The Impact of Technical Barriers to Trade on Home Bias: An application to EU data*

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Abstract:

The purpose of this paper is trying to estimate the impact of technical barriers to trade on bilateral trade flows of individual EU countries and to evaluate the downward impact of national border on trade flows (home bias). Here we try and identify the effect of technical barriers to trade on EU imports applied to data in which sectors where the EU has sought to introduce harmonized technical regulations to remove technical barriers to trade (New Approach, Old Approach, Mutual Recognition) as well as an aggregate of sectors for which technical barriers are deemed to be unimportant. Using the gravity model, we find that home bias remains substantial for products where the EU has sought to introduce harmonized technical regulations to remove technical barriers to trade but mutual recognition sectors exhibit the smallest home bias. Based upon the analysis on the evolution of home bias in the EU, we find no evidence that the home bias has decreased for products where differences in technical regulations are important.

Keywords: home bias, gravity model, European integration, technical barriers to trade.

JEL Classification: F15, L50, C30

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1. Introduction

Because tariffs on imports among European countries have been eliminated as the result of the Single Market Program (SMP), there has been increasing interest in the extent to which technical barriers to trade (TBT's) may distort or restrict trade. Possibly, this is also because quantitative measurements of the effects of technical regulations are burdensome, and indeed, they have been characterized as "…one of the most difficult non-tariff barriers imaginably to quantify" (Deardorff and Stern, 1998). This reflects in part problems relating to data. Using calibrated simulation models, many authors typically assume that technical regulations result in an (ad hoc) increase in trade costs. In any event, there seems to be a case for closer examination on the consequences of technical regulations. This requires a precise quantification and a comprehensive effort to analyze data at a detailed sectoral level.

Our work differs from other studies in that we examine how differences in technical regulations across EU countries has affected the pattern of bilateral trade flows of individual EU countries taking into account the downward impact of national border on trade flows (home bias). For example, when safety standards differ across countries, consumers may have greater trust in domestic regulatory standards, which leads to higher trade within a country. Like Nitsch (2000) we use the gravity model approach, to explain the pattern of bilateral trade flows of EU countries. Using this model we are also able to assess whether 'home bias', which measures the level to which internal trade exceeds international trade, are more prevalent for sectors where technical regulations are important and if EU policy towards the harmonization of national technical requirements has had an impact on the magnitude of the home bias.

The data we use to identify technical regulations is a self-constructed database. We differentiate sectors according to a European classification, which specifically identifies sectors where the EU has sought to introduce harmonized technical regulations to remove TBT's[1]. The principal mechanisms to eliminate TBT's in the

[1] We discuss in more detail the source of this categorization later in the paper.

EU have been the principle of mutual recognition (MRP), whereby a product lawfully produced and sold in any of the EU member states must be given free access to all other EU markets and where this fails through the use of harmonized standards. Prior to the Single Market, the 'old approach' dealt with a single standard laid out in detailed technical regulations for single or group of products unanimously agreed directives of the European Council. In this approach to technical harmonization little progress has been made since the detailed directives were difficult to agree. This led to the 'new approach', whereby technical barriers to trade are removed by the setting of 'essential requirements'.

In this paper we have several objectives. We use the gravity model in order to discern the impact of policies implemented in the EU to remove TBT's and to evaluate the impact of the economic size of these barriers on home bias. Within this, we are particularly interested to see:

- whether there are differences in home bias when applied to sectors where technical regulations are not deemed to be a potential trade barrier, to sectors where technical harmonization is important. Within these latter groups, we are also able to assess whether there are differences in the size of the estimated home bias between sectors according to the approach adopted to the removal of TBT's.
- whether the magnitude of the home bias has fallen since the creation of the Single Market. Within this we are particular interested to see:
    - whether the degree of home bias is lower for sectors, which have already been subjected to the harmonization of technical regulations; "old approach sectors"[2].
    - whether sectors subject to the new approach in the EU, where we might expect the impact of economic integration in the form of the Single Market to be strongest, have experienced a greater fall in home bias during our sample period of 1990 to 1998.

[2] The policy environment in sectors subject to detailed harmonisation under the old approach has changed little over this period, see CEC (1998).

-whether there are significant differences in the parameter values of the gravity model when applied to sectors where technical regulations are not deemed to be a potential barrier to trade, to sectors where technical regulations are important. In particular we are interested to see whether various elasticities differ between these different groups of sectors and whether they are characterized by high-income elasticities of demand in importing countries.

This paper continues in Section 2 by a briefly description of the EU approach to the removal of technical barriers to trade (TBT's). Section 3 reviews the existing work on home bias and the gravity model. Section 4 explores the method for estimation while section 5 discusses the data that are used to examine technical barriers to trade and section 6 presents the results. Section 7 discusses the robustness of our results. In section 8 we discuss the interpretation of the estimated home bias and in section 9, we conclude.

2. The EU approach to eliminate TBT's

TBT's arise when differences in national regulations in health, safety, environmental and consumer protection, may hinder intra-EU trade or render it more costly than domestic trade. The need to adapt product design, re-organize production systems, and the costs of multiple testing and certification can entail significant additional costs for suppliers of exported goods to a particular country. Technical regulations relate to technical specifications and testing and certification requirements such that the product actually complies with the specifications to which it is subjected (conformity assessment) and are the focus of this paper[3].

The removal of TBT's due to differences in technical regulations amongst member states is central to the creation of a Single Market in Europe. EU policy related to technical regulations and testing and certification requirements is currently based upon two approaches: enforcement of the Mutual Recognition Principle (MRP) and if this fails, the harmonization of technical standards across member states.

2.1. The Mutual Recognition Principle

The basic EU approach under the principle of Mutual Recognition is that products manufactured and tested in accordance with the technical regulations of one member state can offer equivalent levels of protection to those provided by corresponding domestic rules and procedures in other member states. Thus, once a product is legally certified for sale in any member state it is presumed that it can be legally placed on the market of any member state, and as such has free circulation throughout the whole of the Single Market. 'Mutual Recognition' tends to apply where products are new and specialized and it seems to be relatively effective for equipment goods and consumer durables, but it encounters difficulties where the product risk is high and consumers or users are directly exposed.

2.2. Harmonization of technical standards

Where 'equivalence' between levels of regulatory protection embodied in national regulations cannot be presumed, the EU has sought to remove TBT's through agreement on a common set of legally binding requirements. Subsequently, no further legal impediments can prevent market access of complying products anywhere in the EU market.

Old Approach

The initial approach adopted in the EU to harmonizing technical specifications was based upon extensive product-by-product or even component-by-component legislation carried out by means of detailed directives. Now known as the 'old

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[3] We do not consider the impact of non-regulatory technical barriers or standards. These are voluntary and arise from the self-interest of producers or consumers, for example, to improve the information in commercial transactions and ensure compatibility between products.

approach' this type of harmonization proved to be slow and cumbersome. In the 1980s the ineffectiveness of this approach was recognized when it became apparent that new national regulations were proliferating at a much faster rate than the production of harmonized EU directives (Pelkmans (1987)). This failure arose because the process of harmonization had tended to become highly technical as it sought to specify individual requirements for each product category (including components). This resulted in extensive and drawn-out consultations. In addition delays arose because the adoption of old approach directives required unanimity in the Council of Ministers. As a result the harmonization process proceeded extremely slowly. The old approach applies mostly to products (chemicals, motor vehicles, pharmaceuticals and foodstuffs) by which the nature of the risk is clearly apparent.

New Approach

In the 1980s it became increasingly recognized that there was a need to reduce the intervention of the public authorities prior to a product being placed on the market. A key element in the plan to create a Single Market in Europe was the adoption of the 'new approach' to technical harmonization under which directives can be adopted by the Council on the basis of majority voting. The new approach applies to products, which have "similar characteristics" and where there has been widespread divergence of technical regulations in EU countries. What makes this approach 'new' is that it only indicates 'essential requirements' and leaves greater freedom to manufacturers on how to satisfy those requirements, dispensing with the 'old' type of exhaustively detailed directives. The new approach directives provide for more flexibility by using the support of the established standardization bodies, CEN, CENELEC (European Standardization Committee for Electrical Products) and the national standard bodies. The standardization work is achieved in a more efficient way, is easier to update and involves greater participation from industry.

3. Related Trade Literature

Recently, following initial work by McCallum (1995) the gravity model has been used to assess the extent of home bias in consumption. The author finds that Canadian provinces are about twenty times more likely to trade amongst themselves than they are to trade with US States after controlling for size and distance between economic centers. The data set applied by McCallum appears to be unique in identifying trade amongst the regional subsets of trading partners. He uses a Statistics Canada dataset for 1988 that consists of imports and exports for each pair of provinces as well as between each of the ten provinces and each of the 50 US states. Helliwell (1996) extended McCallum's (1995) sample over the period 1988-1996 and confirmed McCallum results of reporting such a surprisingly high magnitude of intra-national trade reflecting the importance of national boundaries, given the intense economic integration between Canada and the US through NAFTA.

Wei (1996) introduces a methodology that ruled out the reliance on national trade data and constructed a home bias measure based upon the assumption that what a country imports to itself is mainly the difference between domestic production and exports to all foreign countries. The effects of crossing a border can then be estimated by including a dummy variable and is measured as the antilog of this coefficient. For internal distances, he estimated the average distance to be half of the distance from the economic center to the border. When a country has at least one neighbor, then it is one quarter of the distance to the nearest neighbor. Wei estimated the home bias effect for OECD countries and finds on average, that countries trade 9.6 times more with themselves than with foreign countries. When correcting the basic gravity specification for trade among countries that share the same language and land border[4], home bias is reduced to 2.6. Helliwell (1997) revisits the OECD data and extends the gravity equation with a remote indicator[5] and finds a home bias of 13 separating out the effect of language from the land border effect.

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[4] These two variables have been introduced by Frankel, Stein and Wei, 1995
[5] See section 4 for the definition of the remoteness variable.

For the European Union, Wei (1996) finds a very small home bias of about 1.7 and finds that the border effects for eight EU member countries declined by 50% between 1982 and 1994. He first includes a dummy for any given bilateral trade flow among EU member states and a second dummy for the observation relating to EU member's trade within their own borders. Helliwell (1997) adapts the same methodology but assigns a dummy for EU bilateral trade flows only. This reflects EU membership and by deriving the exponential of the difference between the coefficients on the average home bias of OECD countries and the EU dummy, he reports a home bias of 6.29. In both studies, the sample includes the language and land border (adjacency) variable.

Nitsch (2000) is the first paper that constructs a sample for EU countries by using a more detailed data set compiled by EUROSTAT. He finds evidence of substantial home bias in Europe, with internal trade being on average larger by a factor of ten than trade with other EU partners and that the magnitude of this home bias declined during the 1980's. Contrary to Wei (1996) result, it is interesting to note that this border effect increases to a factor of 11 after language and adjacency are accounted for in the model. Instead of using the ad hoc calculation of measuring distances (e.g. Wei, 1996), Nitsch (2000) proposes a new measure for estimating the average of intra-national distances as a function of country size.

Head and Mayer (2000) apply a gravity approach to sectoral data for the EU countries and then assess whether there is any correlation between the size of the estimated border effect and a crude classification of sectors according to the magnitude of non-tariff barriers (NTB's). Neven and Roeller (1991)[6] investigate the impact of NTB's on the share of EU imports. Both studies conclude that the indicator of non-tariff barriers cannot explain the variation in the size of estimated border effects and that there is no relation between declines in the size of the border effect since the creation of the Single Market and indicators of NTB's. Consequently, the authors suggest that consumer preferences must underlie the border effects that were identified.

[6] Quotes in Head and Mayer (2000)

7. The Gravity Model

The standard framework to account for volume of bilateral trade is the gravity model. The empirical success can be attributed from the model's consistently high statistical fit. Typically in a log-linear form, this model takes its name from the prediction that the volume of trade between countries is promoted by their economic size (income) and constrained by their geographic distances. Other important features characterizing the international exchange of products between countries can easily be added.

This simple form can also be derived from different structural models. Originally, Anderson (1979) assessed that a sufficient condition for obtaining a gravity equation is that consumers have both identical homothetic preferences and access to the same goods prices. More recent applications show that this model is compatible with monopolistic competition models of trade: allowing for economies of scale, (Helpman (1987))[7], and for technological differences across countries, (Davis (1995)). Deardorff (1995) has preserved the CES preference structure and added monopolistic competition of a Hecksher structure to explain specialization arising from factor endowment differences both with frictionless and impeded trade. Surprisingly, an equation of this type seems to work empirically for both OECD countries and developing countries, and that indeed "just about any plausible model of trade would yield something very like the gravity model, whose empirical success is therefore not evidence of nothing, but just a fact of life" (Deardorff, 1995).

Given its performance in explaining trade flows, the literature on the effects of national borders on trade flows adopted the gravity model. Accordingly, the gravity model considered here takes the following form:

$$\ln M_{ijk,t} = \alpha + \beta_{1k,t} \ln GDP_i + \beta_{2k,t} \ln GDP_j + \beta_{3k,t} \ln D_{ij} + \beta_{4k,t} \ln R_i + \beta_{5k,t} \ln R_j + \sum_n \gamma_{nk,t} DUM_{ij} + \varepsilon_{ijk,t}$$

[7] Quotes in Deardorff (1995)

where i and j refer to the importing and exporting country respectively and k to the sector: new approach; old approach; mutual recognition; any combination of the new approach, mutual recognition principle and the old approach; technical and non-technical barriers to trade.

$M_{ijk,t}$ is the value of imports by country i from country j in year t;
GDP_i is the level of income in country i;
GDP_j is the level of income in country j;
D_{ij} is the distance between the trading centers of the two countries.
DUM_{ij} are a set of n dummy variables. Separate dummy variables are included to reflect the effects of adjacency between i and j, the case when i and j share the same language and to reflect home bias in the level of internal trade ($j = i$).

The economic variables in the gravity model (incomes, distance and remoteness) define the 'normal' level of trade. On the assumption that the gravity model is well specified the dummy variables seek to capture systematic deviations from this normal pattern of trade due to physical adjacency, language and home bias. It is important to interpret the value of the coefficients on these dummy variables in the light of a clear description of what is meant by the 'normal' level of trade. This is necessary for a precise definition of exactly what we mean by home bias and what the coefficient on the dummy variable for home trade is capturing. We return to this issue after discussion of the data and a presentation of the econometric results.

We follows Wei's (1996) definition that for any country k, the imports from itself is the difference between its total production and its total exports to the rest of the world:

$$M_{iik} = Y_{ik} - X_{ik} \qquad (1)$$

where Y_{ik} is total production of country i, X_{ik} are total exports of country i to the rest of the world and M_{iik} represents imports of country i to itself ('domestic trade'). A dummy for the quantity that a country imports to itself captures the home effect.

We use a definition of remoteness that has been introduced by Helliwell (1997) and commonly used in the gravity literature (Wei, 1996; Nitsch, 2000; Deardorff, 1998; Soloaga and Winters, 2000). The remoteness of importing country *i* in relation to trading partner *j* is given as the weighted average distance between country *i* and all trading partners other than *j*, where the weights are given by the GDP of the trading partners,

$$R_i = \sum_{k \neq j} D_{ik} / GDP_k \qquad (2)$$

This measure is also computed for the exporting country R_j. If the distance between the exporting country *j* and other exporting countries *k* is higher relative to the distance between the exporting country *j* and importing country *i*, this will increase bilateral trade between country *i* and *j*. Remote countries (e.g. Australia and New Zealand) can be expected to trade more with each other than two other countries (e.g. Germany and Portugal) that are separated by the same distance but are geographically well positioned near other markets.

The remoteness of EU countries averaged over the period 1990-1998 is plotted in figure 1. It makes sense that countries such as Belgium/Luxembourg and the Netherlands are the least remote while Greece and Portugal have the highest remote index. An interesting feature of this measure is that UK is more remote than the lower countries reflecting the closeness of London to other European countries.

Internal distances d_{ii}, are taken from Nitsch (2000) which were calculated by using the disk area procedure to obtain the average distance between economic centres. He shows that the radius of a circle (given by the inverse of the square root of π times the square root of the area) may be a good approximation for the average distance. For distances between countries d_{ij}, we follow the conventional method in the gravity literature and measure the direct (great circle) distance between the economic centres (capital cities).

5. Data Sources and Methodology

Trade data comes from EUROSTAT and are collected at the 8-digit level of the European Combined Nomenclature trade classification, which covers more than 10.000 products. Our data set comprises bilateral trade flows during 1990 and 1998 between each of the following ten EU countries: Denmark, France, Germany, Greece, Italy, Ireland, the Netherlands, Portugal, Spain, United Kingdom and the remaining EU countries (with Belgium and Luxembourg treated as one)[8]. The sample therefore covers a total of (10*14) = 140 observations. We derived the trade data according to the NACE industrial classification, which covers around 100 manufacturing industries. We utilize information on the sectoral incidence of technical barriers and the particular approach adopted by the EU to their removal. Trade in each sector was then aggregated into our four broad groups of new approach sectors, old approach sectors, mutual recognition sectors, and sectors where differences in national technical regulations do not constrain trade flows, according to the classification in CEC (1996)). The data come from the detailed study undertaken for the Commission's review of the impact of the Single Market in the EU (CEC (1998)). This study provides information at the 3-digit level of the NACE classification (about 120 manufacturing industries, see Table 1, 2) of whether trade is affected by technical regulations and the dominant approach used by the Commission to the removal of such barriers in the EU.[9] For sectors where technical regulations affect trade, the study classifies them as those where the barriers are overcome using mutual recognition (MR), and those sectors where mutual recognition is insufficient or unsuitable so that either the old approach (OA) or the new approach (NA) to overcoming technical barriers is used. For these sectors it is assumed that all trade is affected by the technical regulations and by the identified approach to the removal of the barriers. There are; however, a small number of sectors where a combination of approaches is identified, we include these in the analysis, which follows.

[8]Comext did not report trade data for Sweden, Finland, Austria before 1996. Belgium and Luxembourg are also omitted because there is no production data reported before 1995.

We show the overall trade coverage of technical barriers in the EU. The height of the bars in Figure 2 shows for 1998 for each country, the share of EU imports, which are categorized as being prone to technical barriers to trade. In other words, we aggregate the imports of the EU from each country's exports to the EU across all the sectors, which are subject to technical barriers to trade. This figure demonstrates that a very large proportion of intra-EU trade is in sectors affected by EU technical regulations[10]. On average more than 70% of intra-EU imports are in sectors where differences in technical regulations are important. The significance of these sectors ranges from around 75% per cent of EU imports from Germany and Portugal to 65% of EU imports from Belgium. Thus, there is considerable variation across EU members in the share of trade affected by technical regulations; however, we also recognize that this share is not only affected by differing national regulations but also by the level and composition of import volumes.

This paper requires bilateral trade and production data in a compatible classification for 10 European countries over the period 1990-1998. We extracted production data from the Eurostat New Cronos with reference to the domain of the 'business structural database'. The long time series, "covering enterprises with 20 persons employed and more", in NACE revision 1 (code at 3 digit level) were converted to NACE70 (code at 3 digit level) in order to match with trade data extracted from Eurostat (Comext) database. Some in-between-year observations are missing from the New Cronos database. Missing data, then, are approximated by applying a trend of the gross rate of value-added (in quantity) in each NACE sector. The concordance lists the NACE revision 1 and the NACE70 at a 5 and 4 digit level code, respectively. Finally, GDP, unit labor costs and population are obtained from the New Cronos database.

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[9] Trade data according to the NACE classification were obtained from the COMEXT database. The NACE is the industrial classification used by the Statistical Office of the European Communities (Eurostat). A detailed definition of the classification is presented in CEC (1998).

[10] Previous analysis of the SMP in the existing EU countries suggests that the removal of technical barriers to trade may be of great significance. CEC (1998) calculates that over 79% of intra-EU trade may have been affected by technical regulations in 1996. In the graph, we only consider manufacturing and include sectors that are prone to Mutual Recognition Agreements (MRA's), the New Approach, any

6. The estimation

6.1. Total Trade

Following Wei (1996), Helliwell (1997) and Nitsch (2000), we estimate the gravity model as a system with *t*-equations between 1990-1998. We impose all of the coefficients but the home variable (and intercept) to be the same and allow for correlation across the years by employing the method of seemingly unrelated regression (SUR). The basic results for total bilateral trade flows between 1990 and 1998 are reported in the first three columns of Table A1. This gives us an impression of the home bias in aggregate in order to keep the results comparable with previous papers before we proceed to a more disaggregate analysis. For the measurement of internal distances, we take the assumption employed by Nitsch (generally the radius of a circle or 0.56 times the square root of an area). As indicated by the R^2, about 90% of the equation explains satisfactorily the variation in the dependent variable and all explanatory variables are highly significant (>0.99). The GDP coefficients for the exporting countries (EU15) range from 0.63 to 0.65 while the GDP coefficients of the importing countries (EU10) are on average 0.71. This suggests that the economic space between the bilateral trade partners is fairly balanced; namely, when income increases with 1%, the volume of bilateral trade increases (less than proportionally) by about 0.70%.

The coefficients of the distance variable are significantly negative. Similarly, on average a 1% increase in distance (as measured here) reduces bilateral trade by a range between 0.5% and 1.1% and is on average close to previous studies where the consensus estimate is 0.6 (Leamer, 1997). Chen (2000) suggests that reported distance coefficients that are much higher than the general agreed 0.6 elasticity could be explained by the use of different transport modes. For example, in the European

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combination of the New Approach, Mutual Recognition Principle and the Old Approach. For a more detailed analysis, see Brenton, Sheehy and Vancauteren (2001)

Union, in 1998, 57.8% of total intra-EU trade went by road[11] whereas most global trade is maritime transported.

Column (1) represents the simplest specification of the gravity equation as reported by McCallum (1995). The home variable for intra-national trade is 5.75 (exp (1.75)), which means that on average, the EU10 countries export about 6 times more with itself than with another EU country after adjusting for income (size) and distance. This result suggests that the home effect is in the European Union is substantially lower than the home bias estimate found for Canada by McCallum (1995) and Helliwell (1997) and Wei (1996) for OECD countries, close to Nitsch' (2000) estimates, but considerably larger than Wei (1996) estimates for the EU.

In column (2), a language and land border (adjacency) dummy are added to the traditional gravity equation. We follow Helliwell (1997) and Nitsch (2000) method of assigning a value of one only in the case of bilateral trade flows between countries that share a common language and land border. This permits us to capture the home effect of a country relatively to another country by not taking into account that they share a common border and language[12]. In addition, our sample consists of only three member countries that share a common border and language. Consequently, the home bias can be interpreted as how much a country trade with itself than with another unrelated country. By subtracting the coefficients of the dummies from the home bias coefficient and taking the antilog of the remaining result, we obtain an estimate of 4.17 for more intense trade between a country than with adjacent neighbors with which it shares a common language. It can be seen from column (2) that adding language and adjacency clearly augments the border effect, which can be explained by the intuitive definition of these categorical variables. This home bias' estimate is fairly close to Nitsch (2000) results.

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[11] Eurostat, as quoted by Chen (2000)

[12] Wei (1996) also assigns a one to the dummy for common language and adjacency for countries that trade with itself (the additional observation) and can be interpreted as "how much more intensely does a country trade with itself than with another country with which it shares a common border and a common language" Helliwell (1997). Helliwell (1997) provides a detailed discussion on justifying this method.

Moving to column (3), the model adds a remoteness variable for both importing and exporting countries. These added variables are statistically significant; however, the coefficient on the remoteness of exporting countries does not have the correct sign. Nitsch (2000) also reports a wrong sign but the home bias remains unchanged. However, our results show a significant increase (from 2.39 to 2.7) in the home bias effect, which is in line with Wei (1996) and Helliwell (1997) claim. Our estimates suggest that countries tend to trade 14 times more with each other after controlling for distance, income, language, adjacency and remoteness.

An interesting point to note is that our remoteness variable is affected by the sample. We have seen from figure 1 that countries such as Spain, Greece, Portugal, Finland and Sweden relatively show a high remoteness coefficient and this should affect the home bias estimate. As a robustness check, Nitsch (2000) shows that by adding Spain and Portugal, the inclusion of the remoteness variable raises the estimated home bias from a factor 11 to 16[13]. To test for this, we constructed a second sample that excludes Finland, Austria and Sweden and ran the regression from 1990 till 1995 to represent the EU12 during that time. As shown in column (4), the results do not confirm Nitsch (2000) finding; namely, that adding or dropping some countries little affect the home bias estimate in the European Union. On the contrary, we can see that the home bias increases from 2.7 to 2.98. This rise can be partially an indication that can be attributed to a different time period or it may also suggest that the home estimate may collide with the presence of any of the ten importing countries in the estimation sample. We will return to this issue in section 7.

6.2. Technical Barriers To Trade

We now to turn to table A2 and apply the gravity model to two broad sectoral aggregates, those were technical regulations do not cause barriers to trade (column 1) and an aggregate of sectors subject to New Approach, Old Approach, Mutual Recognition Principle and a small number of sectors where multiple harmonization

[13] However, the inclusion of Portugal and Spain little affects the home bias estimate when the remoteness variable is not added to the equation. This makes it interesting for my analysis to investigate the sensitivity of the remoteness coefficient to selecting a country sample.

approaches apply (column 2). The explanatory powers are large in each regression and the income variables are strongly significant. The income effect for the exporter is larger for sectors subject to no technical harmonization. The distance variable is smaller for sectors that are subject to the harmonization of technical regulations and the adjacency variable is larger.

The estimated parameters of home bias are large and strongly significant in both samples. We find that home bias remains substantial for products where the EU has sought to introduce harmonized technical regulations to remove technical barriers to trade. The home bias is 13.19. On the other hand, we find a home bias of 16.7 for products where differences in technical regulations are not deemed to be important constraints upon intra-EU trade. These results suggest that technical barriers to trade are relevant in explaining home bias; nevertheless, we would expect that those industries where no TBT's persist would have a lower home bias than those industries where the EU has sought to introduce harmonized technical harmonization to remove TBT's. This suggests that factors other than differences in technical regulation must constrain trade [14]. We will return to this issue in section 8.

Finally, we provide results for our three groups of products where technical regulations are important grouped according to the approach adopted in the EU to the removal of technical barriers to trade (column 3-5) and for a small number of sectors where multiple harmonization approaches apply (column 6). In all four cases, distance and incomes are strong and significant trade determinants. The parameters are not really similar across the four groups. Distance has a much lower dampening effect for old approach products and we also observe that the income elasticities for both the importing and exporting countries are more balanced. Home bias is significant for all sectors but is smaller for products under mutual recognition. These results suggest that the home bias estimate is important but that the extent of this bias

[14] Head and Mayer (2000) find that crude indicators of non-tariff barriers cannot explain the cross-industry variation in the size of estimated home bias. In Brenton and Vancauteren (2001) we find similar conclusion and suggest a number of arguments other than TBT's that may explain the presence of home bias in the European Union (taste differences, clustering of production, …) .

against trade with other EU countries relative to internal trade varies according to the approach to the removal of technical barriers to trade.

6.2.1. Evolution over time

We now turn to the analysis of changes in home bias over time. In particular we are interested whether reduction in border effects occurred for sectors that are identified as having technical barriers to trade. In 1995, Finland, Austria and Sweden became member of the European Community and we have seen that this change in status has influenced the temporal evolution of the home bias effect. The year-by-year evolution can be best seen from figure 3 and 4, where we use a single OLS regression with constant coefficients but keep the constant and the home bias time dependent. For the period 1990-1998, we observe that the border effects have not decreased for sectors that are prone to technical regulations. Figure 3 shows clearly that the border effect reduces slightly for sectors subject to no technical barriers to trade. The home bias in the European Union has dropped only gradually from about factor 20 to factor 17. For sector where TBT's are important home bias remains at a level below the NTB's sector but shows relatively higher movement and between 1996 and 1997, it returns to the same level of the base year.

Finally, we turn to the evolution of border effects at a more disaggregated level for TBT sectors. This can be seen from Figure 4. The intensity of internal trade relative to EU trade has increased for New Approach sectors, exactly those sectors were we would anticipate that the impact of the Single Market would be most pronounced and has fallen slightly for Old Approach sectors when we compare 1998 to 1991. This may also be that the full impact on trade of NA directives issued during the 1990's has yet to be implemented. It may even be due to the fact that in some cases the New Approach harmonization, over time, has replaced the traditional 'Old Approach' for some products[15].

[15] Council resolution (1985) outlines a model directive for the selection criteria for old approach products to be suitable for the new approach.

Figure 4 also shows that home bias for products under mutual recognition has the lowest level of border effects and virtually remains unchanged between 1991 and 1998 (border effect of 3.14 as against 3.11). Here we also might have expected that the application of the mutual recognition as a powerful tool for economic integration would have increased cross-border trade. Related literature (COM1999, Pelkmans (1996)) points out that there are still obstacles with the application of the MRP preventing full benefit of a Single Market from being gained. These difficulties are merely related to a lack of confidence in acts adopted by the authorities of the member states and administrative delays[16].

We note that between 1990 and 1991, there is a rapid increase in the home bias estimates. From our analysis, this rapid increase in the home estimate collides with the presence of Greece in the estimation sample (see section 7). We also observe that in 1993, home bias seems to jump under all sector categories coefficient. This observation can be attributed to the fact that after 1992, the European Union adopted a new system called Intrastat in which companies no longer reported at the customs level but directly to their respective national statistical institutes and only if a minimum amount is exceeded. It is therefore likely that Instrastat underestimates trade flows. As the methodology of production data collections did not change, there will be some upward bias in the home bias coefficient. We can do little to beyond noting the problem.

7. Statistical Tests

The results that we have obtained so far in our analysis are subject to greater doubt than the standard errors would suggest. However, few studies have addressed the issue at the heart of this paper so that suitable comparisons by which to assess the

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[16] Pelkmans (1998) reports that MR is demanding because its credibility in the market place critically hinges on very extensive monitoring, accessibility of the monitoring authority for complaints and the legal and manpower capacity to impose legal and easy-access to justice.

robustness of the results presented here are not available. Two important sources of doubt remain: endogeneity and outliers.

7.1. Outliers

We have seen from the previous section that outliers may exert a disproportionate influence on the fit of the estimation equation or on the estimates of parameters of interest. To correct for normality we use a method whereby the detection of influential cases calls for diagnostic analysis that attempt to summarize the information on normality into a single statistic. DFITS creates such an index that enables us to understand the influence or importance of each case in our fitted model and solves for the outlier problem. The measure can be interpreted as a scaled difference between predicted values for the *ith* case when the regression is estimated with and without the *ith* observation. It is scaled by the standard deviation of the fit. First we tested for DFITS values greater as the cutoff value suggested by Belsey, Kuh and Welsh (1980, pp. 28[17]) who suggest that DFIT values greater than 2*(square root (number of variables/number observations)) deserve greater observation. We then used the bounded influence estimation procedure in order to minimize the influence of observations with large studentized residuals and DFIT values instead of deleting them. This procedure of bounded influence does not appear to affect our results.

We also verify if the variability in the specified variables, in particular the home estimate, does not collide with the presence of any of the 10 importing countries in the estimation sample. By using the specification from the regression outlined in column 2, table A1, we sequentially remove one country at a time and obtain one border effect for each year. In summary, the border effect differ somewhat on average, which confirms our previous analysis that results are robust to small changes in the sample. The largest deviation from the border effect (2.39) is induced when Greece is omitted and we also obtain a smaller interval between year-to-year home bias estimates for 1990 and 1991. The R^2 changes from 0.92 when Greece is omitted to 0.88 when Spain

[17] See Maddale p. 488 and section 7.2. for a description of this method.

or France is omitted. This analysis suggests that Greece might be a possible outlier and may exert a disproportionate influence on the estimated home bias. We identify 6 high influential cases [DFIT value>2*sqrt(number of var./number of obs.)] with Greece as an importer. The DFIT values range between 0.48 for France imports to 0.93 for Germany.

7.2. Robustness

Endogeneity

A first check is to test the endogeneity in our equation. First as emphasized by McCallum (1995), GDP and exports are most likely jointly determined in equilibrium. Unfortunately, the authors note that the lack of instruments does not permit to deal adequately with this problem. Nevertheless Wei (1996) and McCallum (1995) use the log of the population as an instrument for the log of the GDP variables. We confirm their results in our estimates and conclude that this modification has no effect on the fit of the regression. Equation (5) in Table A1 repeats the specification of equation (3) with a small difference in the estimation. In order to deal adequately with this problem, several endowment measures are used as instruments. The set of instruments are (1) the GDP's from the two previous years - this should be sufficiently to capture the variability from cyclical or temporary disturbances, (2) current population and (3) the ratio of unit labor costs in total manufacturing of the importing and exporting country from the current and two previous years [18]. The relative unit labor costs are then calculated by dividing the unit labor cost of the importing country by a weighted average of the unit labor cost of the exporting country. We use the share of each exporter in total EU exports as the weighting factor. As can be seen from the results, there is a slightly increase in the goodness of fit and the estimated border effect for the period 1990-1998 is slightly larger.

[18] Tests have been run using GDP and unit labour costs from one, two and three years previously as instruments and we found that the equation actually fits better as a lag of two years are used for the instruments.

Extreme Bound Analysis

At present we conclude that the home bias estimate appears to be relatively robust, being consistently found in several studies, but its precise estimate is uncertain. An essential question arises of how much of this bias we have found is influenced by the choice of specification. As shown by Temple (2000), 'extreme bound analysis' (EBA) is essentially a mean of reporting an upper and lower bound for parameter estimates thereby indicating the sensitivity to the choice of the specification. The upper and lower bound are based on all possible linear combinations of a subset of *Z*-variables in addition to a set of *X*-variables that are always included in the regression. The highest and lowest values for the coefficient of the variable of interest that can't be rejected at the 5% significance level and remains at the same sign at the extreme bounds is then referred as robust variable. The pool of variables we from which we allow the EBA to choose Z-variables are adjacency, language, population, the importing and exporting remoteness measure and the ratio of importing and exporting unit labor costs, *RULC*[19]. Table A3 presents the EBA test for the home bias estimate. The table also shows the *p*-values of some diagnostic tests. Any p-value under 0.05 indicates that the model fails the corresponding diagnostic test at the 5% significance level where the null is that the model is correctly specified. The general message from these results is that the home bias estimate is robust and positive at both bounds. However, we note that the residuals are not normally distributed. To provide some evidence concerning our finding (see section 7.1.), we also examined the sensitivity of our results when we exclude Greece in the sample. The bounds did not importantly change; however, we note that for all regressions, the results of the Cooks and Weisberg test were more promising with p-values ranging between 6% and 13% of significance level.

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[19] For each of the 120 sectors considered in this study, we calculate the nominal unit labor costs (ULC) for each industry, *l*, and country *i* defined as UL = (W/(Y/N)), where W is employee compensation, Y is the GDP and N is employment. This indicator shows the relationship between how much each worker is paid and the amount each worker produces.

8. Interpreting the border effect

A number of authors have found evidence that the border effect is an important feature characterizing the international exchange between countries, but we do not clearly understand what the dummy variable we have called the border effect might actually be measuring. It is here that the fragility of the theoretical underpinnings of the gravity model proves to be a hindrance. One possibility is policy-induced trade restrictions, such as technical barriers to trade; however, these cannot be the only factor since we find substantial and persistent border effects for sectors where technical regulations are not expected to constrain trade flows and sectors where there have been substantial efforts to remove regulatory barriers to trade still reflect large border effects. This suggests that policy-related barriers are of relatively minor importance to explain the presence of the border effect[20].

First of all, the home bias that we, and others, have identified seems to be too large to be consistent only with the presence of trade barriers. Theory (Wei, 1996; Anderson and van Wincoop, 2001) shows that the border effect depends upon the tariff equivalent of the border barrier (e.g. tariffs, quotas, exchange rate variability, transation costs, non-tariff barriers, etc.) and the elasticity of substitution between domestically produced goods and imports. Taking a representative value of the border effect of from this study of 3 and an elasticity of substitution of 20 generates a tariff equivalent of over 16 percent, way in excess of the current levels of average tariffs in the EU of around 4 percent.

Secondly, the calculated intra-country distances relative to international distances are much smaller. If this internal distance is over-estimated the border effect will be given even more weight in the regression leading to an overestimated border effect. This observation is not in line with standard trade theory because it tells us that the inverse

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[20] Head and Mayer (2000) find that crude indicators of non-tariff barriers cannot explain the cross-industry variation in the size of estimated home bias.

relationship of transportation costs (approximated by distance) with trade increases when transportation costs are high. By contrast, our measure suggests that trade with a country itself, captured by the border effect increases, as internal distance rises[21]. Yet, the empirical evidence supporting the idea that declining trade with rising distances seems to be only warranted for international trade flows.

Home bias may have an effect on both foreign (imports) and domestic prices. Consider the case when there is a large consensus for home bias in domestic goods, this may raise domestic prices and could prevent foreign goods to enter the domestic market (for a given identical product). This may well explain our finding for a small variability in home bias throughout time. Neven, and al. (1991) modeled the behavior of prices when demand is subject to home bias characterized in a non-cooperative equilibrium. Their analysis based upon an equilibrium condition confirms that when national bias in favor of domestic goods occurs, the domestic price exceeds the foreign price even if some consumers are in favor for foreign goods. They conclude that relative higher domestic prices increase the domestic market share and stimulate domestic trade.

It is well known that consumer attaches different values to products, which are otherwise identical but produced in different countries. Yet, the body of empirical and survey literature, supporting the idea that country of origin matters, seems also to warrant a specific analysis. Johanson and Thorelli (1985)[22] argue that American perceptions of cars cannot be fully explained by the characteristics and observe that the country of origin can explain the discrepancy between domestic and foreign bias. In the same line, according to Papadopoulos et al. (1987) "French consumers think highly of their own products, relative to those from other consumers. Coupled with their tendency to pay more attention to country of origin…this national pride would indicate greater difficulties for exporters who try to penetrate the French market.

[21] In a simple exercise, Wei (1996) let the intra-national distance be larger by 25%, leaving international distances unchanged; the reported home bias coefficient was about 25% larger.
[22] Quoted in Neven et al. (1991)

However, the results reported in Knight (1999)[23] appear to be rather convincing and suggest that not only the country of origin matters. The author shows on basis of a survey of US consumer preferences regarding microwave ovens and dishes that US made products were preferred over products made in Japan regardless of whether the company was American or Japanese owned.” This finding reflect the notion that when comparing foreign versus home goods, consumers appear to be rather influenced by the country in which a product is made than by the manufacturer’s national origin. From these sources of information, the question then arises of how much of this ‘country-of-origin effect’ and/or ‘location-of-production-effect’ linked to domestic preferences can be can be accounted for in the home bias. Knight (1999) finding interprets that the diversity of home bias matters and is akin to an enlargement in the scope of product differentiation[24]- products differentiated by local firms and foreign firms operating in the same country. This can have a negative effect of imports. The reason is that both firms will gain market power in a same country and prevent foreign good imports from further entry.

9. Conclusion

Consistent with the existing literature, we find substantial home bias in applications using the gravity model. Firstly, we find substantial home bias for sectors where differences in technical regulations are not thought to be important. Thus technical barriers to trade cannot be the only factor linked to the home bias effect and other attributes such as differences in preferences, price competition and other non-tariff barriers may also explain the presence of home bias. Secondly, where technical barriers to trade are deemed to be present we find that mutual recognition sectors exhibit the smallest home bias; nevertheless sectors where there are regulatory barriers still reflect a large home bias. Based upon the analysis on the evolution of home bias in the EU, we find no evidence that the Single Market has increased the intensity of

[23] As quoted in Brenton and al. (2001)
[24] -products differentiated from those produced by local firms and foreign firms operating in the same country-

intra-EU trade relative to domestic trade for products where differences in technical regulations are important, the focus of the Single Market Program.

For further research, we have not explored the empirical analysis on home bias when consumer preferences are non-homothetic. Almost all theoretical derivations of the gravity model are based upon CES preferences. This imposes homotheticity on preferences. Hence, the assumption of a constant proportion of total expenditure allocated to each commodity is may be unrealistic. An alternative approach would be to derive a gravity equation from a more flexible underlying utility function. The hypothetical framework is then to assume that there are differences in tastes across countries and within this that consumers are biased towards domestic goods.

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APPENDIX

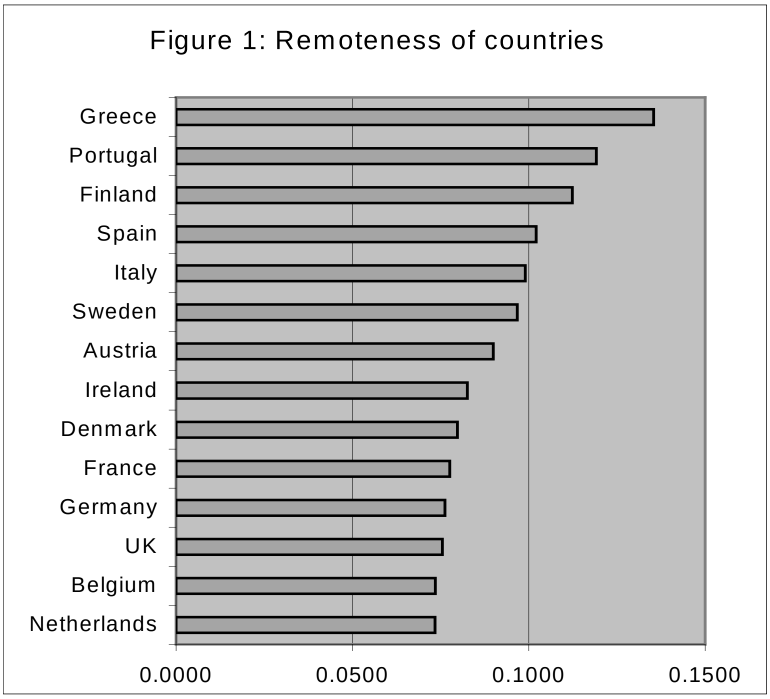

Figure 1: Remoteness of countries
Greece
Portugal
Finland
Spain
Italy
Sweden
Austria
Ireland
Denmark
France
Germany
UK
Belgium
Netherlands
0.0000
0.0500
0.1000
0.1500

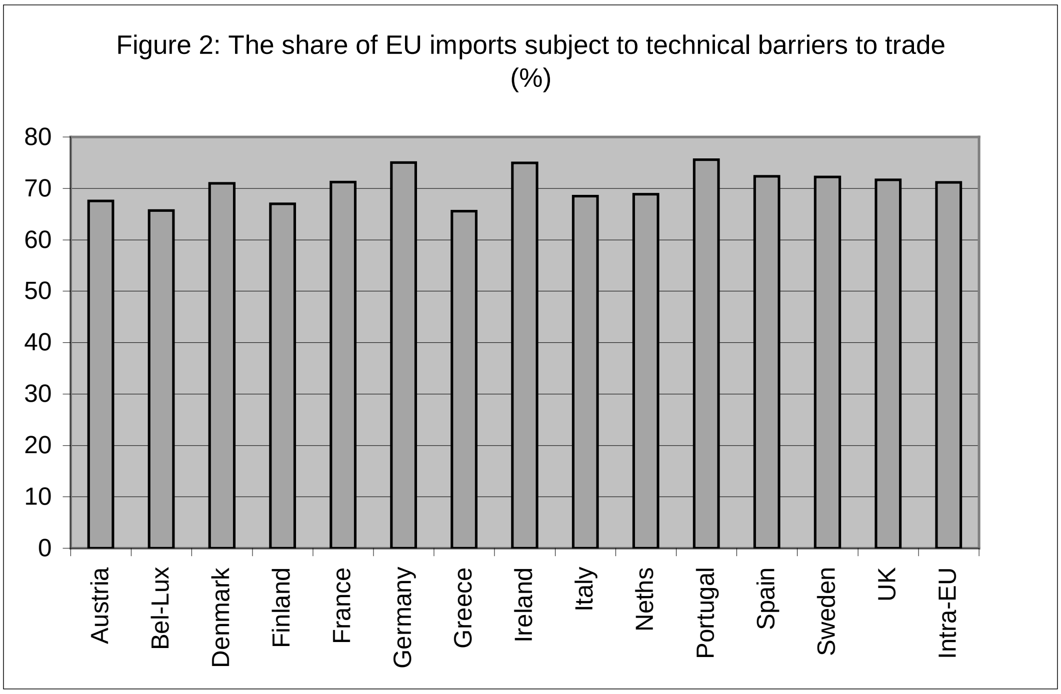

Figure 2: The share of EU imports subject to technical barriers to trade (%)
80
70
60
50
40
30
20
10
0
Austria
Bel-Lux
Denmark
Finland
France
Germany
Greece
Ireland
Italy
Neths
Portugal
Spain
Sweden
UK
Intra-EU

TABLE 1

NACE	**Mutual recognition sectors**	NACE	**New Approach Sectors**
1200	Coke ovens	2210	Iron and steel
1300	Extr. Of petroleum and natural gaz	2240	NF materials
2210	Iron and steel (other)	2410	Clay products for constr. Purposes
2310	Extraction of building material	2420	Cement
2510	Basic industry chem, petrochem.	2470	Manuf. of glass
2550	Paint, varnishing, printing ink	3140	Structural metal products
3166	Manufacture of metal furniture	3150	Boilers, reservoirs, tanks
2600	Man-made fibers	3165	Domestic heating appliances
3610	Shipbuilding	3210	Agricultural mach. Tractors
3620	Manuf of railway rol. Stock	3220	Machine tools working metal
3630	Manuf. of cycles, motor cycles	3230	Textile machines, sewing
3640	Aerospace equipment	3240	Machines for food and chem Industry
4110	Manufacture of oils and fats	3250	Machines for iron and steel
4240	Ethyl alcohol, spirit dist.	3260	Transmission equipment
4250	Wine of fresh grapes, cider	3270	Equipm. For use in spec. branches
4270	Brewing and malting	3720	Medical and surg. Equipment
4280	Soft drinks	4620	Semi-finished goods
4360	Knitting industry	4630	Carpentry
4370	Textile finishing	4830	Construction products
4530	Manuf. of clothing	4910	Manufact. Of articles of jewelry
4550	Manuf. of household textiles	4940	Toys
4560	Manuf. of furs		
4670	Manuf. of wooden furniture		
4830	Processing of plastics		

TABLE 2

NACE	Old approach	NACE	No Regulations
1100	Extraction of solid fuels	2110	Extr. Prep. Of ore
1400	Mineral oil refining	2120	Extr. Prep. Of non-fer met. Ores
1510	Extr. Nuclear materials	2220	Man. of steel tubes
1520	Production of nuclear materials	2230	Draw. Cold rolling of steel
1700	Water supply	2320	Salt
2470	Man. Of glass	2480	Man. of ceramic goods
2580	Soap, detergents	3160	Tools and finished goods
3510	Manuf. of ass. Motor vehicles	3520	Man. bodies for motor vehicles
3530	Man. Parts for motor vehicles	3730	Optical instruments
3630	Man. Of cycles, motor cycles	3740	Man. of watches
4120	Prep. Of meat	4310	Wool industry
4130	Man. Of dairy products	4320	Cotton industry
4140	Proc. Of fruit and vegetables	4330	Silk industry
4150	Proc. Preserv. of fish	4350	Jute industry
4160	Grain milling	4410	Tanning; dressing of leather
4170	Man. of spaghetti	4420	Leather products
4180	Starch and starch products	4510	Footwear
4190	Bread and flour	4610	Sawing and proc. Of wood
4210	Cocoa and sugar conf.	4640	Man of wooden containers
4220	Animal and poultry food	4670	Man. of wooden furniture
4290	Tobacco products	4730	Printing and allied industries
4710	Manuf. of pulp and paper	4810	Man. of rubber products
4720	Proc. Of paper and board	482	Rubber tires
4740	Publishing	492	Musical instruments
		493	photograph

TABLE A1: Home country bias in the European Union, 1990-1998, Estimation of the gravity model applied to total trade

	1	2	3	4	5
Ln GDP_i	0.72** (0.019)	0.70** (0.019)	0.71** (0.016)	0.84** (0.019)	0.72** (0.016)
Ln GDP_j	0.63** (0.023)	0.65** (0.022)	0.63** (0.028)	0.78** (0.03)	0.64** (0.025)
Ln D_{ij}	-1.02** (0.039)	-0.79** (0.043)	-0.56** (0.04)	-0.92** (0.06)	-0.56** (0.04)
Adjacency	-	0.55** (0.082)	0.64** (0.07)	0.53** (0.07)	0.65** (0.07)
Language	-	0.41** (0.127)	0.48** (0.11)	0.74** (0.10)	0.49** (0.11)
Ln R_i	-	-	0.11** (0.02)	0.23** (0.01)	0.11** (0.02)
Ln R_j	-	-	-1.34** (0.10)	-1.44** (0.19)	-1.33** (0.10)
Home	1.75** (0.208)	2.39** (0.221)	2.70** (0.277)	2.98** (0.41)	2.77** (0.197)
Intercept	4.85** (0.51) 4.42** (0.50) 4.44** (0.52) 4.34** (0.50) 4.54** (0.51) 4.32** (0.51) 4.54** (0.51) 4.46** (0.51) 4.39** (0.51)	3.20** (0.51) 2.76** (0.50) 2.78** (0.50) 2.69** (0.50) 2.88** (0.50) 2.67** (0.51) 2.85** (0.52) 2.8** (0.51) 2.73** (0.51)	-0.89 (0.56) -1.38* (0.56) -1.47** (0.56) -1.43* (0.55) -1.59** (0.56) -2.18** (0.57) -2.06** (0.57) -2.18** (0.58) -2.18** (0.57)	-1.89 (0.67) -2.37* (0.61) -2.57** (0.76) -3.22* (0.41) -3.58** (0.56) -3.18** (0.77) -3.06** (0.45) -3.98** (0.58) -3.18** (0.78)	-1.05* (0.59) -1.53* (0.59) -1.62** (0.59) -1.43* (0.55) -1.59** (0.56) -1.74** (0.59) -2.33** (0.60) -2.33** (0.60) -2.33** (0.60)
R^2	0.87	0.86	0.86	0.87	0.88
Estimation Method	Weighted-SUR	Weighted-SUR	Weighted-SUR	Weighted-SUR	Weighted-SUR-IV
Observations	10*14*9	10*14*9	10*14*9	10*11*9	10*14*9

Notes: Bounded influence estimation. Robust (White Heteroskedasticity consistent) standard errors are reported. ** denotes significance at 1 per cent and * denotes significance at 5 per cent.
We define the coefficient of determination R^2 for the system as 1-(residuals sum of squares/total sum of squares).

TABLE A2: Home country bias in the European Union, 1990-1998, Estimation of the gravity model applied to technical barriers to trade

	Non-technical barriers to trade	Technical barriers to Trade	Old Approach products	New Approach products	Mutual Recognition products	Other Technical Barriers to Trade
ln GDP_i	0.74** (0.02)	0.71** (0.02)	0.78** (0.026)	0.69** (0.021)	0.65** (0.022)	0.78** (0.015)
ln GDP_j	0.69** (0.025)	0.64** (0.022)	0.70** (0.032)	0.83** (0.027)	0.57** (0.028)	0.67** (0.021)
Ln D_{ij}	-0.73** (0.049)	-0.44** (0.051)	-0.34** (0.061)	-0.51** (0.053)	-0.48** (0.055)	-0.53** (0.038)
Adjacency	0.62** (0.094)	0.69** (0.088)	0.88** (0.114)	0.68** (0.101)	0.72** (0.107)	0.80** (0.073)
Language	0.40** (0.142)	0.51** (0.155)	0.61** (0.179)	0.75** (0.162)	0.45** (0.173)	0.62** (0.119)
ln R_i	0.06 (0.037)	0.11** (0.037)	0.15** (0.031)	0.20** (0.041)	0.07* (0.04)	0.17** (0.04)
ln R_j	-0.69** (0.138)	-1.50** (0.117)	-1.64** (0.166)	-0.92** (0.150)	-1.73** (0.140)	-2.17** (0.121)
Home	2.82** (0.213)	2.58** (0.212)	3.52** (0.271)	3.39** (0.231)	3.06** (0.204)	3.12** (0.21)
Intercept	-1.14 (0.67) -1.58* (0.67) -1.60* (0.68) -1.65* (0.67) -1.68* (0.67) -1.96** (0.69) -1.92** (0.65) -1.98** (0.69) -2.1** (0.69)	-2.32** (0.64) -2.85** (0.63) -2.97** (0.64) -2.90** (0.63) -3.07** (0.632) -3.86** (0.65) -3.45** (0.66) -3.74** (0.65) -3.71** (0.65)	-5.95** (0.83) -6.75** (0.83) -6.91** (0.84) -6.73** (0.83) -7.03** (0.83) -7.79** (0.85) -7.79** (0.85) -7.80** (0.86) -7.76** (0.85)	-4.12** (0.73) -4.86** (0.73) -4.93** (0.74) -5.00** (0.72) -5.41** (0.72) -5.98** (0.74) -6.01** (0.74) -6.01** (0.74) -6.1** (0.74)	-2.25** (0.71) -2.98** (0.71) -3.1** (0.72) -3.02** (0.70) -3.12** (0.69) -3.70** (0.72) -3.88** (0.73) -3.90** (0.72) -3.61** (0.71)	-7.02** (0.48) -7.12** (0.53) -7.43** (0.50) -7.11** (0.49) -7.53** (0.48) -8.28** (0.50) -8.49** (0.50) -8.29** (0.50) -8.15** (0.505)
R^2	0.88	0.90	0.86	0.88	0.86	0.90
Estimation Method	Weighted-SUR-IV	Weighted-SUR-IV	Weighted-SUR-IV	Weighted-SUR-IV	Weighted-SUR-IV	Weighted-SUR-IV
Observations	10*14*9	10*14*9	10*14*9	10*14*9	10*14*9	10*14*9

Notes: Bounded influence estimation. Robust (White Heteroskedasticity consistent) standard errors are reported. ** denotes significance at 1 per cent and * denotes significance at 5 per cent.

We define the coefficient of determination R^2 for the system as 1-(residuals sum of squares/total sum of squares).

Figure 3: Evolution of Home Bias, 1990-1998

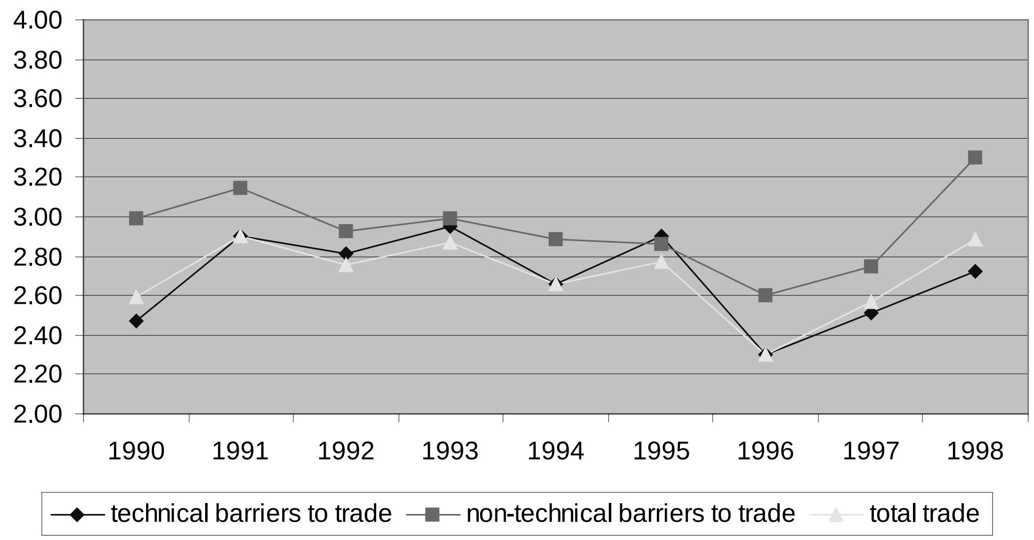

Figure 4: Evolution of Home Bias, 1990-1998

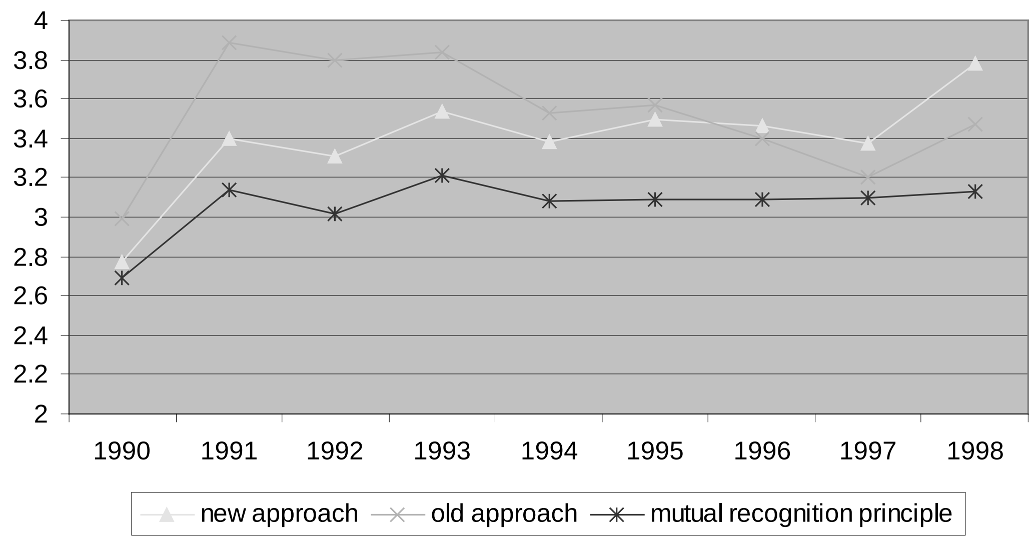

TABLE A3: Sensitivity Results for Home Bias Estimate[a], 1990-1998

Home Bias	Bound	t	R^2	Other Variables	Normality[b]	Ramsey Reset	Hetero-skedasticity[c]
Total Trade	High: 2.59	6.47	0.91	Adj, Pop, Remi	0.00	0.07	0.004
	Base: 1.75	4.67	0.87		0.00	0.82	0.00
	Low: 1.67	3.78	0.88	Remj, Pop	0.06	0.97	0.01
TBT	High: 3.41	5.75	0.91	Adj, Pop, Remi	0.00	0.11	0.001
	Base: 2.06	3.98	0.88		0.00	0.91	0.00
	Low: 1.86	3.67	0.91	Adj, Remj, Lang	0.09	0.62	0.02
NTB	High: 3.75	6.46	0.91	Adj, Remi, RULC	0.00	0.01	0.00
	Base: 2.87	5.87	0.90		0.00	0.14	0.00
	Low: 2.14	4.94	0.91	Remj, Pop	0.02	0.54	0.005
OA	High: 4.70	6.02	0.87	Adj, Remi	0.08	0.03	0.007
	Base: 2.96	4.37	0.84		0.07	0.74	0.00
	Low: 2.54	4.38	0.87	Remj, Pop	0.11	0.94	0.04
MRP	High: 4.53	6.57	0.88	Adj, Remi, Lang	0.07	0.33	0.06
	Base: 2.53	4.01	0.85		0.05	0.84	0.017
	Low: 2.17	3.32	0.86	Adj, Remj	0.16	0.90	0.02
NA	High: 4.31	6.39	0.91	Adj, Pop, Remi	0.04	0.01	0.00
	Base: 2.62	4.31	0.88		0.03	0.11	0.01
	Low: 1.90	3.92	0.90	Remj, Pop	0.11	0.67	0.14

[a]The table reports the coefficient of home bias in regressions which also include the importing and exporting GDP's and distance. We define the coefficient of determination R^2 for the system as 1-(residuals sum of squares/total sum of squares).
[b]The diagnostic test for normality of the residuals is based upon the Shapiro-Wilk W test. The p-value is based on the assumption that the distribution is normal.
[c]Cooks-Weisberg test.