Europe's Internal Market at Fifty: Over the Hill?*

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Abstract

For more than half a century, members of the European Union (EU) have pursued policies aimed at reducing the cost of cross-border transactions. Using a closed-form solution for the non-linear gravity system of Anderson and Van Wincoop (2003) we find that Internal Market policies have created trade between EU members, while diversion of trade with non-members has been limited. Around 1995, 18 percent of total trade by EU15 countries can be attributed to the Internal Market. In the second half of the 1990's the European advantage started to deteriorate relative to other trade flows: in 2005 the contribution of the Internal Market was just 9 percent. Most enlargements of the EU have had a positive impact on trade.

Key words: European Union, gravity equation, trade diversion

JEL codes: F15, F10

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*We thank Albert van der Horst, Arjan Lejour, Peter Neary, and participants to seminars at the Institute for Fiscal Studies, the University of Oxford, and the University of Groningen for their comments and suggestions.

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1 Introduction

Since 1958 the European Union and its predecessors[1] have adopted various policies with the intention of reducing the cost of trade between member states. Apart from lowering tariff barriers these policies also comprise harmonization of regulation in areas related more to domestic policy. Europe's Internal Market[2] can be regarded as the most far-reaching free trade area in the world.

We estimate a time-varying treatment effect of the Internal Market (IM) using the theoretical framework introduced by James Anderson and Eric van Wincoop (2003). Our results contribute to the literature in three respects. First, the theoretical model allows us to take into account trade diversion. When an FTA is formed or extended this is not only likely to create trade between its members, but can also adversely affect trade between members and non-members due to trade diversion. Ignoring trade diversion leads to upward biased estimates of the consequences of trade policies. We find that diversion of international is limited, around 2 percent of the trade between members and non-members in 2005.[3]

Second, we trace the effect of EU-membership over time, taking general globalization trends as a baseline. Besides giving a more detailed picture of how the IM performed over time, our panel approach leads to more robust estimates when compared to cross-section studies. We find that the IM has had a positive effect on total trade by its members, but that this effect has declined since 1995. In 2005 the contribution of the Internal Market was just 9 percent.

[1]The European Economic Community (EEC) was established in 1958 and became part of the newly formed European Union (EU) in 1993. The European Coal and Steel Community (ECSC) was established in 1951 and was also replaced by the EU.

[2]Alternatively known as the "common market" or "Single Market".

[3]Within the framework of Anderson and Van Wincoop (2003) the total value of all transactions in the world economy is constant in a given year. The aggregate value of international trade can only increase if the total value of domestic transactions decreases correspondingly.

Third, we explore the effects of EU enlargements. The entry of Denmark, Ireland, and the United Kingdom in 1973 is responsible for 5 percent of trade by the EU15, while 3 percent can be ascribed to the accession of Portugal and Spain. We do not find a positive effect for the enlargement by ten countries of 2004, but this can be due to the fact that our data sample ends in 2005.

There are two approaches to estimating the treatment effect of free trade agreements (FTAs) like the Internal Market (IM). The first approach imposes a theoretical model and was introduced by Anderson and Van Wincoop A-vW, who studied the effect of the border between Canada and the United States (Anderson and Van Wincoop, 2003). Scott Baier and Jeffrey Bergstrand (2009a) have applied this methodology to FTAs. Where they use a linear approximation to A-vW's non-linear system of multilateral resistance terms, we use a closed-form solution that allows for asymmetry in the multilateral resistance terms. The second approach relies on econometrics to isolate treatment effects. This route is followed by Egger, Egger and Greenaway (2008), Magee (2008), and Baier and Bergstrand (2009b).

Although theoretically-founded estimates of the treatment effect of FTAs are a recent development, ad-hoc estimates have been around much longer. Tinbergen (1962) already used a gravity equation to study the effect of free trade agreements (FTAs) on trade. He concluded that FTAs had an economically insignificant effect.[4] Some later studies produced different outcomes. Abrams (1980), Aitken (1973) and Brada and Mendez (1985), for example, found an economically significant positive impact of FTAs. However, their conclusions are not supported by Bergstrand (1985), Frankel et al. (1995) and Frankel (1997).

Baier and Bergstrand (2007) suggest that these mixed results stem from a failure to account for the endogeneity of FTAs: countries that trade intensively are also likely to form FTAs. Without correcting for FTA-endogeneity,

[4] He might have been right: the Internal Market and other FTAs were still in their early phases at the time.

they report that FTAs boost trade by just 14 percent. After correcting for endogeneity, they find that an FTA almost doubles the trade between members. We follow their recommendation of including country-pair fixed effects.

Closely related to this literature are studies specifically focusing on the EU. Frankel (1997) notes that the effect of EU-membership fluctuates over time and that pooling data from 1970 to 1992 yields an EU effect of 16 percent. Fidrmuc and Fidrmuc (2003) find effects of the EU12 ranging between 34 and 60 percent depending on sample and year. The baseline gravity equation of Baldwin and Rieder (2007) implicitly yields an EU-effect of 51 percent.

The introduction of the Euro also received much attention. After Frankel and Rose (2002) claimed that common currencies triple trade between members, a number of studies followed. Rose and Stanley (2005) provide a meta-analysis of these studies. More recent papers are due to Baldwin (2006), Barro and Tenreyro (2007), and Serlenga and Shin (2007). Bun and Klaassen (2007) argue that panel estimates of the Euro-effect are generally too large because they fail to account for trends in bilateral trade. They show that the Euro effect disappears after allowing for pair-wise trends. Berger and Nitsch (2008) arrive at a similar conclusion. In Appendix D we show that our approach to estimating the IM effect is not sensitive to their critique.

The structure of this paper is as follows. The theoretical framework is introduced in Section 2, where the technical details related to counterfactual trade flows are deferred to Appendix A. Estimation results are presented in Section 3. The post-estimation results regarding the impact of the Internal Market on European trade flows are analyzed in Section 4. Here we separate trade creation from trade diversion. Section 5 concludes.

2 Theoretical framework

A simple way of testing the hypothesis that membership of the EU leads to lower cost for trade with other members, is to compare the trade between EU-members with trade flows for which at least one of the trading partners is not a member of the EU.

There are two reasons why such a straightforward approach can lead to false conclusions about the effect of the IM on trade. First, the precision of such an approach hinges on the proper inclusion of control variables. The second has to do with trade diversion: the creation of the IM is likely to have influenced trade outside the IM as well. We will return to trade diversion later on and proceed with a discussion on control variables.

If not all factors influencing trade can be controlled for, the estimate of the IM-effect can be biased. For two reasons, this bias is likely to persist even when controlling for size of the economies, distance, common borders, language, colonial relationships, etc. First, trade between two countries depends not only on the characteristics of those two countries, but also on the characteristics of other countries (Anderson, 1979). Australia and New Zealand, for example, trade more with each other than can be judged from the distance between the two nations. The geographic isolation of New Zealand with regard to the large economies elsewhere in the world, enhances the attractiveness of Australia as a trading partner.

Second, countries do not join free trade agreements (FTAs) randomly. Instead, the decision to form an FTA depends on factors like geographical proximity and cultural similarities. Some of these factors can be approximately controlled for using easily accessible data, but Baier and Bergstrand (2007) argue that this is not the whole story. For an FTA to make sense there need to be policy-related barriers to trade otherwise signing an FTA would be a purely ceremonial affair. Trade between FTA-members is not necessarily larger than trade between countries that do not need to form an FTA because the latter may already have few policy-related trade barriers. Comparing the trade between FTA-members with other trade flows thus leads to underestimation of the benefits of the FTA, unless all policy-related trade barriers are adequately controlled for.

It is possible to avoid problems caused by unobserved control variables by means of panel data estimation techniques. Baier and Bergstrand (2007) show that bias due to omitted time-invariant controls can be prevented by adding fixed effects for each pair of trade partners. Drawback of this approach is that all time-invariant factors are lumped together, such that the effect of, say, distance on trade can no longer be isolated.

The second problem why comparing trade between IM-members with other trade flows leads to a biased estimate of the effect of the IM has to do with trade diversion. When two countries establish an FTA this will not only intensify the trade between them, but will also change other flows. By making trade with non-members less attractive FTAs not only lead to trade creation, but also cause trade to be diverted from non-members towards members. Going one step further, the consequences of an FTA extend even to trade between non-members as trade between a member and a non-member is partly replaced by trade between non-members.

Anderson and Van Wincoop (2003) have proposed a method for estimating the effect of the border between the United States and Canada on trade between US states and Canadian provinces. Building on the framework of Anderson (1979) and Bergstrand (1985), they derive trade flows for the counterfactual situation in which the border between the United States and Canada would not induce trade costs of any kind. As the method proposed by A-vW can be used for all kinds of trade cost, it can also be applied to the IM. Just like A-vW estimate the trade cost for cross-border trade relative to the trade cost of intra-national trade, we evaluate the trade cost within the IM relative to the trade cost outside of the IM.

The framework of A-vW rests on two main assumptions. The first is that a country's production is fixed for a given year. The total value of a country's exports can therefore only change if the value of domestic transactions moves in the opposite direction. Within the theoretical framework, creation of international trade will coincide with a reduction of intra-national trade.

The second main assumption is that each country produces a single type of final good, which is unique to that country.[5] The purpose of this assumption is that exports from one country are imperfect substitutes for the exports from another country. Let c_{ij} be the consumption of goods from country i in country j and assume that consumers in country j maximize utility u as defined by a CES utility function

$$u_j = \left(\sum_i (c_{ij}/\beta_i)^{(\sigma-1)/\sigma} \right)^{\sigma/(\sigma-1)} \quad (1)$$

subject to the budget constraint

$$\sum_i p_{ij} c_{ij} \leq y_j \quad (2)$$

The parameter β_i allows for differences in preferences and the quality of goods across countries, σ is the elasticity of substitution between goods, y_i is a country's income, and p_{ij} is the price of goods produced in i for consumers in j. The price of a good is different for consumers in different countries because of trade costs. If p_i is the domestic price of goods produced in i, then p_{ij} is the domestic price multiplied by a trade cost factor τ_{ij}.

$$p_{ij} = p_i \tau_{ij} \quad (3)$$

A-vW show that this framework leads to a 'gravity equation' explaining bilateral trade from the size of the trading economies relative to the size of the world economy y_W, the trade cost factor specific to the pair of countries,

[5] Anderson and Van Wincoop (2004) weaken this assumption by introducing sectors in which each country produces a distinct variety.

and two multilateral resistance terms Π_i and P_j.

$$x_{ij} = \frac{y_i y_j}{y_W} \left(\frac{\tau_{ij}}{\Pi_i P_j} \right)^{1-\sigma} \tag{4}$$

The larger the multilateral resistance terms are, the less attractive it is for countries i and j to trade with third countries. High multilateral resistance terms relative to the costs of trade between i and j therefore imply more trade between these two countries.

Each multilateral resistance term is a non-linear function of the multilateral resistance terms of the other countries, their share of the world economy and the trade cost factors:

$$\Pi_i^{1-\sigma} = \sum_j P_j^{\sigma-1} \frac{y_j}{y_W} \tau_{ij}^{1-\sigma} \tag{5}$$

$$P_j^{1-\sigma} = \sum_i \Pi_i^{\sigma-1} \frac{y_i}{y_W} \tau_{ij}^{1-\sigma} \tag{6}$$

If the IM has reduced the cost of trade between members of the EU, then—controlling for other factors—trade costs are lower for all country pairs for which both trading partner are members. A basic specification of trade cost that captures the IM effect is:

$$\tau_{ijt} = b^{1-EU_{ijt}} \varepsilon_{ij} \ . \tag{7}$$

Here, EU_{ijt} is a dummy variable that equals one if both country i and country j are members of the EU at time t and zero otherwise. $b-1$ is the tariff equivalent for trade flows that (partly) fall outside of the IM and ε_{ij} captures the effects of all time invariant factors influencing the trade cost for the pair ij.

We use the last four equations to estimate the effect of the IM on trade. The analysis proceeds in two steps. In the first step, the parameter b is estimated and in the second step, trade flows are computed for the counterfactual situation that the IM would not exist. The method we use with the second step employs a closed-form solution for the system formed by (4), (5), and (6). The technical details can be found in Appendix A.

There are several methods for estimating b in a way consistent with the theoretical framework. The simplest method is to estimate the gravity equation with the multilateral resistance terms replaced by dummies for each country-year combination. This "dummy method" yields unbiased estimates, but is not the most efficient approach. Our main estimates and post-estimation results rely on this method.

Other methods involve solving the non-linear system of resistance terms. A-vW use non-linear programming to get a solution for the system. Baier and Bergstrand (2009a) proceed by taking a first-order Taylor expansion of the system and substitute the resulting linear approximations of the resistance terms into the gravity equation. They labeled their method BONUS VETUS ("good old") OLS because it avoids the non-linear programming used by A-vW and allows for estimation with standard econometric procedures. A third way involves the closed-form solution of Appendix A. The resulting expressions for the resistance terms can be used in the gravity equation, which can subsequently be estimated by OLS. We compare alternative estimation methods in Appendix D.

3 Estimation results

To estimate the effect of the IM on trade, we use panel data on bilateral trade for 38 countries and subcontinents for the period between 1961 and 2005.[6] The use of panel data has two advantages. First, it allows us to follow the IM-effect over time. Second, using fixed-effects for each pair of trading partners reduces bias due to the endogeneity of IM-membership by taking into account time-invariant omitted variables. The empirical equivalent of

[6] A description of the data can be found in Appendix B.

the gravity equation using the dummy method is given by

$$\ln x_{ijt} = a_0 + a_1 \ln (y_{it} y_{jt}) + a_2 EU_{ijt} + e_{it} + m_{jt} + \eta_{ij} + \phi_{ijt} \qquad (8)$$

In the expression above $a_2 = (\sigma - 1) \ln b$ captures the effect of EU membership. The disturbance terms e_{it} and m_{jt} capture exporter-year and importer-year specific effects and ensure that the estimated parameters are not biased because of multilateral resistance. In addition, they absorb variation caused by y_W that is not absorbed by the constant a_0. The unobserved time-invariant characteristics of trade between i and j is captured by the pair wise fixed effects η_{ij}, which is a transformation of ε_{ij}.

Equation (8) can be estimated using least squares. However, the residuals are likely to be heteroskedastic, clustered and autocorrelated. By estimating the covariance matrix as suggested by Driscoll and Kraay (1998) it is possible to avoid biased and inconsistent standard errors for the coefficients. The country-year specific effects are implemented by including dummies. Because adding dummies for each combination of country and year in addition to the pair wise fixed effects leads to a large loss in the degrees of freedom and is computationally taxing, country dummies have been constructed on a biennial basis.

3.1 Average effect of the Internal Market

Estimation results for the average effect of EU membership are presented in Table 1. Column (1) refers to equation (8). The log of trade is regressed on "GDP", which is the log of the exporter's GDP plus the log of the importer's GDP, and a dummy equal to one if both countries are a member of the EU and zero otherwise. Pair wise fixed effects and biennial exporter and importer dummies are included, but are not reported. The coefficient for the EU dummy of 0.33 reveals a positive and statistically significant effect of EU membership on trade between members of the EU.

[Table 1 about here.]

Models (2) to (5) add various other indicators to the basic specification: a dummy on EFTA membership, a dummy for all trade between Central and Eastern European countries (CEEC) and non-CEEC countries that occurred before 1990, and a Euro dummy.

Inclusion of these dummies hardly changes the coefficient for EU membership. The coefficient on EFTA has the expected sign, but is not statistically significant. In regression results not reported here, the EFTA dummy has been split up for different cohorts. Also these dummies were not significant. This outcome is somewhat unexpected as EFTA countries can be considered to be participants in the IM—at least partly. The story of the EFTA, however, is different than that of the EU as the EFTA has lost members to the EU on several occasions. EFTA members for which the potential gains of EU membership are large are likely to have left EFTA earlier than countries for which these gains are smaller. This selection process could have had a downward effect on the EFTA dummy.

The CEEC dummy is negative and large, which is a reflection of the Iron Curtain. The effect of using the Euro as a common currency is zero.[7]

Including a single dummy for EU captures the effect of IM averaged over time and countries. In the next two subsections we will loosen both restrictions. Below, we will first allow the EU effect to vary over time. After that, we turn to the effects of new member states entering the IM.

3.2 The effect of the Internal Market over time

IM policies, as well as global trading conditions, have changed over time. Therefore, the trade cost advantage of the IM relative to the rest of the world might also have changed. The relative depth of the IM can be estimated by

[7]The absence of a Euro effect is in line with the findings of Bun and Klaassen (2007) and Berger and Nitsch (2008).

replacing the EU dummy of the previous empirical models with a flexible time trend (or "linear spline") which allows a change in slope at several fixed points in time.

Table 2 contains the estimates for such an EU spline. We have divided the period 1961-2005 into six intervals. A separate coefficient is estimated for each interval, indicating the slope for that period. Note that a negative slope does not necessarily mean that the IM-effect is negative, but only that the IM-effect is declining. For example, the variable for the first interval starts with zero in 1961 and increases by $1/45$ per year to $10/45 = 0.2$ in 1970. From that year onwards the variable remains constant at 0.2. The variable for the second interval is zero before 1971, increases to $3/45$ in 1973 and keeps that value for the subsequent years. Intervals are chosen after visual inspection of results from rolling pooled regressions (this is explained in Appendix C).

The results reveal that the impact of the IM has varied substantially over the years. The largest coefficient is found for the early stages of the IM, indicating a positive slope of the EU trend. The lowering of tariffs between the six founding members of the EU seems to have stimulated trade between them markedly. The advantage of EU membership suffered a backlash in the first beginning of the 1970s, as the slope of the EU trend is strongly negative for the period between 1970 and 1972. (We will see in Section 4 that this steep decline did not last long enough to let the IM effect become negative.)

Between 1973 and 1983, the Internal Market got back on track with a slope of 0.85. Between 1984 and 1991 the effect of the IM remained roughly constant as coefficients are small and not significantly different from zero. The lead of the IM over the rest of the world declined after 1992, first slowly, later more rapidly. A possible explanation for this finding is intensified globalization, which makes intra-EU market regulation less exceptional. The global agreements made under the Uruguay Round of the GATT came into force on January first 1995, leading to a world-wide reduction in tariffs and non-tariff barriers. The coefficient on the dummy for Central and Eastern Europe remains strongly negative.

[Table 2 about here.]

3.3 Enlargement of the Internal Market

During the period 1961 to 2005 the EU has expanded five times. The first enlargement occurred in 1973 with the entry of the United Kingdom, Ireland and Denmark. The fifth enlargement took place in 2004 and included ten countries from Central Europe.

The consequences of entry can be identified by adding a dummy for each of the five cohorts of entering countries. Each dummy is equal to one for all trade flows that are new to the IM and zero otherwise. For example, the dummy EU7-9 equals zero for all trade flows before 1973 and one for all intra-IM trade where United Kingdom, Ireland or Denmark are either importer or exporter. Thus, after 1973 not only exports from Ireland to Denmark get a one, but also the imports by the United Kingdom from France.

Table 3 displays the regression results with indicators for each cohort of entrants. All coefficients have the expected sign and, except for the enlargement to EU25, all coefficients are statistically significant. This means that almost every enlargement of the EU has raised the level of intra-IM trade with the new members. The small coefficient (0.08) for the enlargement to 25 members is not unexpected because it is based on data from only two years, 2004 and 2005. (Visual inspection of the data suggests that it takes about ten years before a country is fully adjusted to the IM.)

The coefficient on a cohort dummy is an average over the time period since that cohort entered the IM. Especially for the earlier enlargements of the EU, these coefficients will pick up some of the deepening of the IM. The reported coefficients are likely to overestimate the contribution of enlargement to trade and can be considered upper bounds on the enlargement effect.

[Table 3 about here.]

4 Counterfactual trade

How would the exports and imports of EU members be affected if there would have never been a common market? Although the regression results presented above give an idea of the role played by the IM, additional analysis is required to make a distinction between trade created by the IM and trade diverted by it.

A first question which needs to be answered is whether the IM actually has created trade or whether it has merely diverted trade with non-members to trade within the IM. Figure 1 shows how the openness of the EU15 has changed over time.[8] The figure is based on the spline estimate of Table 2. The top line is the actual openness, while the second line refers to the counterfactual situation without the IM. The bottom line is the difference in openness with and without the IM (right hand axis).

Without the IM, the openness of the EU15 would not have grown as fast as it has. Our method implies that at the beginning of our data set the estimated IM-effect is zero. Over the years the IM has contributed increasingly to openness, but in the last decade the difference has become smaller.

[Figure 1 about here.]

The first peak in the contribution of the IM occurred around 1970. In this year the share of trade attributable to the IM was 11 percent. A sharp drop immediately afterward stabilized in 1973 at 6 percent. A second increase occurs in the second half of the 1980s culminating in a peak around 1995. At that time the IM contributed approximately 22 percent of openness. After 1995 the IM-effect started to decline gradually eventually arriving at 9 percent in 2005.

[8] Openness is defined here as the sum of a country's total exports and imports of goods divided by value added in non-service sectors.

The top panel of Table 4 displays the share of the EU15 exports that can be attributed to the IM. The first row reports that in 2005 10 percent of all exports by the EU15 were attributable to the IM. The second row shows that for the entire period from 1961 to 2005 the IM has on average been responsible for 13 percent. The other rows refer to sub-intervals. The bottom panel of the table displays the outcomes for imports. The first column containing the total effect shows a sharp increase in the IM-effect in the early stages.

Another issue is how the IM has created trade: by reducing trade cost between existing members (deepening) or by giving more countries access to the IM (enlargement). The second and third column of Table 4 contain the effects for deepening and enlargement of the IM, respectively. Although it is not possible to distinguish between deepening and enlargement in a single specification,[9] we use the estimates of Table 2 to calculate the counterfactual trade flows without enlargement of the IM. Deepening can then be approximated by the difference of the overall effect and the enlargement effect.

The impact of EU enlargement on exports proved to be more durable than the impact of deepening. In 2005 enlargement has been responsible for the entire effect of the IM.[10] Deepening has been a substantial factor in the second half of the 1980s, but its contribution has weakened in the years thereafter.[11] For imports enlargement has been equally influential.

The last three columns consider three important enlargements in isolation. Just like it is possible to study what would have happened without the IM, it is also possible to compute counterfactual trade flows assuming that

[9] In principle, a spline can be included in the regression for each cohort of trade flows. The problem of this approach is that the coefficients obtained in this way are strongly influenced by intra-EU trade diversion. The A-vW method requires that only variables are included that directly affect trade cost; the effects of trade diversion should be captured by the biennial exporter and importer dummies.

[10] The enlargement effect might be overestimated in 2005, because coefficients for enlargement are not allowed to vary over time. The resulting deepening effect might therefore be underestimated.

[11] It is possible that the coefficients capturing enlargement also include some deepening effects.

only a specific enlargement would not have occurred, while the other enlargements remain in place. The first column shows that the enlargement to nine members is responsible for 5 percent of EU15 trade in 2005. The accession of Spain and Portugal has had an effect of 3 percent; the enlargement to fifteen member states contributed 2 percent.

[Table 4 about here.]

Table 5 decomposes the IM-effect into trade creation and trade diversion. Where Table 4 referred to changes in aggregate trade, Table 5 distinguishes between intra-IM trade and extra-IM trade. The first column refers to the share of actual intra-EU15 trade that can be attributed to the IM. The second and third columns apply EU15 exports to non-members and EU15 imports from non-members, respectively. Over the entire period, extra-EU15 exports and imports would have been 3 percent higher without the IM. Trade diversion was largest in the period from 1973 to 1991, about 5 percent. Compared to trade created by the IM, however, trade diversion has been small.[12] Over the years, trade creation was at least a factor 6 larger than trade diversion.

[Table 5 about here.]

[12]Within our approach, a net creation of international trade comes at the expense of domestic transactions.

5 Concluding remarks

We have estimated how the Internal Market has affected trade over time, taking into account trade diversion using the framework of Anderson and Van Wincoop (2003). We find that the Internal Market appears to have stimulated trade between members substantially, while trade diversion has been small. The impact of the IM on the imports and exports of European countries has varied over time. The first stage of the IM was characterized by a elimination of internal tariffs, culminating in a peak contribution to EU trade of about 11 percent of actual trade in 1970. After this first peak, the contribution of the IM to trade dropped sharply to 6 percent in 1973.

A second peak of was reached in 1995, a few years after the Single Market was formally completed. At this time the share of trade attributable to the IM was about 18 percent for EU-members on average. During the last decade of our data sample, the impact of the IM declined again to 9 percent in 2005.

All enlargements of the EU have had a positive impact on trade with new members. The accession of Denmark, Ireland and the United Kingdom has had the most profound impact (5 percent of EU15 trade), while the impact of the 2004 enlargement has been small. This may be due to the fact that in the data sample the EU25 only exists for two years. Overall, enlargement of the EU is estimated to be responsible for 10 percent of EU15 exports and imports.

The Internal Market did have a negative effect on trade with non-members. The magnitude of this effect was small compared to the trade created within the IM. Trade creation was about six times larger than trade diversion.

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A Closed-form solution

The theorem below shows that the right-hand-sides of (5) and (6) can be rewritten as the product of geometric means, yielding a log-linear system of equations.

Theorem 1 *Provided that* (4) *holds, the system formed by* (5) *and* (6) *is equivalent to the system formed by*

$$\ln \Pi_i = -\sum_{j=1}^{n} w_{ij} \ln P_j + \frac{1}{1-\sigma} \left(\ln N_i + \ln \Theta_i\right) + \ln T_i \tag{9}$$

$$\ln P_j = -\sum_{i=1}^{n} \tilde{w}_{ij} \ln \Pi_i + \frac{1}{1-\sigma} \left(\ln \tilde{N}_j + \ln \tilde{\Theta}_j\right) + \ln \tilde{T}_j \tag{10}$$

where $w_{ij} = x_{ij}/\sum_{h=1}^{n} x_{ih}$, $\tilde{w}_{ij} = x_{ij}/\sum_{h=1}^{n} x_{hj}$, $N_j \equiv \prod_{i=1}^{n} w_{ij}^{-w_{ij}}$, $\tilde{N}_j \equiv \prod_{i=1}^{n} \tilde{w}_{ij}^{-\tilde{w}_{ij}}$, $\Theta_j \equiv \prod_{i=1}^{n} \theta_i^{w_{ij}}$, $\tilde{\Theta}_j \equiv \prod_{i=1}^{n} \theta_i^{\tilde{w}_{ij}}$, $T_j \equiv \prod_{i=1}^{n} \tau_i^{w_{ij}}$, *and* $\tilde{T}_j \equiv \prod_{i=1}^{n} \tau_i^{\tilde{w}_{ij}}$.

Θ and T are export-weighted geometric means of expenditure and trade cost, respectively. N is the anti-log of Shannon's entropy and can interpreted as an index of exported product variety (Straathof, 2007). The indexes decorated with a tilde use import shares as weights.

Proof. The proof proceeds in two steps. First, (5) and (6) can be written as (9) and (10) with $w_{ij} \equiv \frac{P_j^{\sigma-1}\theta_j\tau_{ij}^{1-\sigma}}{\sum_h P_h^{\sigma-1}\theta_h\tau_{ih}^{1-\sigma}}$ and $\tilde{w}_{ij} \equiv \frac{\Pi_i^{\sigma-1}\theta_i t_{ij}^{1-\sigma}}{\sum_h \Pi_h^{\sigma-1}\theta_h t_{hj}^{1-\sigma}}$. Second, $w_{ij} = x_{ij}/\sum_{h=1}^{n} x_{ih}$ and $\tilde{w}_{ij} = x_{ij}/\sum_{h=1}^{n} x_{hj}$ if (4) holds.

Step 1. Take logs in (5) and multiply by $\sum_{h=1}^{n} w_{ih} = 1$,

$$\ln \Pi_i^{1-\sigma} = \ln \left(\sum_{j=1}^{n} P_j^{\sigma-1}\theta_j\tau_{ij}^{1-\sigma}\right) \sum_{h=1}^{n} w_{ih} \; . \tag{11}$$

Within brackets, multiply by $P_h^{\sigma-1}\theta_h\tau_{ih}^{1-\sigma}/P_h^{\sigma-1}\theta_h\tau_{ih}^{1-\sigma}$ to get

$$\ln \Pi_i^{1-\sigma} = \sum_{h=1}^{n} w_{ih} \ln \left(\frac{P_h^{\sigma-1}\theta_h\tau_{ih}^{1-\sigma}}{\frac{P_h^{\sigma-1}\theta_h\tau_{ih}^{1-\sigma}}{\sum_j P_j^{\sigma-1}\theta_j\tau_{ij}^{1-\sigma}}} \right) . \tag{12}$$

Apply the definition of w and rearrange.

$$\ln \Pi_i^{1-\sigma} = \sum_{h=1}^{n} w_{ih} \ln \left(\frac{P_h^{\sigma-1}\theta_h\tau_{ih}^{1-\sigma}}{w_{ih}} \right) \tag{13}$$

$$\ln \Pi_i^{1-\sigma} = \sum_{h=1}^{n} w_{ih} \ln \frac{1}{w_{ih}} - \sum_{h=1}^{n} w_{ih} \ln \left(P_h^{1-\sigma}\right) + \sum_{h=1}^{n} w_{ih} \ln \theta_h + (1-\sigma) \sum_{h=1}^{n} w_{ih} \ln \tau_{ih} \tag{14}$$

$$\ln \Pi_i = -\sum_{h=1}^{n} w_{ih} \ln P_h + \frac{1}{1-\sigma} (\ln N_i + \ln \Theta_i) + \ln T_i \tag{15}$$

The same procedure can be repeated for (6), with a tilde indicating import weights or import weighted index:

$$\ln P_j = -\sum_{h=1}^{n} \tilde{w}_{hj} \ln \Pi_h + \frac{1}{1-\sigma} \left(\ln \tilde{N}_j + \ln \tilde{\Theta}_j \right) + \ln \tilde{T}_j \tag{16}$$

Apply the definitions of N, Θ and T in order to complete Step 1 of the proof.

Step 2. Take the share of the value of exports to j in the total exports of region i and substitute for x using equation 4.

$$\frac{x_{ij}}{\sum_{h=1}^{n} x_{ih}} = \frac{\frac{y_i y_j}{y_w} \left(\frac{\tau_{ij}}{\Pi_i P_j} \right)^{1-\sigma}}{\sum_{h=1}^{n} \frac{y_i y_h}{y_w} \left(\frac{\tau_{ih}}{\Pi_i P_h} \right)^{1-\sigma}} \tag{17}$$

Let the Π_i and y_i cancel out and use $\theta_j \equiv y_j/y_w$ to get

$$\frac{x_{ij}}{\sum_{h=1}^{n} x_{ih}} = \frac{P_j^{\sigma-1}\theta_j \tau_{ij}^{1-\sigma}}{\sum_{h=1}^{n} P_h^{\sigma-1}\theta_h \tau_{ih}^{1-\sigma}} = w_{ij} \ . \tag{18}$$

The same steps can be repeated for $\tilde{w}$, with P_j and y_j canceling out. ■

The system formed by (9) and (10) can be written in matrix notation as

$$\begin{bmatrix} \ln \mathbf{\Pi} \\ \ln \mathbf{P} \end{bmatrix} = - \begin{bmatrix} 0 & \mathbf{W} \\ \tilde{\mathbf{W}}' & 0 \end{bmatrix} \begin{bmatrix} \ln \mathbf{\Pi} \\ \ln \mathbf{P} \end{bmatrix} + \frac{1}{1-\sigma} \left(\begin{bmatrix} \ln \mathbf{N} \\ \ln \tilde{\mathbf{N}} \end{bmatrix} + \begin{bmatrix} \ln \mathbf{\Theta} \\ \ln \tilde{\mathbf{\Theta}} \end{bmatrix} \right) + \begin{bmatrix} \ln \mathbf{T} \\ \ln \tilde{\mathbf{T}} \end{bmatrix} \tag{19}$$

with $\mathbf{W}$ being a matrix of all w_{ij} and $\tilde{\mathbf{W}}$ being a matrix of all $\tilde{w}_{ij}$.

The matrix $\begin{bmatrix} \mathbf{I} & \mathbf{W} \\ \tilde{\mathbf{W}}' & \mathbf{I} \end{bmatrix}$ is rank deficient, such that there is no unique solution for $\begin{bmatrix} \ln \mathbf{\Pi} \\ \ln \mathbf{P} \end{bmatrix}$. Formulated in general terms, solving $\mathbf{Ax} = \mathbf{b}$ for $\mathbf{x}$ yields a set $\{\mathbf{x}\}$ containing an infinite number of solutions. In the empirical application, the solution with the minimum norm $\mathbf{x}_{\text{min}}$ is selected from this set. As the generalized inverse $\mathbf{A}^*$ has to be computed without knowledge of $\mathbf{b}$, the generalized inverse being used corresponds to the solution $\hat{\mathbf{x}}_{\text{min}} = \mathbf{A}^*\mathbf{I}$, with $\mathbf{x} = \hat{\mathbf{x}}_{\text{min}}\mathbf{b}$. The advantage of this approach over other normalizations is computational robustness and precision. Using a generalized inverse, a solution for $\ln \mathbf{\Pi}$ and $\ln \mathbf{P}$ can be obtained in terms of σ and the indexes.

$$\begin{bmatrix} \ln \mathbf{\Pi} \\ \ln \mathbf{P} \end{bmatrix} = \begin{bmatrix} \mathbf{I} & \mathbf{W} \\ \tilde{\mathbf{W}}' & \mathbf{I} \end{bmatrix}^{-1} \left(\frac{1}{1-\sigma} \left(\begin{bmatrix} \ln \mathbf{N} \\ \ln \tilde{\mathbf{N}} \end{bmatrix} + \begin{bmatrix} \ln \mathbf{\Theta} \\ \ln \tilde{\mathbf{\Theta}} \end{bmatrix} \right) + \begin{bmatrix} \ln \mathbf{T} \\ \ln \tilde{\mathbf{T}} \end{bmatrix} \right) \tag{20}$$

With the system solved, an expression for $\ln\left(\Pi_i^{1-\sigma}\right)$ and $\ln\left(P_j^{1-\sigma}\right)$ is readily available.

$$\ln\left(\Pi_i^{1-\sigma}\right) = \bar{\mathbf{w}}_i \left(\begin{bmatrix} \ln \mathbf{N} \\ \ln \tilde{\mathbf{N}} \end{bmatrix} + \begin{bmatrix} \ln \boldsymbol{\Theta} \\ \ln \tilde{\boldsymbol{\Theta}} \end{bmatrix} + (1-\sigma) \begin{bmatrix} \ln \mathbf{T} \\ \ln \tilde{\mathbf{T}} \end{bmatrix} \right) \tag{21}$$

$$\ln\left(P_j^{1-\sigma}\right) = \bar{\mathbf{w}}_{j+n} \left(\begin{bmatrix} \ln \mathbf{N} \\ \ln \tilde{\mathbf{N}} \end{bmatrix} + \begin{bmatrix} \ln \boldsymbol{\Theta} \\ \ln \tilde{\boldsymbol{\Theta}} \end{bmatrix} + (1-\sigma) \begin{bmatrix} \ln \mathbf{T} \\ \ln \tilde{\mathbf{T}} \end{bmatrix} \right) \tag{22}$$

Here, $\bar{\mathbf{w}}_i$ is the i-th row vector of the inverted matrix. Solutions for $\ln\left(\Pi_i^{1-\sigma}\right)$ and $\ln\left(P_j^{1-\sigma}\right)$ can be inserted into (4), such that a reduced-form equation now summarizes the system formed by (4), (5) and (6):

$$\begin{aligned} \ln x_{ij} = {} & \ln\left(\frac{y_i y_j}{y_w}\right) + (1-\sigma)\ln \tau_{ij} \\ & - \left(\bar{\mathbf{w}}_i + \bar{\mathbf{w}}_{j+n}\right) \left(\begin{bmatrix} \ln \mathbf{N} \\ \ln \tilde{\mathbf{N}} \end{bmatrix} + \begin{bmatrix} \ln \boldsymbol{\Theta} \\ \ln \tilde{\boldsymbol{\Theta}} \end{bmatrix} + (1-\sigma) \begin{bmatrix} \ln \mathbf{T} \\ \ln \tilde{\mathbf{T}} \end{bmatrix} \right) \end{aligned} \tag{23}$$

This reduced form gravity equation can be estimated using linear regression under the assumption that τ is a log-linear function of observed variables. The first two terms on the right-hand-side are traditional components of the gravity equation, while the last term is new and contains the multilateral resistance effects. The vectors $\bar{\mathbf{w}}_i$ and $\bar{\mathbf{w}}_j$ reflect that multilateral resistances can be different across regions.

First-order treatment effects are obtained from the reduced form by setting the τ_{ij}'s to their counterfactual values. The resulting trade flows are used to update the weights in a second iteration. This procedure is repeated until trade flows have converged to their counterfactual values.

B Data

Data on bilateral trade were obtained from the International Trade in Commodity Statistics (ITCS) database using the OECD's website. The ITCS database is maintained by the OECD and the UNSD. Data on all countries was retrieved and most developing countries were aggregated by (sub-) continent in order reduce the number of zero trade flows and to focus on the OECD. As a rule reported imports were used as the primary source. When a country did not report any imports for a specific partner, the exports reported by the partner were used in stead.

An important exception to this rule has been made for all intra-EU trade flows from 1992 onwards. The establishment of the Single Market in that year had the side effect that data on intra-EU trade no longer could be collected from customs forms. Instead, trade statistics are gathered from data on value-added tax, the so-called INTRASTAT methodology. Due to sensitivity to fraud and other factors, intra-EU trade statistics suffered (and still suffer) from under-reporting. Because reported imports turn out to be more affected by underreporting than reported exports, the latter kind of data were used as a primary source for intra-EU trade from 1992 onwards. (In many cases, underreporting was so large that reported exports even exceeded reported imports despite the cif/fob difference.) The median cif/fob ratios in the years immediately prior to 1992 were used to correct for this exceptional treatment of INTRASTAT data.

The primary source for data on nominal GDP and value added is the World Bank's World Development Indicators (WDI) CD rom (edition 2008). For several (including European) countries, the WDI does not contain data on GDP in the earlier years of the sample. In particular, no GDP data was reported for West Germany prior to 1971. In these cases, additional data from the IMF's International Financial Statistics (IFS) database was used to lengthen the series, scaling the IFS data to avoid structural breaks.

[Table 6 about here.]

C Choice of spline intervals for trade in goods

In Section 3 regression results are presented employing a spline (a "flexible trend") for EU-members. The choice of the years at which the slope of the spline is allowed to change is determined ex-ante and influences the precision with which IM-effect is measured. Estimating a cross-section gravity equation for all years separately can give an idea of how the EU-membership has affected trade over the years. A repeated cross-section, however, turns out to produce coefficients on the EU-dummy that are highly volatile.

A less volatile alternative is a so-called rolling regression. This involves estimating a (pooled) regression on a fixed number of subsequent years or "window", shifting the window for each regression by adding a later year to and dropping the first year from the previous sample. A rolling regression is thus similar to a moving average.

Figure 2 shows the results of a rolling regression of bilateral trade on the log of importer GDP plus the log of exporter GDP, the log of distance, dummies for common-border and common language, and an EU dummy. The figure shows the estimated coefficient of the EU dummy for a three-year window, a five-year window, and a seven-year window. The vertical lines indicate the chosen breakpoints for the slope of EU spline.

After the observed peak in 1970, a steep decline sets in until 1974. A possible explanation for this trough is the collapse of Bretton Woods in 1971, which reintroduced exchange rate volatility for the major trading economies. These results are robust to including a generic dummy for the years 1971 to 1974.

[Figure 2 about here.]

D Robustness estimation

Bun and Klaassen (2007) criticized studies of the effect of the Euro on trade (e.g. Frankel and Rose, 2002) for their failure to take into account trends in residuals. If residuals of a gravity equation exhibit an upward trend, then including a dummy for a discrete event, like the introduction of the Euro, will have a positive coefficient even when the discrete event has had no impact on trade. Bun and Klaassen showed that the introduction of the Euro has had hardly any effect on trade once a trend was added for each pair of countries.

The case of the IM, however, differs from the case of the Euro as the construction of the IM has not been a discrete event, but a gradual one. Including pair wise trends would not work when measuring such a gradual effect because most genuine IM-effects would be filtered out.

Nevertheless, the criticism of Bun and Klaassen implies that any trend in the residuals should not be larger for EU-members than for other countries. Figure 3 displays the average residuals per year for EU6 countries and for all other countries. The underlying regression model has a spline for all members of the EU (Table 2). The figure shows that there is no trend in the mean residuals of EU6 countries, nor for the mean of the rest. The mean residuals are higher for the EU6 because of the inclusion of pair wise fixed effects.

[Figure 3 about here.]

All estimation results presented in the main text relied on biennial country dummies as a means to control for multilateral resistance. It is also possible to transform variables prior to estimation as proposed by Baier and Bergstrand (2009a) and above in Appendix A. Table 7 compares the dummy method in column (1) with the asymmetric closed-form transformation in column (2), Baier and Bergstrand's GDP-weighted transformation (BVO-GDP) in column (3), Baier and Bergstrand's n-weighted transformation (BVO-n) in column (4). The transformations proposed by Baier and Bergstrand perform very well in terms of estimation efficiency and have coefficients close to those of the dummy model.

[Table 7 about here.]

The countries chosen for the base sample are mainly OECD countries and Middle and Eastern European countries (see the first two columns of Table 6). All other trade flows are aggregated by (sub-) continent for two reasons. First, in this way a set of relatively homogeneous countries is created, such that bias due to unobserved country characteristics is limited. Second, because it reduces the number of zero-trade flows.

In order to test for the sensitivity of our main results, the base sample is extended with the major developing countries (listed in the third column of Table 6). Table 8 repeats the regression results of Table 7 for the extended sample. The coefficients on the EU spline are closer to zero than those for the base sample. Do these results suggest that using the base sample leads overestimation of the EU effect? Not necessarily. A number of large developing countries have experienced rapid economic growth in combination with substantial trade liberalization. This has stimulated trade with and between these countries. Failure to control for this process of catching up is likely to have blurred the EU effect in regressions using the extended sample.

[Table 8 about here.]

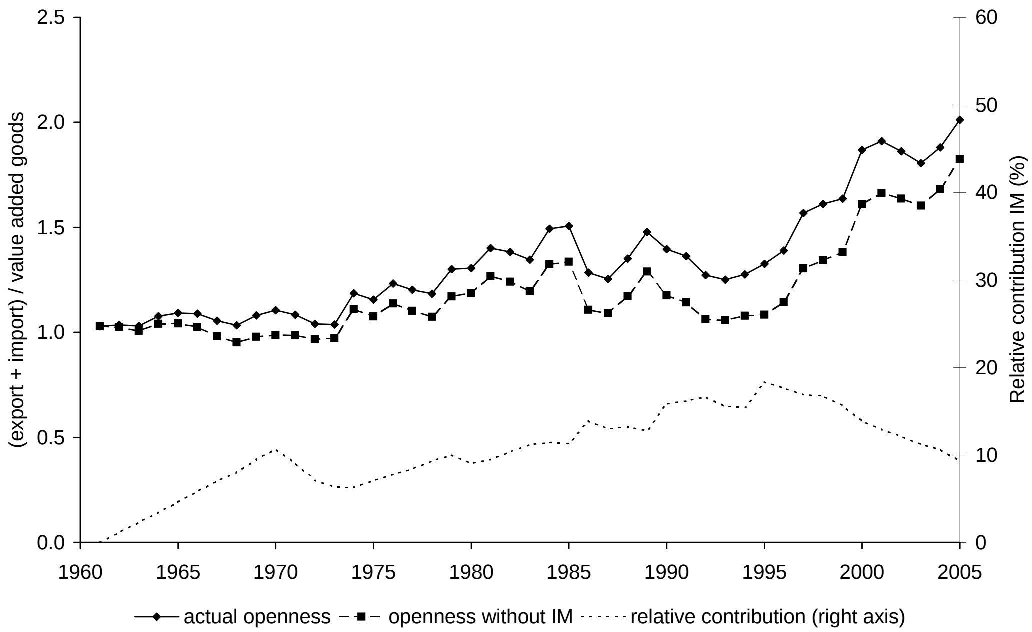
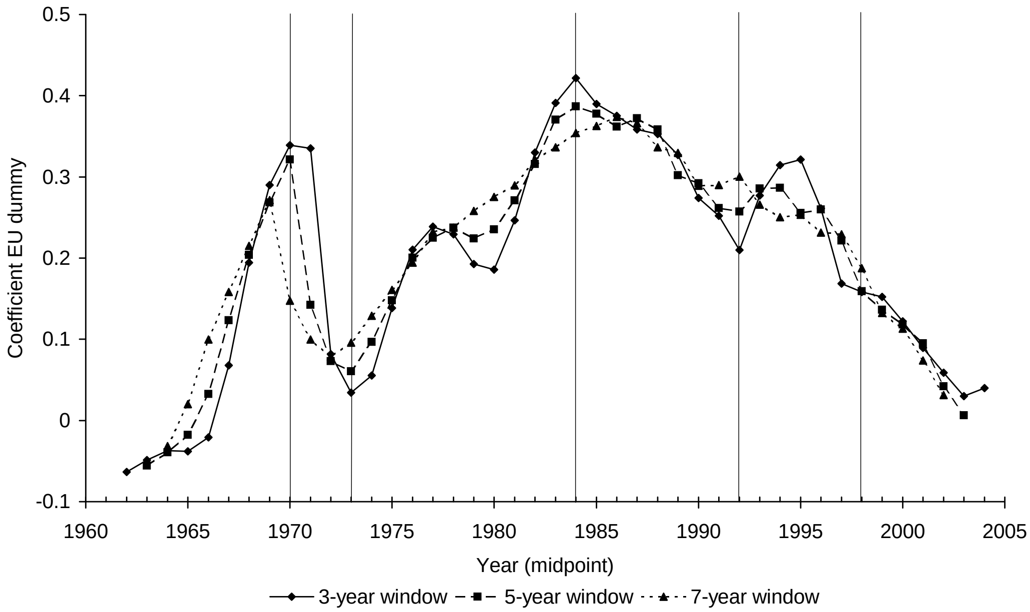


Figure 1: Openness of EU15, with and without the Internal Market

Notes: The solid line shows actual openness of the EU15, measured as the sum of exports and imports divided by GDP. The dashed line refers to openness computed using counterfactual trade flows based on the regression of Table 2 and the post-estimation procedure detailed in Appendix A. The dotted line (right axis) shows the relative difference between the other two lines in percentages.



Vertical lines indicate the breakpoints chosen for the spline.

Figure 2: Rolling regression results for windows of 3, 5 and 7 years

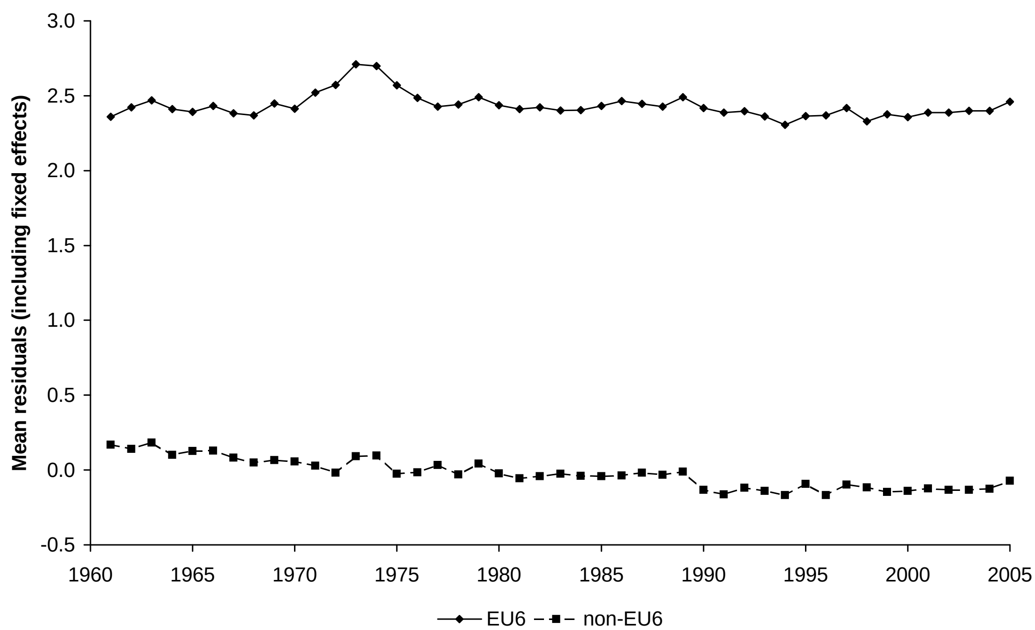


Figure 3: Mean trend in residuals for EU6 members and other countries

Table 1: Regression of log bilateral trade on bilateral EU dummy

	(1)	(2)	(3)	(4)	(5)
GDP	0.51**	0.51**	0.50**	0.51**	0.50**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
EU	0.33**	0.34**	0.33**	0.34**	0.34**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
EFTA		0.13			0.12
		(0.09)			(0.09)
CEEC			−2.02**		−2.02**
			(0.17)		(0.17)
EURO				−0.01	−0.00
				(0.04)	(0.04)
$N \times T$	51586	51586	51586	51586	51586
N	1406	1406	1406	1406	1406
parameters	1630	1631	1631	1631	1633
R^2-adj.	0.84	0.84	0.85	0.84	0.85

Notes: Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% and **1%. Country-pair fixed effects and biennial exporter and importer dummies included, but not reported.

Table 2: Regression of log bilateral trade on EU spline

	period		coefficient	s.d.
GDP			0.50**	(0.05)
EU	1961-1969		2.35**	(0.23)
	1970-1972		−4.22**	(0.98)
	1973-1983		0.85**	(0.29)
	1984-1991		0.18	(0.25)
	1992-1997		−0.24	(0.38)
	1998-2005		−1.11**	(0.29)
CEEC			−2.01**	(0.17)
$N \times T$	51586	number of parameters		1636
N	1406	R^2-adj.		0.85

Notes: Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% and **1%. Country-pair fixed effects and biennial exporter and importer dummies included, but not reported.

Table 3: Regression of log bilateral trade on EU cohort indicators

	cohort		coefficient	s.d.
GDP			0.50^{**}	(0.05)
EU	EU7-9		0.56^{**}	(0.04)
	EU10		0.19^{**}	(0.03)
	EU11-12		0.48^{**}	(0.05)
	EU13-15		0.25^{**}	(0.05)
	EU16-25		0.08	(0.05)
CEEC			-2.02^{**}	(0.17)
$N \times T$	51586	number of parameters		1635
N	1406	R^2-adj.		0.85

Notes: Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% and **1%. Country-pair fixed effects and biennial exporter and importer dummies included, but not reported.

Table 4: Share of EU15 exports and imports due to the IM

Years	Total effect*	Deepening†	Enlargement‡			
			All cohorts	EU7-9	EU11-12	EU13-15
Exports						
2005	0.10	0.00	0.10	0.05	0.03	0.02
1961-2005	0.13	0.04	0.09	0.05	0.02	0.01
1961-1969	0.06	0.06	0.00	0.00	0.00	0.00
peak 1970	*0.11*	*0.11*	*0.00*	*0.00*	*0.00*	*0.00*
1970-1972	0.09	0.09	0.00	0.00	0.00	0.00
through 1973	*0.07*	*0.02*	*0.05*	*0.05*	*0.00*	*0.00*
1973-1983	0.09	0.04	0.05	0.05	0.00	0.00
1984-1991	0.14	0.06	0.08	0.06	0.02	0.00
1992-1997	0.17	0.07	0.10	0.06	0.03	0.01
peak 1995	*0.18*	*0.08*	*0.11*	*0.06*	*0.03*	*0.02*
1998-2005	0.13	0.02	0.10	0.05	0.03	0.02
Imports						
2005	0.09	0.00	0.10	0.05	0.03	0.02
1961-2005	0.13	0.04	0.09	0.05	0.02	0.01
1961-1969	0.05	0.05	0.00	0.00	0.00	0.00
peak 1970	*0.10*	*0.10*	*0.00*	*0.00*	*0.00*	*0.00*
1970-1972	0.09	0.09	0.00	0.00	0.00	0.00
through 1973	*0.06*	*0.02*	*0.04*	*0.04*	*0.00*	*0.00*
1973-1983	0.09	0.04	0.05	0.05	0.00	0.00
1984-1991	0.14	0.06	0.08	0.06	0.02	0.00
1992-1997	0.17	0.07	0.10	0.06	0.03	0.01
peak 1995	*0.18*	*0.08*	*0.10*	*0.06*	*0.03*	*0.02*
1998-2005	0.12	0.02	0.10	0.05	0.03	0.02

*Total effect is based on the EU spline estimates of Table 2.
†Deepening is approximated as the total effect minus the enlargement effect for all cohorts jointly.
‡The enlargement effect is reported for all enlargements since 1973 jointly ("All cohorts"); for enlargement from EU6 to EU9 ("EU7-9"); for enlargement from EU10 to EU12 ("EU11-12"); for enlargement from EU12 to EU15 ("EU13-15"). The last three columns assume that all earlier and later enlargements did take place. The enlargement effects are based on the estimates shown in Table 3.

Table 5: Trade creation and trade diversion

Years	Intra-EU15 trade	EU15 exports to non-EU15	EU15 imports from non-EU15
2005	0.16	-0.02	-0.02
1961-2005	0.25	-0.03	-0.03
1961-1969	0.20	-0.01	-0.01
1970-1972	0.29	-0.02	-0.02
1973-1983	0.24	-0.04	-0.04
1984-1991	0.31	-0.05	-0.05
1992-1997	0.30	-0.02	-0.02
1998-2005	0.21	-0.03	-0.03

Notes: The data in the table are shares of actual trade flows. Calculations are based on the EU spline estimates of Table 2.

Table 6: List of countries and aggregates

Australia	Malta	*Extended sample:*
Austria	Netherlands	Argentina
Belgium & Luxembourg	New Zealand	Australia
Bulgaria	Norway	Brazil
Canada	Poland	Chile
Cyprus	Portugal	China
Denmark	Romania	India
Finland	Spain	Indonesia
Fmr. Czechoslovakia	Sweden	Mexico
Fmr. USSR	Switzerland & Liechtenst.	South Africa
Fmr. Yugoslavia	Turkey	Sri Lanka
France & Monaco	USA, PR, & Virgin Isds.	Suriname
Germany	United Kingdom	Thailand
Greece		Venezuela
Hungary	*Aggregates:*	Zimbabwe
Iceland	East Asia and Pacific	
Ireland	Latin America and Caribbean	
Italy, SM, & V	Middle-East and North Africa	
Japan	South Asia	
Korea, Rep. of	Subsaharan Africa	

Table 7: Estimation results for transformed variables

		(1)	(2)	(3)	(4)
GDP		0.50**	−0.86**	0.61**	0.62**
		(0.05)	(0.09)	(0.09)	(0.10)
EU	1961-1969	2.35**	3.34**	2.29**	2.62**
		(0.23)	(0.36)	(0.28)	(0.26)
	1970-1972	−4.22**	−6.26**	−4.83**	−5.31**
		(0.98)	(1.18)	(1.01)	(0.89)
	1973-1983	0.85**	0.67	0.95**	0.89**
		(0.29)	(0.42)	(0.25)	(0.22)
	1984-1991	0.18	1.62**	−0.08	0.10
		(0.25)	(0.40)	(0.23)	(0.21)
	1992-1997	−0.24	−2.99**	−0.95**	−0.44
		(0.38)	(0.53)	(0.27)	(0.32)
	1998-2005	−1.11**	−1.29**	−1.46**	−1.46**
		(0.29)	(0.49)	(0.23)	(0.30)
CEEC		−2.01**	−0.53	−1.73**	−1.59**
		(0.17)	(0.40)	(0.55)	(0.55)
Transformation		none	closed form	BVO-GDP	BVO-n
Exporter-year dummies		yes	no	no	no
Importer-year dummies		yes	no	no	no
Year dummies		no	yes	yes	yes
$N \times T$		51586	51586	51586	51586
N		1406	1406	1406	1406
parameters		1636	52	52	52
R^2-adj.		0.85	0.67	0.76	0.76

Notes: Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% and **1%.

Table 8: Estimation results for extended sample of countries

		(1)	(2)	(3)	(4)
GDP		0.47^{**}	-0.75^{**}	0.62^{**}	0.63^{**}
		(0.05)	(0.08)	(0.08)	(0.08)
EU	1961-1969	1.14^{**}	3.61^{**}	0.39	1.92^{**}
		(0.35)	(0.46)	(0.61)	(0.41)
	1970-1972	-2.96	-4.78^{**}	-2.25	-3.14^{*}
		(1.75)	(1.35)	(2.58)	(1.45)
	1973-1983	1.47^{**}	0.82^{*}	0.91	0.55
		(0.54)	(0.39)	(0.68)	(0.34)
	1984-1991	0.76^{*}	0.38	1.24^{**}	0.61^{*}
		(0.34)	(0.31)	(0.43)	(0.30)
	1992-1997	0.25	-2.61^{**}	-0.44	-0.31
		(0.40)	(0.46)	(0.40)	(0.34)
	1998-2005	-0.82^{*}	-0.00	-0.95^{**}	-0.53
		(0.36)	(0.47)	(0.33)	(0.28)
CEEC		-1.58^{**}	-0.37	-1.57^{**}	-0.90^{**}
		(0.16)	(0.34)	(0.55)	(0.32)
Transformation		none	closed form	BVO-GDP	BVO-n
Exporter-year dummies		yes	no	no	no
Importer-year dummies		yes	no	no	no
Year dummies		no	yes	yes	yes
$N \times T$		88819	88819	88819	88819
N		2550	2550	2550	2550
parameters		2208	52	52	52
R^2-adj.		0.75	0.57	0.63	0.63

Notes: Driscoll-Kraay standard errors with lag one between brackets; stars indicate statistical significance levels: *5% and **1%.