROM together with OECD STAN data for OECD member countries, after using a conversion table from ISIC rev3 to ISIC rev2. We also completed the trade data, using the harmonized database of international trade from CEPII (BACI).[3] We end up with rather complete data in our sample consisting of 8 EU members (the countries that were members throughout the whole period of the sample: Germany, France, Great Britain, Italy, Belgium-Luxembourg, The Netherlands, Ireland and Denmark), the United States and Japan for 26 industries. Relative prices are captured though a price level of GDP expressed relative to the United States. The data comes from the Penn World Tables v.6.1. The distance variable needed for the implementation of equation (2) is a slightly more complex than usual, as our specification requires measures of distances between and within countries. The conceptual and practical problems associated with this issue are discussed in Helliwell and Verdier (2001) and Head and Mayer (2002b). They primarily involve finding a consistent and relevant way to aggregate inter-regional distances within and

[3] http://www.cepii.fr/anglaisgraph/bdd/baci/baci.pdf

between countries. We developed a new database of internal and external distances[4], which uses city-level data in the calculation of the distance matrix to assess the geographic distribution of population inside each nation. The basic idea is to calculate distance between two countries based on bilateral distances between cities weighted by the share of the city in the overall country's population. The database also contains the contiguity and common language variables used here.

3 Results

3.1 Overall levels of market access and asymmetries

Table 1 gives results for different subperiods of regressions pooled over all industries. For ease of comparison between the different border effect coefficients, we drop the constant of those regressions and incorporate a dummy variable for each of the possible combinations of partner countries. The coefficient on those dummy variables enables the direct calculation of the border effect on the corresponding combination. When dropping one dummy and keeping the constant, the overall fit of those regressions is around .6, in line and even a little higher than usual in pooled industry-level gravity equations.[5] The coefficient on relative production stays very stable around .8, that is quite near the unitary value predicted by theory. The coefficient on distance is also very comparable with usual findings in gravity equations, with coefficients ranging from -0.47 to -0.64 and no apparent sign of decrease over time. Taking the estimate of the last period, it can be seen that speaking the same language more than doubles trade volumes and that having a common border raises trade volumes by 58%, everything else held constant. The coefficient on the price term is more disappointing, with a lot of volatility and too small implied values of σ. This result of low price elasticities when using directly proxies for prices is usual in the literature (see Erkel-Rousse and Mirza, 2002, for instance).

The border effects for intra-EU trade reported in Table 1 are regularly decreasing over time[6]: The European Integration revealed by this decrease in border effects is an ongoing and successful process[7]. Crossing a national border inside the EU reduces trade by a factor of $\exp(3.16) = 23.6$ in the late seventies, and by a factor of $\exp(2.55) = 12.8$ in the late nineties, which is a substantial increase in the level of integration, and matches with orders of magnitude of preceding work (Head and Mayer, 2000; Nitsch, 2000, and Chen, 2004, for instance). Note that in the most recent period,

[4]Available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm

[5]As can be seen from the error term in equation (2), the errors have a correlated structure in our specification. We therefore use the Huber-White sandwich estimator with clusters defined at the importer-industry-year level to correct standard errors.

[6]When referring to border effects, we always mean the multiplicative effet of national borders on trade with self compared to trade with an international partner. This corresponds to the exponential of minus the coefficients obtained on the dummy variables defined in section 2.1

[7]Furthermore, due to the Single Market entering into action in 1993, the statistical procedure for collection of trade flows changed (a threshold for declaration being introduced in international trade flows) and reduced observed trade flows whereas the production value calculations were kept unchanged. This results in an overestimate of the border effect starting in 1993.

Table 1: Border effects between EU9 countries, Japan and the USA.

	Dependent Variable: Ln Imports Partner/Own					
Model :	(78-80)	(81-84)	(85-88)	(89-92)	(93-96)	(97-00)
Ln. Rel Production	0.80^a	0.80^a	0.78^a	0.80^a	0.77^a	0.73^a
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Ln Rel. Prices	-0.84^a	-1.44^a	-0.33^c	0.55	-0.33^c	-1.34^a
	(0.14)	(0.23)	(0.20)	(0.36)	(0.18)	(0.33)
Ln Rel. Distance	-0.59^a	-0.52^a	-0.47^a	-0.59^a	-0.60^a	-0.64^a
	(0.09)	(0.08)	(0.08)	(0.08)	(0.09)	(0.10)
Contiguity	0.53^a	0.51^a	0.50^a	0.48^a	0.43^a	0.46^a
	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.08)
Common Language	0.67^a	0.67^a	0.57^a	0.53^a	0.65^a	0.81^a
	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.07)
EU9 → EU9	-3.16^a	-3.05^a	-3.07^a	-2.71^a	-2.72^a	-2.55^a
	(0.13)	(0.12)	(0.12)	(0.12)	(0.13)	(0.15)
EU9 → USA	-4.11^a	-4.26^a	-3.86^a	-3.84^a	-3.70^a	-3.48^a
	(0.18)	(0.15)	(0.15)	(0.15)	(0.18)	(0.20)
USA → EU9	-3.86^a	-3.72^a	-4.09^a	-3.20^a	-3.26^a	-3.12^a
	(0.31)	(0.30)	(0.29)	(0.31)	(0.32)	(0.36)
EU9 → Japan	-4.37^a	-4.62^a	-4.60^a	-3.51^a	-3.64^a	-3.77^a
	(0.35)	(0.32)	(0.34)	(0.35)	(0.37)	(0.43)
Japan → EU9	-4.31^a	-4.34^a	-4.63^a	-4.18^a	-4.17^a	-3.66^a
	(0.38)	(0.35)	(0.35)	(0.35)	(0.40)	(0.45)
USA → Japan	-3.46^a	-3.21^a	-3.45^a	-2.31^a	-2.57^a	-2.82^a
	(0.30)	(0.29)	(0.29)	(0.32)	(0.32)	(0.36)
Japan → USA	-3.46^a	-3.70^a	-3.45^a	-3.78^a	-3.55^a	-3.17^a
	(0.23)	(0.22)	(0.20)	(0.22)	(0.24)	(0.26)
N	5072	6584	6303	6213	6332	6317
R^2	0.930	0.919	0.924	0.919	0.911	0.894
RMSE	1.425	1.518	1.432	1.435	1.507	1.639

Note: Standard errors in parentheses: ^{a}, ^{b} and ^{c} represent respectively statistical significance at the 1%, 5% and 10% levels. The reported standard errors take into account the correlation of the error terms for a given importer.

Figure 1: Border effects over time between the EU and the USA

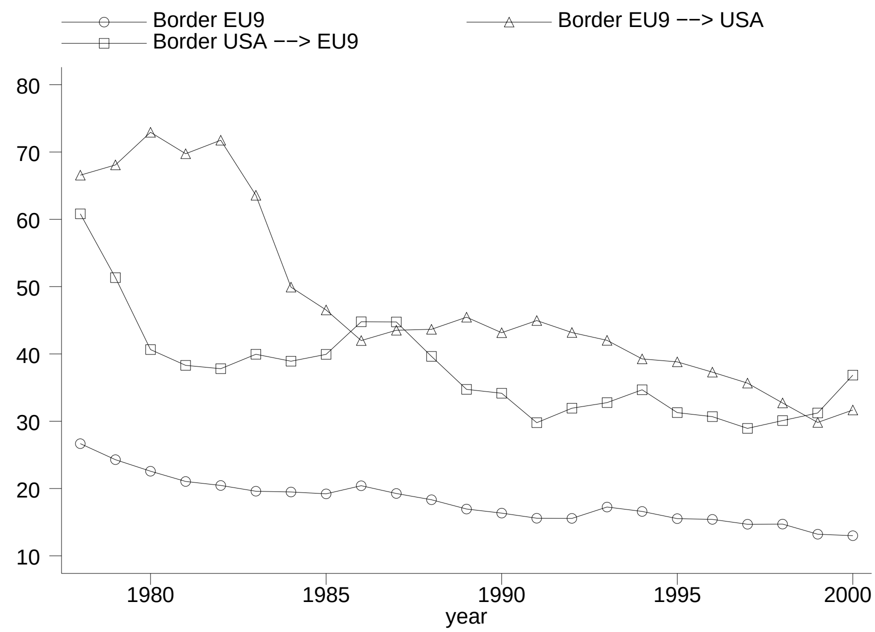


Figure 2: Border effects over time between the EU and Japan

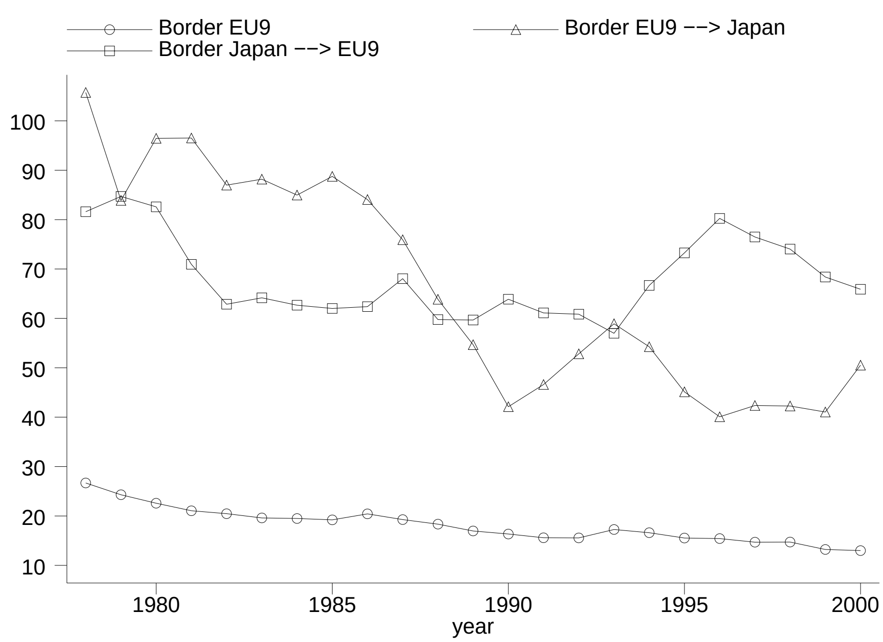
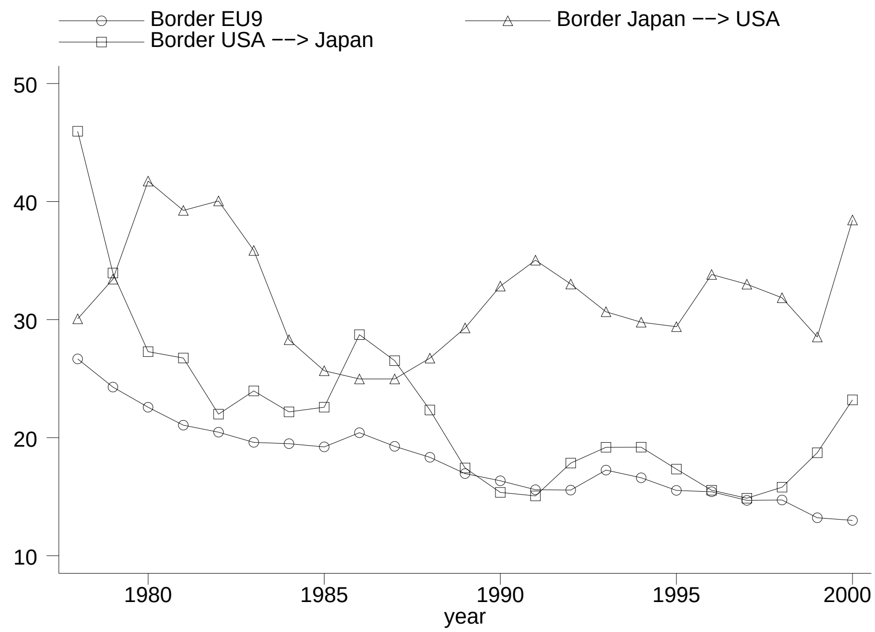


Figure 3: Border effects over time between the USA and Japan



two EU member countries speaking a common language have a border effect reduced to only 5.7.

The level of trade integration among EU countries seems unmatched in the other combinations considered here over the whole period. Only American exports to Japan are occasionally estimated to have a comparable ease of access than intra-EU trade. For instance, in the most recent period, the 12.8 figure for intra-EU flows compares with 32.5 for European exports to the USA, and 22.6 for the reciprocal flow. Flows between the EU and Japan appear as the most impeded in our sample, while those between the United States and Japan show lower border effects. It has been shown that the border effect estimate is extremely sensitive to the measurement of distance among and within countries (Head and Mayer 2002b). The spectacular result that Japan would seem almost as open to the US exports than German consumers would be to French goods, might be driven by a potential overestimate of the US - Japan distance with respect to intra-EU distances. However, this issue touches equally the estimates over time and the coefficients on Japan exports to the United States. The evolution and asymmetries in border effects among non intra-EU pairs are therefore not subject to this issue and informative in this respect.

The rather smooth and regular evolution for intra-EU trade flows contrasts with the one observed for US and Japanese access to the EU as appears in figures 1 and 2. Those figures are obtained through an estimation interacting the border effect for each inter-Triad combination with year dummies.[8] There is a noticeable increase of EU market access difficulties for American ex-

[8]This procedure tends to smoothen the evolution of border effects compared to year-by-year estimates which are more sensitive to outliers.

porters in the middle of the eighties; thereafter, the US producers benefit from a gradual decrease in obstacles. Japanese exporters have suffered from a constantly high level of border effect from 1978 to 2000, with a small improvement in EU market access in the mid-eighties reversed from the mid-nineties onwards.

Turning to the (reciprocal) European access to the US and Japanese markets, it appears from our results that, although the ease of access to the US market for EU producers is substantially lower than the reverse, the gap is narrowing over time, and has become very small recently. In relative terms, the asymmetry of EU market access evolution with third countries is even more apparent with Japan: During the 1985-1990 period, the border effect stays constant for EU markets, but falls markedly for the EU exporters to the Japanese market. In the end of the period, the divergence is even clearer.

Figure 3 represents reciprocity in market access between the United States and Japan. The picture arising is clearly asymmetric with a much better revealed access of US exporters to the Japanese consumers than the reverse, everything else equal (holding constant in particular the respective size of the two economies through the relative production variable dictated by theory). This result, although surprising when confronted with the official positions and disputes concerning market access issues, is not isolated. Harrigan and Vanjani (2003) show in a similar framework that the American market is more closed to Japanese exports than the reverse and increasingly so since the beginning of the nineties.

A striking feature of figures 1, 2 and 3, is the apparent negative correlation between respective bilateral border effects. Furthermore, those bilateral border effects seem influenced by nominal exchange rates movements. Indeed, for the European consumer, we should expect the increase of the US dollar in the mid eighties for instance to have generated substitution away from American goods and in favor of alternative sources, most notably domestic goods, thus creating a rise in the ratio of trade with self over imports from the USA and therefore a rise in the border effect if the exchange rate movement is not in the equation. The exchange rate movement *is in fact present* in our equation through the log of relative prices term (this variable exhibits for instance correlations with the log of nominal exchange rate of 0.93 and 0.96 for the Germany-USA / France-Japan pairs respectively). Note however that the coefficient on the price variable is very small for some periods, denoting a low price elasticity of trade flows, which means that imports do not seem to react significantly to overall price changes largely caused by nominal exchange rate variation. This might be the result of incomplete pass-through of exchange rate variations by firms, and therefore an overestimate of price volatility in our data not matched by high trade volume response. Obstfeld (2002) states that the standard empirical result is that pass-through rate is around 50% over a one year horizon. Table 2 presents a sensitivity analysis using different price variables in regressions pooled over all industries and years, in order to search for a variable that would have a higher impact on trade patterns. Column (1) presents benchmark results with the same price variable as in Table 1. Column (2) replaces this variable with the log of relative wages in the considered industry, assuming that labor is the only input of production and that the markup of prices over

Table 2: Border effects in the Triad: Different Price Variables (1978-2000)

	Dependent Variable: Ln Imports Partner/Own			
Model :	(1)	(2)	(3)	(4)
Ln. Rel Production	0.77^a	0.79^a	0.82^a	0.77^a
	(0.01)	(0.01)	(0.01)	(0.01)
Ln Rel. Distance	-0.58^a	-0.51^a	-0.70^a	-0.57^a
	(0.04)	(0.04)	(0.04)	(0.04)
Contiguity	0.48^a	0.55^a	0.39^a	0.49^a
	(0.03)	(0.03)	(0.03)	(0.03)
Common Language	0.67^a	0.69^a	0.60^a	0.67^a
	(0.03)	(0.03)	(0.03)	(0.03)
EU9 → EU9	-2.87^a	-2.97^a	-2.69^a	-2.88^a
	(0.05)	(0.06)	(0.06)	(0.05)
EU9 → USA	-3.82^a	-3.90^a	-3.73^a	-3.82^a
	(0.07)	(0.07)	(0.07)	(0.07)
USA → EU9	-3.54^a	-3.78^a	-3.02^a	-3.58^a
	(0.13)	(0.13)	(0.14)	(0.13)
EU9 → Japan	-4.14^a	-4.21^a	-3.29^a	-4.20^a
	(0.15)	(0.15)	(0.16)	(0.15)
Japan → EU9	-4.08^a	-4.50^a	-4.01^a	-4.09^a
	(0.16)	(0.16)	(0.16)	(0.16)
USA → Japan	-3.06^a	-3.14^a	-2.18^a	-3.13^a
	(0.13)	(0.13)	(0.14)	(0.13)
Japan → USA	-3.38^a	-3.63^a	-3.72^a	-3.35^a
	(0.09)	(0.09)	(0.09)	(0.09)
Ln Rel. Prices	-0.85^a			-1.05^a
	(0.07)			(0.09)
Ln Rel. Wage		0.00		
		(0.04)		
Ln Bilateral Exchange Rate			-0.07^a	
			(0.00)	
Ln Rel. Prices Intra-EU				0.43^a
				(0.11)
N	37865	35340	37979	37865
R^2	0.915	0.916	0.916	0.915
RMSE	1.515	1.501	1.508	1.515

Note: Standard errors in parentheses: [a], [b] and [c] represent respectively statistical significance at the 1%, 5% and 10% levels. The reported standard errors take into account the correlation of the error terms for a given importer.

marginal cost is constant (as is the case in this model). Relative wages have no significant effect on trade flows. Column (3) uses directly the bilateral nominal exchange rate in the regression. Its impact is significantly negative, but the estimated elasticity is even lower than with the benchmark variable. Our last experiment is to separate the impact of the price variable depending on the fact that the observation involves two EU countries or not. The idea behind that distinction is that the response to price changes might be less important inside the EU and drive the overall coefficient towards 0. This hypothesis is supported by the results, which show a positive effect of relative price changes inside the EU, whereas the price elasticity (accounting for non intra-EU observations now) is raised. Nevertheless, the price response stays at low levels even in the latter case, probably reflecting an association between high prices and high quality of varieties. When looking at the evolution of asymmetries in global market access, one has therefore to keep in mind that nominal exchange rate fluctuations can be part of the causes, in addition to the other explanations we emphasize in section 4.

3.2 Results at the industry level

We now proceed to estimations at the industry level, in order to evaluate the degree of symmetry of revealed trade obstacles in bilateral relationships between the EU, the USA and Japan for specific products. We begin with three figures (4, 5, and 6) representing bilateral symmetry in market access in the three different combinations pooled over the years 1978-2000. For instance, in figure 4, the horizontal axis has (the log of) the border effect faced by American exporters on European markets and the vertical axis has (the log of) the border effect faced by European exporters on the American market. In this figure, industries located beneath the 45 degree line are those for which the access to European markets is more difficult than the access to the American market. Results are as follows:

First, there is positive correlation between the reciprocal market access of different industries in each combination of trade partners. The most apparent correlation being between the EU and Japan. This can be interpreted in terms of endogenous protection (similar countries –like the ones here– protect their "sensitive" industries in the same way and industries tend to have the same pattern of sensitivity in all those countries). An additional explanation is in terms of industry characteristics (domestic preferences are more diversified in sectors such as food, leading to a larger border effect in all samples for this industry).

Turning to specific industries, we can note that Furniture, Plastic, Food and Wood industries are systematic outliers, characterized by very large border effects in all combinations. Here different tastes, transportation issues[9] and other factors related to distribution networks might explain this result. Conversely, Industrial chemicals, professional and scientific equipment and transport equipment for instance do face limited border effects in all bilateral relationships. Those three

[9]Those results come from industry-level regressions and therefore industry specific coefficients on distance should at least partly capture cross-industry differences in "transportability" of the good.

Figure 4: Industry-level market access between the EU and the USA – Border coefficients

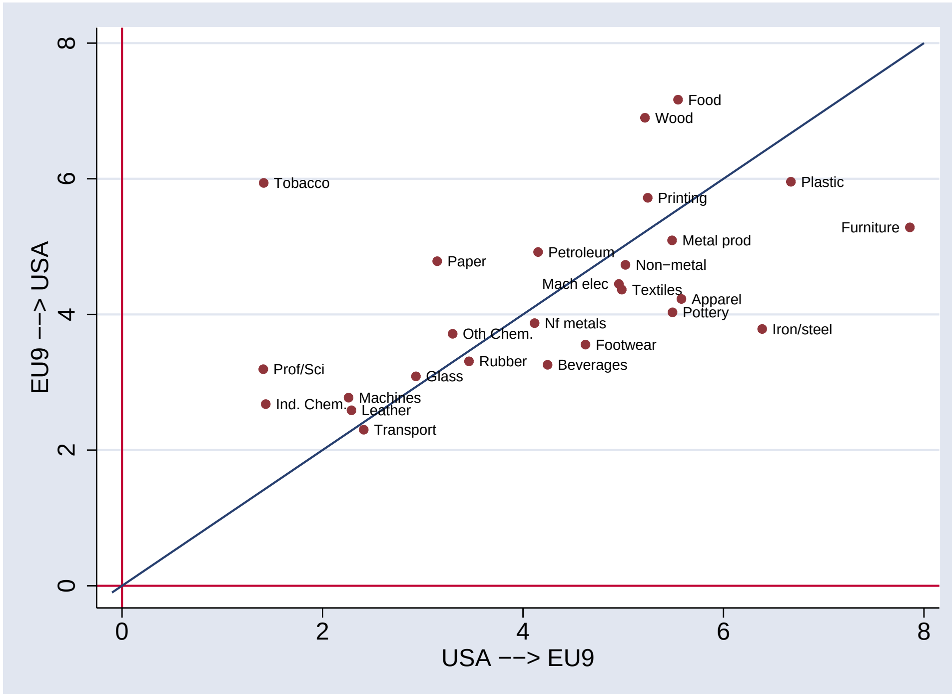


Figure 5: Industry-level market access between the EU and Japan – Border coefficients

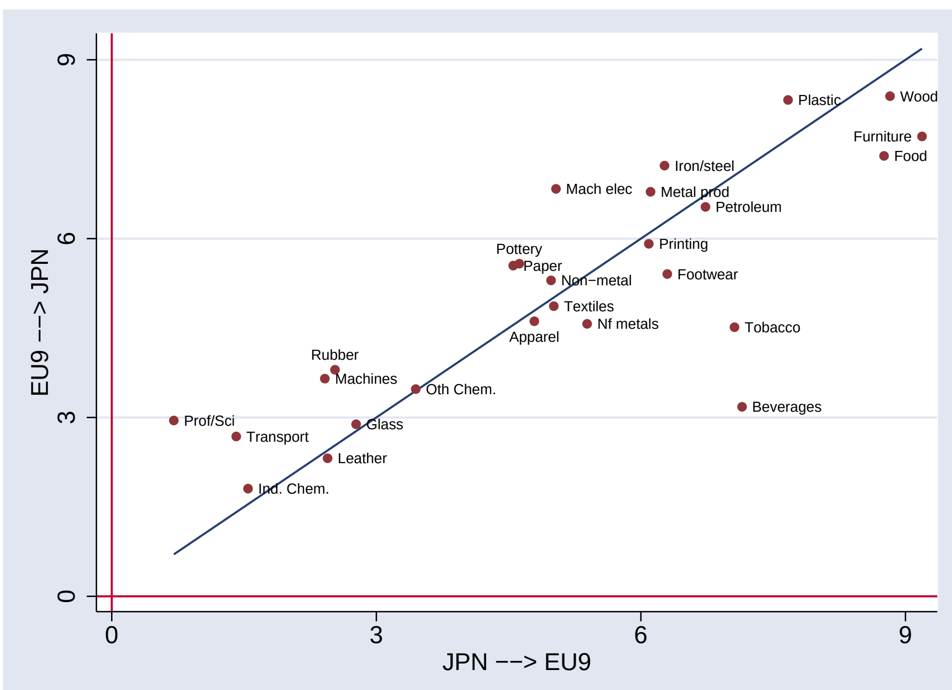
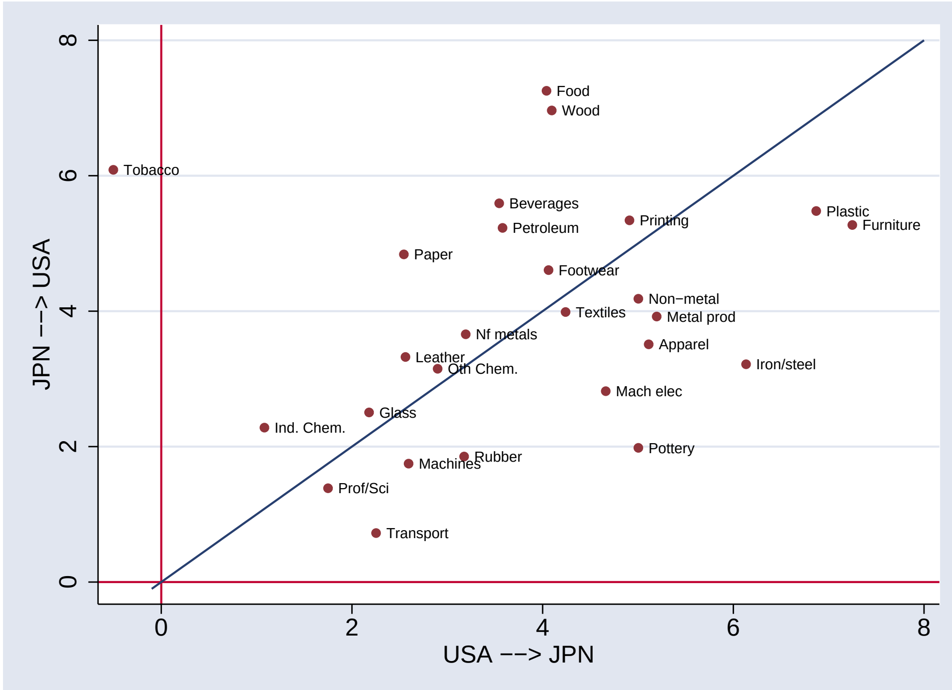


Figure 6: Industry-level market access between the USA and Japan – Border coefficients



figures do not support a "strong asymmetry" view such that either the EU, the USA or Japan would impose higher restrictions in market access to the two other partners over all goods: The industries seem to be distributed on both sides of the 45 degree line in all three figures.

Figures 7, 8, and 9 give additional information on the evolution of market access difficulties over time. We graph the *difference in border effect coefficients* for each industry in each country pair for two periods (diamonds for 1980-1989 and triangles for 1990-1999). Overall, we identify in figure 7 Furniture, Iron and steel, Pottery, Wearing apparel, Footwear and Beverages among others to be industries more "protected" in the EU (vis--vis US producers) than in the USA (vis--vis European producers) during the first period. The asymmetry is however shrinking over time for those industries. Reciprocally, Tobacco, Wood products, Food, Printing and publishing, and Paper and products markets were far more protected in the USA. Overall, the evolution of reciprocal integration is unclear, with American markets perhaps becoming slightly asymmetrically more open to European exporters over time, which confirms the finding of figure 1. As far as the bilateral relationship between EU and Japan is concerned, and considering the period 1990-99, our results identify a large number of industries where access to EU markets by Japanese exporters is substantially more difficult than the reverse. This is in sharp contrast with the preceding period, where most industries lie to the left of the vertical line of 0 difference in coefficients. This global evolution also mirrors the one of figure 2. Beverages, Footwear, Tobacco, Wood products, Food, Printing, Leather goods and Wearing apparel are among those sectors where the access to European markets

Figure 7: Evolution of industry-level market access between the EU and the USA – Border coefficients

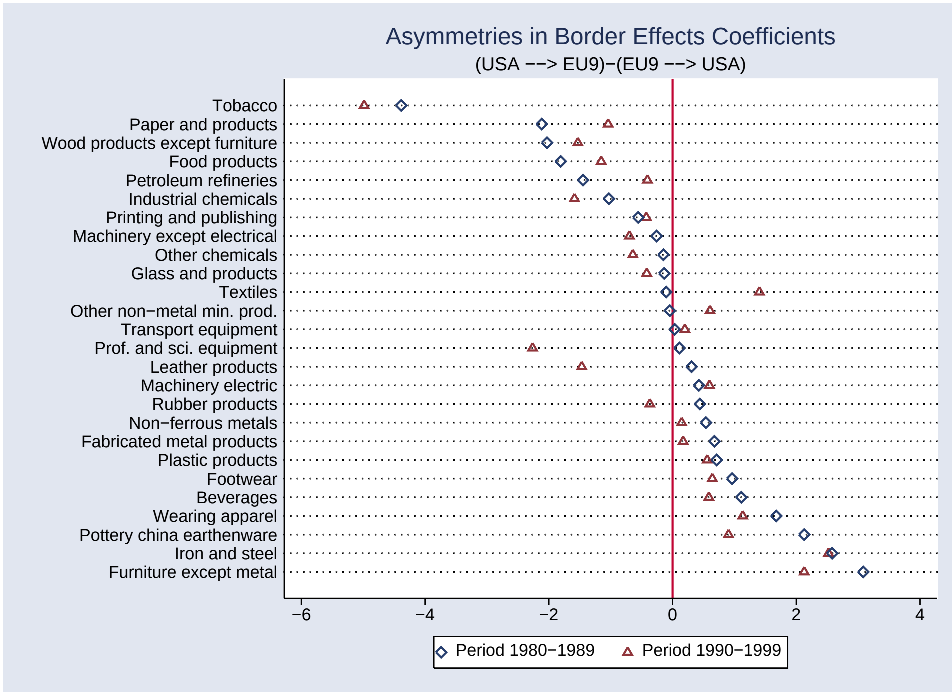


Figure 8: Evolution of industry-level market access between the EU and Japan – Border coefficients

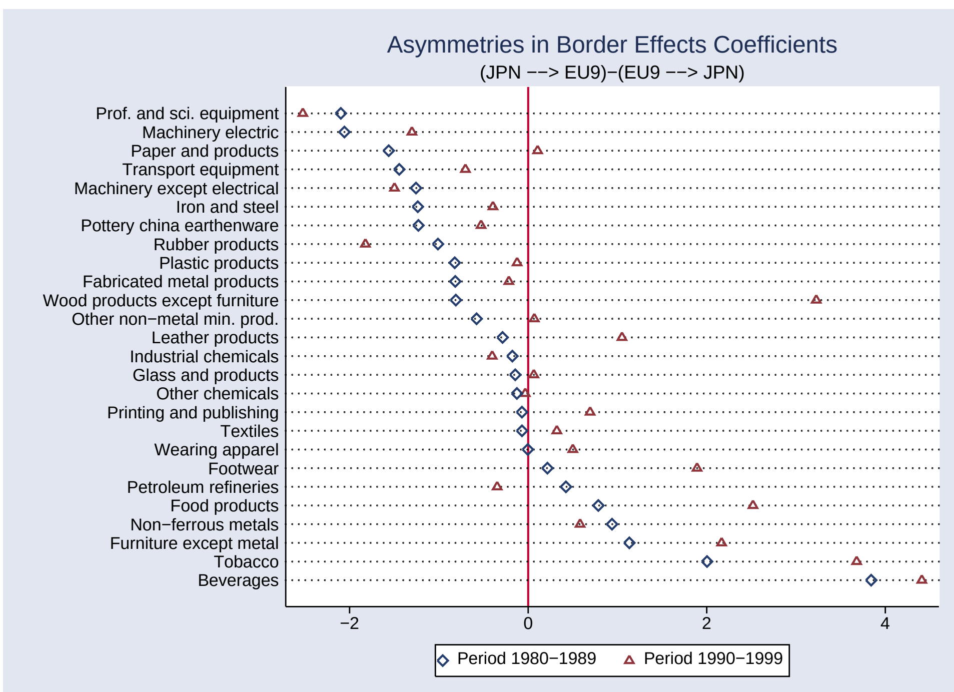
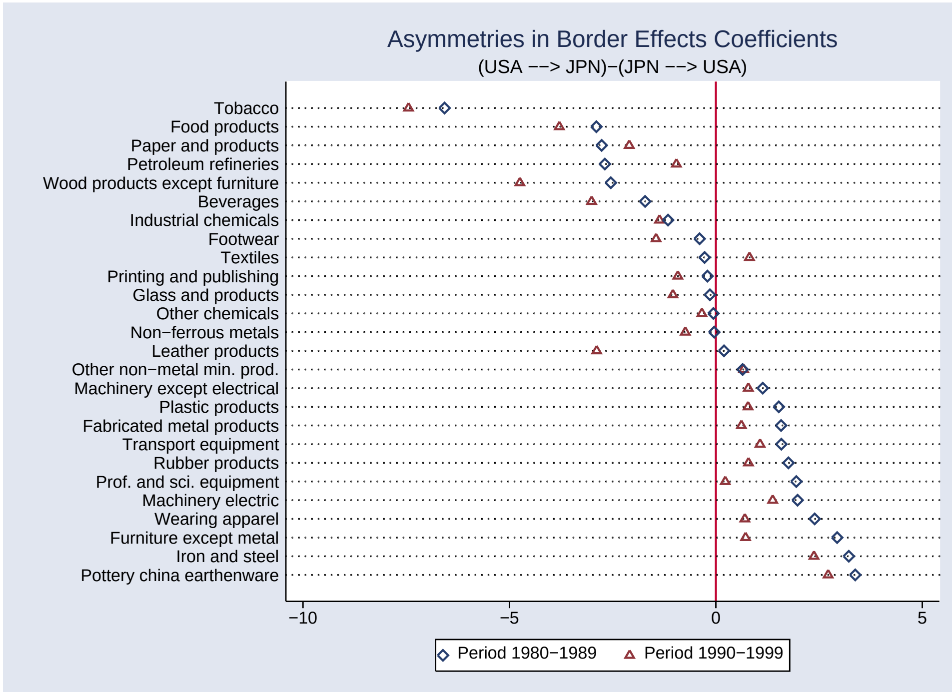


Figure 9: Evolution of industry-level market access between the USA and Japan – Border coefficients



for Japanese goods has asymmetrically deteriorated. Reciprocally, electrical and non electrical machinery, professional and scientific equipment, rubber products and transport equipment are more closed markets in Japan.

The next step is to provide explanations for this variance in border effects which reveal difficulties in reaching consumers in a certain country from another country. This is what we do in the next section.

4 Explaining Border Effects within the Triad

4.1 Possible explanations

This section aims at disentangling the different components of hindrances to market access. Returning to our modelling framework, the coefficient (multiplied by -1, for ease of interpretation) estimated on the dummy variable JP-USA$_{ij}$ for instance, in the preceding section has a theoretical counterpart of:[10]

$$(\sigma^s - 1)[\ln(1 + t^s_{ij}) + \ln(1 + \text{ntb}^s_{ij}) + \beta^s_i], \tag{3}$$

[10]In the estimations of the above section 3, no measure of tariffs or other protection measures have been explicitly included in the model.

where i =Japan and j =USA. We now use the industry-subscript s that was omitted before for clarity, but becomes now crucial as underlined in section 3.2: Much of the variance in border effects will be related to variance of protection measures or home bias across industries. We want to introduce in the estimated equation proxies for the different terms in (3) and measure the resulting fall in the estimated border effect.[11] We therefore need industry-level variables for tariffs (t^s_{ij}), NTBs (ntb^s_{ij}) and home biased preferences (β^s_i). Note also from (3) that the border effect is positively influenced by the elasticity of substitution of the industry (σ^s). The more homogenous the product (high σ^s), the more sensitive to price differentials will be consumers, which yields a magnified trade volume response to a same level of trade costs (should it be protection or preference-based).

Tariffs can be measured at the bilateral level and for each product of the HS6 nomenclature in the TRAINS database from UNCTAD. We base our investigation on this rather crude measurement of tariffs, namely considering weighted averages of MFN tariffs among the three partners. This should however be a reliable procedure for the countries under consideration, since they do not have any bilateral preference scheme. Those tariffs are aggregated from Jon Haveman's treatment of TRAINS data (UTBC Database[12]) in order to match our ISIC rev2 industry classification using the world imports as weights for HS6 products, an extract of the data for 1999 is shown in Table 3. Even in manufactured goods, tariffs between industrialized countries are not negligible and vary quite substantially across industries and countries combinations.

Besides tariffs, there are other obstacles to trade imposed by governments at the border in order to protect national industries and that will be captured by the border effects in the above regressions. Those NTBs, for which tariff equivalent are difficult to compute, take a myriad of different forms, from traditional border formalities and administrative harassment to more sophisticated sanitary and phyto-sanitary measures (Fontagné et al. 2001). We follow here Haveman et al. (2003) (using the same source data), and divide NTBs into four categories: (1) Those that have direct price effects such as minimum import pricing, trigger prices, and variable levies, (2) those that involve quantity restrictions such as quotas, seasonal prohibitions, and orderly marketing arrangements, (3) those that involve quality restrictions such as health, safety or technical standards, and (4) those that involve a threat of retaliation such antidumping and countervailing duty investigations. For a given HS6 category, each NTB variable is set equal to 1 if at least one of the underlying tariff lines in that category is subject to an NTB, and 0 otherwise. As for tariffs data, this information on NTBs is then aggregated to match with the 3-digit ISIC rev2 classification by calculating a frequency index.

Within the EU, tariffs are 0 on all products since 1968. The removal of non tariff barriers was

[11] An alternative procedure would use two steps, first estimating border effects coefficients and then regressing them on the possible explanatory variables. However, this involves the undesirable feature of using an econometric estimate as the dependent variable in the second stage. In addition, exploiting the full dimension of the problem would require estimating 7 different border effects for each industry and year, which results in certain regressions having very few observations, and therefore an increased volatility in estimated border effects.

[12] http://www.eiit.org/Protection/extracts.html

Table 3: Bilateral tariffs (in %) in 1999 between Triad countries.

Industry	US→EU	EU→US	JP→EU	EU→JP	US→JP	JP→US
Apparel	11.8	12.6	11.8	13.2	13.2	12.6
Beverages	9.9	4.7	9.9	19	19	4.7
Food	10.2	4.7	10.2	14	14	4.7
Footwear	10.6	13.3	10.6	36	36	13.3
Furniture	1.6	2.9	1.6	4.8	4.8	2.9
Glass	5.2	5.9	5.2	2.1	2.1	5.9
Ind. Chem.	4.9	4.4	4.9	3.9	3.9	4.4
Iron/steel	2.6	2.5	2.6	3.2	3.2	2.5
Leather	4.4	7.2	4.4	21.4	21.4	7.2
Mach elec	2.6	1.7	2.6	0.2	0.2	1.7
Machines	1.1	0.8	1.1	0.1	0.1	0.8
Metal prod	2.4	2	2.4	1.3	1.3	2
Misc	2.6	2	2.6	2.7	2.7	2
Nf metals	2.5	1.7	2.5	1.6	1.6	1.7
Non-metal	2.2	3.2	2.2	2	2	3.2
Oth Chem.	2.1	1.6	2.1	2.1	2.1	1.6
Paper	2.9	0.7	2.9	1.9	1.9	0.7
Petroleum	2.5	5.2	2.5	3.3	3.3	5.2
Plastic	6.8	4.4	6.8	5	5	4.4
Pottery	6.8	6.2	6.8	2.3	2.3	6.2
Printing	1.5	0.4	1.5	0.2	0.2	0.4
Prof/Sci	1.7	1.5	1.7	0.2	0.2	1.5
Rubber	3	2.4	3	0.5	0.5	2.4
Textiles	9.5	10.8	9.5	9.2	9.2	10.8
Tobacco	51.7	261	51.7	12.9	12.9	261
Transport	6.5	3.1	6.5	0	0	3.1
Wood	1.8	1	1.8	3.9	3.9	1

Source: TRAINS converted to ISIC rev2 3-digit industries the goal of the Single European Act, which targeted a vast number of observable remaining NTBs between EU members between 1987 and 1993. Our regressions will start in 1993 due to protection data availability, that is after completion of the single market where all government-controlled trade impediments should have been removed inside the EU. The remaining border effect for intra-EU flows are therefore expected to mainly reflect other causes than protection. On the contrary, trade policy measures might still have a sizeable impact for all other combinations in our sample. Note that even if actual protectionist measures are not the only explanation for the border effects differences we want to explain, some of the alternative explanations work in a quite similar fashion. An important potential explanation can be found in asymmetric preferences among consumers. For instance, EU consumers may have a particular taste for American tobacco products, while the American consumers have on the contrary a particular distaste for EU goods in this industry. This type of preference pattern would therefore dampen, everything else equal, the level of trade from EU countries to the United States and raise the reciprocal flow. This consequence is *observationaly* equivalent to an asymmetric tariff on this good by the trading partners. Our approach here is to contribute to the literature by assessing which part of the variance of the border effects can be explained by simple differences in tariff rates and which part results from other determinants and preferences in particular.

Home bias of consumers is the other important candidate explanation. We capture the systematic preference for domestic goods (β_i^s in equation (3)) by using the intuitive distinction between final and intermediate goods in terms of the home bias. We suppose that preferences are more likely to be biased in favor of domestic products when consumers decide the origin of the good consumed rather than firms. There are opposing arguments. Wolf (1997) suggests that border effects can be particularly strong for intermediate goods because of geographic clusters of vertically linked industries[13]. However, results by industry from section 3.2 tend to indicate higher border effects for final consumption goods and Head and Mayer (2000) find some relationship between the magnitude of market fragmentation and the fact that the goods of the industry are directed to final consumption. Using the United Nations Broad Economic Categories (BEC), defined in terms of SITC Rev. 3, Fontagn et al. (1996) classify the HS6 products into four categories according with their economic use: Primary, intermediate, capital and consumption products. We use their concordance table to calculate the share of final goods in the total external demand of a Triad importer in a given industry. [14] The sign of this variable is expected to be negative.

As outlined above, high degrees of product differentiation lowers the incentive to substitute foreign varieties in favor of domestic ones for given trade costs. This will result in higher bilateral

[13]Hummels (2001) shows that the tendency for firms to choose their locations so as to minimize the need to incur the costs associated with trade across geographic barriers such as distance or borders could explain the high coefficients on both variables in gravity models. Hillberry (1999) confirms this hypothesis showing that the estimated border effect depends negatively on the degree of geographic industry concentration. In Yi (2003), vertical specialization, which occurs when regions specialize only in particular stages of a good's production sequence, magnifies the effects of border barriers.

[14]We are assuming that this share is not different from the share of consumption goods in the total demand, which includes the demand for domestic goods.

trade volumes and lower border effects. We proxy the degree of differentiation of traded goods ($1/\sigma^s$ in equation (3)) by the share of intra-industry trade in each industry-bilateral relationship. This share is calculated at the HS 6-digit level following the methodology introduced by Fontagné et al. (1998) that considers the flows between two countries to be inter-industry when the flow in one direction amounts to less than 10% of the value of the flow in the other direction. Evans (2003) also uses a measure of the intra-industry trade share in total trade to proxy for differences in elasticities across industries, in addition with other proxies. She finds that all variables yield consistent results suggesting that border effects fall with the degree of product differentiation. The variable used in the equation is the residual share of inter-industry trade, which reflects homogeneity of products and has an expected negative sign in the regression.

Finally, concerning the FDI hypothesis, we use the bilateral stock of FDI between each combination of the triad. The source is the OECD database, often used in gravity-like empirical work on FDI (Wei, 2000 being a recent example), which gives those figures from 1980 to 2000. Although this variable lacks one dimension of our dataset (the industry level), it has the advantage of good overall reliability across the entire period. Hillberry (1999) uses the sectoral dimension but not the bilateral dimension, using the foreign-owned establishments 1990 share of total US employment in an industry.

4.2 Results

Column (1) of Table 4 gives coefficients for a regression without any variable intended to explain the border effect but with the sample constrained to be the one where all the explanatory variables, except FDI, are available. This enables a direct comparison of different coefficients when introducing protection, product differentiation and home bias variables accounting for the impact of borders on trade.

We start by introducing tariffs in column (2), in order to obtain a first estimate of the impact of tariffs alone on estimated border effects. The first result is that bilateral tariffs indeed impact trade significantly, even though our sample includes tariffs that can be considered relatively low (see Table 3). Contrary to usual belief, tariffs still matter in shaping trade volumes, even between Triad countries, despite their limited average magnitude. The estimated price elasticity (σ in our theoretical framework) ranges between 1.96 and 3.79 here, depending on the specification. This estimate of σ is still lower than recent estimates from the literature, but we only have 26 industries here, where Head and Ries (2001) for instance estimate their σ to be around 8 with 106 industries.

Second, comparing columns 1 and 2, we observe a decrease in border effects for all combinations except intra-EU bilateral relationships[15] (which do not suffer from any tariff). Tariff barriers therefore contribute to the impact of national borders in the expected way: They tend to raise the ratio of internal to cross-border trade volumes. The border effects remain however high and significant, pointing to other important additional explanations.

[15]The slight difference between three first columns in the EU9 coefficient is due to rounding.

Table 4: Determinants of Border Effects in the Triad

Model :	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent Variable: Ln Imports Partner/Own						
Ln. Rel Production	0.73^a	0.73^a	0.72^a	0.73^a	0.72^a	0.71^a	0.69^a
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Ln Rel. Prices	-0.72^a	-0.73^a	-0.75^a	-0.75^a	-0.77^a	-0.71^a	-0.59^a
	(0.19)	(0.19)	(0.19)	(0.19)	(0.19)	(0.18)	(0.19)
Ln Rel. Distance	-0.66^a	-0.65^a	-0.65^a	-0.65^a	-0.63^a	-0.54^a	-0.36^a
	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)	(0.08)	(0.10)
Contiguity	0.44^a	0.45^a	0.45^a	0.45^a	0.47^a	0.42^a	0.42^a
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)
Common Language	0.79^a	0.79^a	0.79^a	0.79^a	0.82^a	0.76^a	0.24^a
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.08)
EU9 → EU9	-2.60^a	-2.61^a	-2.61^a	-2.61^a	-2.30^a	-2.18^a	-3.85^a
	(0.11)	(0.11)	(0.11)	(0.11)	(0.12)	(0.12)	(0.36)
EU9 → USA	-3.61^a	-3.45^a	-3.37^a	-3.34^a	-3.14^a	-3.03^a	-4.76^a
	(0.16)	(0.17)	(0.16)	(0.16)	(0.16)	(0.16)	(0.44)
USA → EU9	-3.03^a	-2.85^a	-2.76^a	-2.74^a	-2.61^a	-2.63^a	-4.75^a
	(0.28)	(0.28)	(0.28)	(0.28)	(0.27)	(0.27)	(0.53)
EU9 → Japan	-3.64^a	-3.48^a	-3.25^a	-3.38^a	-3.14^a	-3.14^a	-4.81^a
	(0.34)	(0.34)	(0.34)	(0.34)	(0.33)	(0.33)	(0.54)
Japan → EU9	-3.78^a	-3.61^a	-3.51^a	-3.50^a	-3.37^a	-3.39^a	-5.36^a
	(0.35)	(0.35)	(0.35)	(0.35)	(0.34)	(0.33)	(0.58)
USA → Japan	-2.55^a	-2.39^a	-2.18^a	-2.30^a	-2.04^a	-2.04^a	-4.15^a
	(0.29)	(0.30)	(0.30)	(0.30)	(0.29)	(0.29)	(0.54)
Japan → USA	-3.28^a	-3.12^a	-3.02^a	-2.96^a	-2.78^a	-2.67^a	-4.85^a
	(0.23)	(0.23)	(0.22)	(0.23)	(0.22)	(0.22)	(0.52)
Ln (1 + tariff)		-2.66^a	-2.37^a	-2.79^a	-1.30^a	-0.96^b	-1.21^a
		(0.50)	(0.43)	(0.54)	(0.42)	(0.46)	(0.47)
Frequency index of NTB (all)			-0.85^a		-0.62^a	-0.44^c	-0.55^b
			(0.22)		(0.23)	(0.23)	(0.23)
Frequency index of Threat NTB				-0.59^a			
				(0.21)			
Frequency index of Price NTB				-2.13^a			
				(0.58)			
Frequency index of Quantity NTB				0.85			
				(0.65)			
Frequency index of Quality NTB				-0.51^c			
				(0.27)			
Share of consumption goods					-0.86^a	-0.87^a	-0.74^a
					(0.11)	(0.11)	(0.12)
Share of Inter-Industry Trade						-0.61^a	-0.45^a
						(0.13)	(0.13)
Ln bilateral FDI stock							0.14^a
							(0.03)
N	7683	7683	7683	7683	7683	7683	6122
R^2	0.894	0.895	0.896	0.897	0.9	0.9	0.907
RMSE	1.552	1.543	1.538	1.535	1.513	1.506	1.451

Note: Standard errors in parentheses: ^{a}, ^{b} and ^{c} represent respectively statistical significance at the 1%, 5% and 10% levels. The reported standard errors take into account the correlation of the error terms for a given importer.

The aggregated frequency index of all NTBs introduced in column (3) also impacts international trade negatively and significantly, and yields a decrease in all relevant border effect coefficients. The most reduced border effects are those concerning the access to the Japanese market. This result is detailed in column (4) which considers the different types of NTBs separately, and suggests a particular aggregation bias problem of NTBs measures in this market (the most important fall in border effect becomes the one encountered by Japanese exporters on the US market). The price NTBs seem to have the greater impact on trade flows, while the quantity NTBs show a positive although insignificant coefficient. Haveman et al. (2003) find that, for the year 1993, the average level of tariffs reduces trade flows by 5.5 percent in their OECD countries sample. We find a close figure of $\exp(-2.66 \times \ln(1.0287)) - 1 = 7.3$ percent. Their trade-reducing effect for NTBs is 8 percent on average, ours is 3.2 percent. This result of a measurable impact of NTBs contrasts with Chen (2004) and Head and Mayer (2000) who finds that, inside the EU, residual NTBs at the end of the single market programme were not significant explanations of border effects.

The share of consumption goods in the total imports of each importer in each industry also reduces the estimated border effects, supporting our hypothesis that the home bias is actually more important in the industries characterized by a large share of final demand. Unsurprisingly, this variable also reduces the explanatory power of tariffs and NTBs, which are generally more important in those industries. Our proxy for the degree of homogeneity of exchanged products, the share of inter-industry/one-way trade also has the expected sign. The more homogenous the goods exchanged, the more sensitive the consumers are to given levels of tariffs or other impediments to trade and therefore the lower the trade flows. The degree of homogeneity of the good exchanged is therefore also a significant part of the explanation of the border effect as in Evans (2003). Note that all those explanations related to actual protection, home bias and substitutability of goods put together explain a large part of the border effect between blocs of the triad in the years 1993 to 1999 studied here. The part explained ranges from 32.3% for the Japan → EU combination to 45.7% for the Japan → USA combination. Standard explanations to border effects are therefore empirically important, although they do not explain the whole of the border effect puzzle.

The stock of overall bilateral FDI has a positive impact on trade flows, which represents a confirmation that, at such an aggregate level, FDI and trade are complements rather than substitutes. This positive relationship supports the Hillberry (1999) hypothesis that international transactions costs could to be lower when the firm is multinational.[16] Aggregate bilateral FDI stocks are therefore *not* an explanation of border effects in our sample, although detailed data at the industry-level would be needed to confirm this result.

[16] "...to the extent that any of the border effect is due to fixed, rather than variable costs, multinational firms ought to have already incurred them and can benefit from returns to scale in international trade. Multinationals may also exploit cross-border trade as a means of reducing currency risk."

5 Conclusion

We investigate in this paper the ease of reciprocal market access among the three constituent blocs of what is often referred to as the "Triad" (the EU, Japan and the United States). Our method involves an estimation of difficulties encountered by exporters located in one of the blocs when selling their products in another bloc. Those estimates come from a structural gravity-like bilateral trade equation, derived from the now canonical model of trade under monopolistic competition. It is based on a comparison of inter-national trade flows with intra-national trade flows, the *border effect* method of assessing trade costs recently surveyed by Feenstra (2003) and Anderson and van Wincoop (2004). The level and asymmetry in border effects reveals the market access difficulties in each of the bloc combinations we consider.

Our results point to important differences and asymmetries in the quality of market access. A typical European country in the late nineties has an average ratio of trade with self over trade with another EU country around 13 times larger than predicted by the model, which gives an idea of the substantial level of fragmentation remaining in the EU. This fragmentation has however largely decreased since the late seventies and its current level is generally much lower than in the rest of the sample. The same ratio for the United States for instance when considering imports from the EU is 32.5. Japan appears to be specially asymmetrically open to US exports in the recent period, with a ratio of 16.8 against 23.8 for the reverse flows, confirming recent results from Harrigan and Vanjani (2003). Results are also detailed across industries and we identify industries where each bloc has specifically high revealed restrictions in its market access.

We show that a substantial part of those border effects can be explained by a set of determinants that have been proposed in the literature. We use several proxies to capture the fact that the level of border effects in a given industry can be caused by actual protection set by governments (tariffs and NTBs), home-biased preferences of consumers and the degree of homogeneity of the good traded. The set of proxies used in our regressions to capture those determinants explain a substantial part of border effects. The explanatory power of those variables range from 32.3% of the Japan $\rightarrow$ EU border effect to 45.7% of the Japan $\rightarrow$ USA one. While the border effect puzzle is not *totally* solved, our theory-consistent method coupled with standard economic explanations manage to provide a good overall picture of the causes of market access difficulties in the Triad.

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