

The Euro Impact on FDI Revisited and Revised

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Abstract

We find no or negative effects on FDI of the European monetary union and large positive effects of the Single Market. Previous studies found positive effects of the monetary union because they did not allow the impact of the Single Market to change over time. Our estimates indicate that trade and FDI have been substitutes rather than complements with respect to the monetary union.

JEL classification: F15, F21, F23, F33

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1 Introduction

We investigate whether the European monetary union has had an impact on foreign direct investment (FDI). Previous studies have found substantial positive effects within the euro area, ranging from 16 to 300 per cent. The wide range of the findings and the considerable political and economic importance of the euro justify further investigation.

The studies by Brouwer et al. (2007), de Sousa and Lochard (2006), Petroulas (2007), and Schiavo (2007) use panel data and a difference-in-difference procedure to estimate a gravity equation with FDI as the dependent variable. They find that the euro has increased FDI within the euro area by 16 to 300 per cent. Brouwer et al. (2007), Petroulas (2007) and Schiavo (2007) also find significant positive effects on FDI between the euro area and outsider countries by 4 to 200 per cent. The study by Foad (2006) has a narrower and different focus; he estimates the effect of EMU membership and the suitability of host countries as export platforms on FDI from the U.S. and finds positive effects of both. A large share of FDI consists of mergers and acquisitions. The study by Coeurdacier et al. (2009) uses detailed, sector-level data on bilateral mergers and acquisitions and finds euro effects of 200 per cent between euro countries and 70 per cent between euro and non-euro countries.

The approach of our study is essentially the same as that of most previous studies, but with two important differences. We use panel data and a difference-in-difference procedure to estimate a gravity equation with FDI as the dependent variable. The first difference is that our data ends in 2006, which means that there is a smaller risk of confounding the effect of different timing of the general surge in FDI at the end of the 1990's with the effects of the euro. Previous studies use data ending in 2001 (Petroulas, 2007; Schiavo, 2007) or 2004 (Brouwer et al., 2007; Coeurdacier et al., 2009; de Sousa and Lochard, 2006). There is a risk that the effect of different timing is interpreted as an impact of monetary union if one uses data ending in 2001 or 2002, see figure 1.

[Figure 1]

The second difference, which is crucial, is in the specification of the gravity equation. We find that the results depend entirely on the way in which the Single Market

is controlled for and specifically if the impact of the Single Market is allowed to change over time. Although the Single Market was officially launched on January 1, 1993, implementation of some 360 measures has been gradual and uneven across countries and some have still not been implemented. We should therefore expect the Single Market to have a gradual effect on trade and foreign direct investment.

Section 2 presents the estimation model and the data, section 3 results, section 4 robustness checks, and section 5 a summary and conclusions.

2 Estimation model and data

The gravity equation for trade derived by Anderson and van Wincoop (2004) can be written on the logarithmic form (with time subscripts added)

$$x_{ijt} = \alpha_{ij} + y_{it} + y_{jt} + \sum_{m=1}^M \lambda_m \ln(z_{ijt}^m) + \theta_i + \theta_j + \varepsilon_{ijt}, \quad (1)$$

where x_{ijt} is the log of exports from country i to country j , y_{it} and y_{jt} are the log of the exporting and importing country's GDP respectively, $\sum_{m=1}^M \lambda_m \ln(z_{ijt}^m)$ are bilateral trade barriers, and θ_i and θ_j are exporting and importing country fixed effects respectively.

The latter terms capture indices of trade costs of country i 's competitors to country j and of country i 's trade costs to all other countries than country j that are assumed to be constant over time here, what Anderson and van Wincoop (2004) term inward and outward multilateral trade resistance. Note that the fixed effect of a given country as an exporter in general is different from the fixed effect as an importer.

We will estimate equation (1) with FDI from country i to country j as the dependent variable instead of exports. Empirical research to explain bilateral FDI has often used the gravity model, but theoretical underpinnings of this practice were provided only recently. Kleinert and Toubal (2005) derive gravity equations for both bilateral horizontal FDI – with symmetric as well as heterogeneous firms as in Melitz (2003) – and bilateral factor proportions based vertical FDI. Head and Ries (2005) derive a gravity equation for bilateral, strategically motivated FDI. Bergstrand and Egger (2007) derive a gravity equation from the general-equilibrium knowledge-capital model generalized to three factors and three countries. This model generates both horizontal and vertical FDI

plus trade. Thus, use of the gravity equation to estimate effects of the euro on FDI is theoretically justified.

All derivations posit that FDI is explained by some measure of the source and host country's economic size – usually measured by GDP – and by transactions costs – usually measured by distance. The effect of distance is likely to be non-linear and to depend on cultural as well as geographic distance. We therefore add contiguous borders and common language to geographical distance, as is common practise.

Our main interest is in the impact on FDI of a reduction in transactions costs and nominal uncertainty caused by the introduction of a common currency. We estimate the impact by the interaction of time with dummy variables for three types of bilateral relations: FDI between euro countries, from euro to non-euro countries and from non-euro to euro countries. FDI between euro and non-euro countries is of interest since we suspect the euro to have increased FDI within the euro area at the expense of FDI between euro area and outsider countries for the same reason that a customs union is expected to lead to trade creation between members and trade diversion with non-members. We estimate euro effects for two time periods, 1999-2001 and 2002-2006. The former can be considered a transition period when euro notes and coins were not yet in circulation. This means that our estimates of euro effects on FDI compare the differences between the levels of FDI in 1999-2001 and 2002-2006 respectively and the level in 1995-1998 for the three categories of bilateral relations involving euro countries with the corresponding differences involving FDI between non-euro countries only, that is, we compare the difference between differences.

In order to estimate the impact of the euro on FDI, it is important to control for the impact of the Single Market. A majority of the Single Market measures had been implemented by 1993 – the official launch date – but some were implemented later and others have still not been implemented. The Single Market eliminated much differential and discriminatory treatment of foreign direct investment, but not all. Such discrimination still remains in some service sectors and implementation of existing rules is not always perfect. We estimate Single Market effects analogously with euro effects, by interacting time with dummy variables for the three types of bilateral relations – between Single Market countries, from Single Market to outsider countries and from outsider to Single Market countries – and for the same time periods.

Finally, we control for changes in real exchange rates. Two alternative approaches can be used. One is to use data in current prices converted into a given currency by current nominal exchange rates. The other is to use data in constant prices converted into one currency by the nominal exchange rate in a base year and to control for changes in real exchange rates. The two alternatives would be equivalent if differences in inflation rates were exactly and contemporaneously adjusted for by nominal exchange rate changes, i.e. if purchasing power parity is permanent. That is not the case, however. Changes in nominal exchange rates in the short run can best be modelled as a random process.¹ The first alternative therefore risks confounding the effects of real exchange rates with those of other factors.

Our country sample consists of 20 countries. The euro area consists of ten countries in our sample: Austria, Belgium-Luxembourg (which are treated as a single country for statistical reasons), Finland, France, Germany, Ireland, Italy, Netherlands, Portugal and Spain.² The Single Market consists of 14 countries: the ten euro countries plus Denmark, Sweden and the UK, which are members of the EU, plus Norway. Norway has a formal agreement – the European Economic Area agreement – with the EU, making it part of the Single Market. Six OECD countries at about the same level of development and GDP per capita make up the control group: Australia, Canada, Japan, New Zealand, Switzerland, and the U.S.

The sample period is 1995-2006. The starting year was chosen for several reasons. Austria, Finland and Sweden became members of the EU in 1995. By starting in 1995, we do not have to control for the change in their status. Additionally, we minimize the problem of potential trends in FDI due to omitted variables that have been shown to exist in trade data for the euro countries relative to trade data for outsider countries (Berger and Nitsch, 2008). Finally, we are going to use trade data that are affected by a change in the way trade data are collected that took effect in 1993.

Data on FDI and trade in current U.S. dollars were taken from the OECD and United Nations Comtrade database respectively. They were deflated using producer price indices from the OECD, or the consumer price index if a producer price index was missing, and current nominal exchange rates from IMF. We use data on FDI stocks

¹ Rigobon (2008).

² Greece entered in 2001, but is excluded because of uncertainty surrounding the data.

instead of flows to avoid the problem of taking logs of negative values. About 30 per cent of the potential number of observations are listed as missing and are treated as such.³ There are slightly more observations of the same FDI stock – from country i to country j – reported by the host than the source country. We therefore use data reported by the host country. The correlation between the two sets of data should ideally be unity but is 0.88. Real exchange rates were calculated as the ratio of producer price indices expressed in current U.S. dollars with producer price data from the OECD and nominal exchange rates from IMF. Data on geographical distance, border contiguity and common language were taken from the CEPPII database.⁴

3 Euro and Single Market effects on FDI

It is common to classify FDI as horizontal and vertical although the distinction is not so clear-cut in practice.⁵ The former usually refers to the establishment of local production for local sales, while the latter refers to the establishment of production in different locations depending on differences in costs due to comparative advantage. Data for the U.S. indicate that horizontal FDI dominates vertical FDI; foreign affiliates of U.S. firms export back only about 15 % of their output (Brainard, 1997; Markusen, 2002).

Models of the so-called proximity-concentration trade-off assumes that FDI is horizontal and is a substitute for exports in a world of two countries; high trade costs make it profitable to incur the extra fixed cost associated with FDI and local sales instead of exporting to the local market. There is some empirical evidence in favor of such a trade-off. Brainard (1993), Carr et al. (2003) and Yeaple (2003) find that FDI *relative* to exports increases with distance, but that distance by itself has a negative impact on FDI. Blonigen (2001) finds that Japanese new FDI in the U.S. leads to increased exports of intermediate inputs and decreased exports of the finished products. However, if a third or more countries are added, it is no longer certain that trade and horizontal FDI are

³ A few observations have zero and even negative values; these have also been treated as missing. Their number was judged to be too small to warrant a different estimation procedure, such as the one suggested by Santos Silva and Tenreiro (2006) to deal with heteroscedasticity between panels and the problem of negative observations with log-linear specifications.

⁴ <http://www.cepii.fr/anglaisgraph/news/accueilengl.htm>

⁵ Markusen (1983) provided the first formalization of horizontal FDI, where trade and FDI are substitutes, and Helpman (1984) provided the first formalization of vertical FDI, based on comparative advantage and factor proportions theory.

substitutes. A particular form of horizontal FDI is so-called export-platform FDI, when multinationals establish foreign affiliates to sell not only in the host country market but in neighboring countries as well. Free trade within a common market such as the EU attracts multinationals to establish affiliates in one country to serve other countries within the common market. An example is Ireland, which has attracted a great amount of FDI from multinationals seeking better access to the rest of the EU market. Blonigen et. al. (2004) and Foad (2006) find evidence that higher GDP in neighboring countries increases U.S. FDI into individual European countries. Thus, in a multi-country world, trade and horizontal FDI can be complements as well as substitutes.

Vertical FDI is thought to be driven primarily by comparative advantage. It is not clear how a change in transactions costs should affect vertical FDI. Neary (2007) demonstrates that a lower tariff in the host country discourages vertical FDI and encourages exports for the same reasons as with horizontal FDI, whereas a lower tariff in the source country encourages vertical FDI since it lowers the cost of exporting back to the parent firm. The net result of mutual, bilateral tariff reductions is therefore ambiguous.

A relatively small part of FDI takes the form of establishing or expanding production and other facilities abroad, so-called greenfield investment. About 70-80 per cent of FDI between OECD countries takes place in the form of mergers and acquisitions (Head and Ries, 2005). FDI by merger and acquisition can be motivated by cost considerations, as for horizontal FDI, or comparative advantage, as for vertical FDI, but can also be motivated by strategic considerations – reducing competition – or efficiency, for example by coordination of production or marketing or getting access to a superior technology. Gugler et al. (2003) find that 54 per cent of cross-border mergers and acquisitions in OECD countries are conglomerate, i.e. strategic, 42 per cent horizontal and only 4 per cent vertical. Neary (2007) shows that mergers and acquisitions tend to be an instrument of comparative advantage in the sense that they and trade move in the same direction. The effect of a small reduction in transaction costs on mergers and acquisitions is, however, ambiguous in his model.

The conclusion is that the expected effects of a reduction in transactions costs on FDI are ambiguous in general. It seems that vertical FDI and trade tend to be complements in practice, but vertical FDI is a minor part of total FDI. If horizontal FDI

is dominant, the introduction of a common currency may result in more trade and less FDI. However, if export-platform FDI is the main type of horizontal FDI, trade and FDI may be complements rather than substitutes. Also, much FDI takes the form of mergers and acquisitions, where the motives can be strategic and the effects of the introduction of a common currency are ambiguous.

So much for what we should expect based on theory. Table 1 shows the results of estimating a gravity equation explaining bilateral FDI with our data covering the period 1995-2006. The estimates are based on panels with at least nine observations and a maximum of twelve. This restriction makes certain that every panel has at least one observation before 1999 and at least five observations starting in 1999. (Table 4 contains robustness checks with respect to the number of observations in each panel.)

[Table 1]

It is clear from the first column that, contrary to results in previous studies, the euro has had no impact on FDI within the euro area and on FDI from the euro area to non-euro countries, and a large negative impact on FDI from non-euro to euro countries. A comparison of the first, second and third columns reveals one probable reason for the contradictory result of our and previous estimates. When the Single Market is not controlled for, in column [2], or when it is controlled for by a fixed, time-invariant effect, in column [3], the euro effect on FDI within the euro area is positive and of the same magnitude as in most previous studies, but when the Single Market is controlled for and its impact is allowed to vary in the same way as the impact of monetary union, in column [1], the effect disappears. Instead, we find that the Single Market has had a very large impact on FDI, both within the euro area and between it and non-euro countries, that is concurrent with establishment of the monetary union. Note that the impact is estimated to increase over time. The estimate of 0.745 within the euro area in 2002-2006 is equivalent to an increase of more than 100 per cent ($(e^{0.745} - 1) \times 100 = 112$).

GDP of the source country is estimated to have a strong effect, while GDP of the host country has no effect. The real exchange rate has a positive effect; a doubling of the real exchange rate of the source country doubles its FDI in the host country, indicating

that exports and FDI are substitutes. Geographical and cultural distance have an expected negative and positive effect, while border contiguity is estimated to have no effect. All of the estimates are robust to the exclusion of GDP, the real exchange rate and the distance variables.

Table 2 shows the results of estimating the same gravity equation, but with exports (unidirectional trade) as the dependent variable. The purpose is to check whether controlling for the Single Market is crucial for the euro effect on FDI as well.

[Table 2]

A comparison of the first and second columns makes clear that controlling for the Single Market and allowing its impact to vary over time has little effect on the large positive impact of the euro on trade. This shows that the euro has had very different impacts on FDI and trade, and supports our conclusion that the impact on FDI is zero or negative. It also indicates that trade and FDI tend to be substitutes rather than complements with respect to the monetary union and the Single Market. The Single Market itself had a statistically weak and economically relatively small negative effect on trade within and from the euro area during this period, but a weak and positive effect on exports to the euro area.

The effects of the other variables on trade are highly significant and have expected signs. Note that the real exchange rate has a negative effect on exports; a doubling of the exchange rate will reduce exports by about 80 per cent. The effect is of the same magnitude as the effect on FDI but with the opposite sign.

4 Robustness checks

Table 3 shows the sensitivity of the euro and Single Market estimates to the exclusion of one country at a time.

[Table 3]

We find that the estimates of significant and large negative euro effects on FDI from non-euro to euro countries become statistically insignificant when Sweden is excluded

and that they also are sensitive to the exclusion of Norway. This means that the negative impact in the whole sample is caused by a fall in FDI to euro countries from Sweden and Norway.

Table 4 shows the sensitivity of the estimates to the changes in the minimum number of observations in each panel. The estimates are insensitive to allowing as little as one observation, see column [1], and to an increase in the minimum number from nine to ten and eleven. When only balanced panels are allowed – with twelve observations – the negative euro effect on FDI from non-euro to euro countries disappears and the Single Markets effects become smaller and less significant. Note that with balanced panels the number of observations and panels is drastically reduced.

We conclude that the main result, that the euro has had no impact within the euro area and the Single Market has had a significant and large positive impact on FDI both within the euro area and between it and outside countries, is robust to the inclusion of individual countries and to the minimum number of observations in each panel. The finding of a significant and large negative euro effect on FDI to the euro area apparently depends on Sweden and Norway.

5 Summary and conclusions

All previous studies of the euro's impact on FDI between euro countries and between euro and non-euro countries have found statistically significant and positive effects. Estimates range between 16 and 300 per cent on bilateral FDI between euro countries and between 4 and 200 per cent between euro and non-euro countries. In contrast, we find no euro effects on FDI between euro countries and from euro to non-euro countries, and significant and large negative effects on FDI from non-euro to euro countries.

It is crucial to adequately control for effects of the Single Market. Without adequate control, the euro effect on FDI is significant, positive and of the same order of magnitude as in most previous studies. This is probably the main reason for the difference between our results and those of previous studies. Most do control for the fixed effect of EU membership, which is an approximate control for fixed, time-invariant effects of the Single Market, but this is inadequate since it does not allow for change over time. Another reason is that the general surge in FDI in the late 1990's had a somewhat

different timing inside than outside the euro area. Hence, what previous studies based on just a few years with the euro have interpreted as the impact of monetary union may to some extent be an effect of different timing of the surge in FDI.

FDI can be both a complement to and a substitute for trade on theoretical grounds. The euro is estimated to have increased bilateral trade involving euro countries, but not FDI. The opposite was found with respect to the Single Market. In other words, our results indicate that trade and FDI have been substitutes rather than complements with respect to the euro and the Single Market. It is quite clear that they have been substitutes with respect to the real exchange rate.

References

- Anderson, J., van Wincoop, E., 2004. Trade costs. *Journal of Economic Literature* XLII, 691--751.
- Berger, H., Nitsch, V., 2008. Zooming out: The trade effect of the euro in historical perspective. *Journal of International Money and Finance* (forthcoming).
- Bergstrand, J., Egger, P., 2007. A knowledge-and-physical-capital model of international trade flows, foreign direct investment, and multinational enterprises. Mimeo.
- Blonigen, B., 2001. In search of substitution between foreign production and exports. *Journal of International Economics* 53, 81--104.
- Blonigen, B., Davies, R., Waddell, G., Naughton, H., 2004. FDI in space: Spatial autoregressive lags in foreign direct investment. NBER Working Paper No. 10939.
- Brainard, L., 1993. An empirical assessment of the factor proportions explanation of multi-national sales. NBER Working Paper No. W4583.
- Brainard, L., 1997. An empirical assessment of the proximity-concentration tradeoff between multinational sales and trade. *American Economic Review* 87, 520--544.
- Brouwer, J., Paap, R., Viaene, J.-M., 2007. The trade and FDI effects of EMU enlargement. *Journal of International Money and Finance* 27, 188--208.
- Carr, D., Markusen, J., Maskus, K., 2003. Estimating the knowledge-capital model of the multinational enterprise. *American Economic Review* 91, 691--708.
- Coeurdacier, N., de Santis, R. A., Aviat, A., 2009. Cross-border mergers and acquisitions and European integration. *Economic Policy* (forthcoming).
- De Sousa, J., Lochard, J., 2006. Union monétaire et IDE: Quels sont les effets de l'euro?. *Revue Economique* 57, 419--430.
- Foad, H., 2006. Export-oriented FDI and the adoption of the Euro. Mimeo.

- Gugler, K., Mueller, D., Yurtoglu, B., Zulehner, C., 2003. The effects of mergers: An international comparison. *International Journal of Industrial Organization* 21, 625--653.
- Head, K., Ries, J., 2005. FDI as an outcome of the market for corporate control: Theory and evidence. Mimeo.
- Helpman, E., 1984. A simple theory of international trade with multinational corporations. *Journal of Political Economy* 92, 451--471.
- Kleinert, J., Toubal, F., 2005. Gravity for FDI. Mimeo.
- Markusen, J., 1983. Factor movements and commodity trade as complements. *Journal of International Economics* 14, 341--356.
- Markusen, J., 2002. *Multinational Firms and the Theory of International Trade*. MIT Press, Cambridge.
- Melitz, M., 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica* 71, 1695--1725.
- Neary, P., 2007. Trade costs and foreign direct investment. Mimeo.
- Petroulas, P., 2007. The effect of the euro on foreign direct investment. *European Economic Review* 51, 1468--1491.
- Rigobon, R., 2008. Exchange rate volatility, in: Durlauf, S., Blume, L.E. (Eds.), *The New Palgrave Dictionary of Economics* vol 3, 96--99.
- Santos Silva, J., Tenreiro, S., 2006. The log of gravity. *The Review of Economics and Statistics* 88, 641--658.
- Schiavo, S., 2007. Common currencies and FDI flows. *Oxford Economic Papers* 59, 536--560.

Yeaple, S., 2003. The complex integration strategies of multinational firms and cross-country dependencies in the structure of foreign direct investment. *Journal of International Economics* 60, 293--314.

Figure 1 Absolute and relative FDI

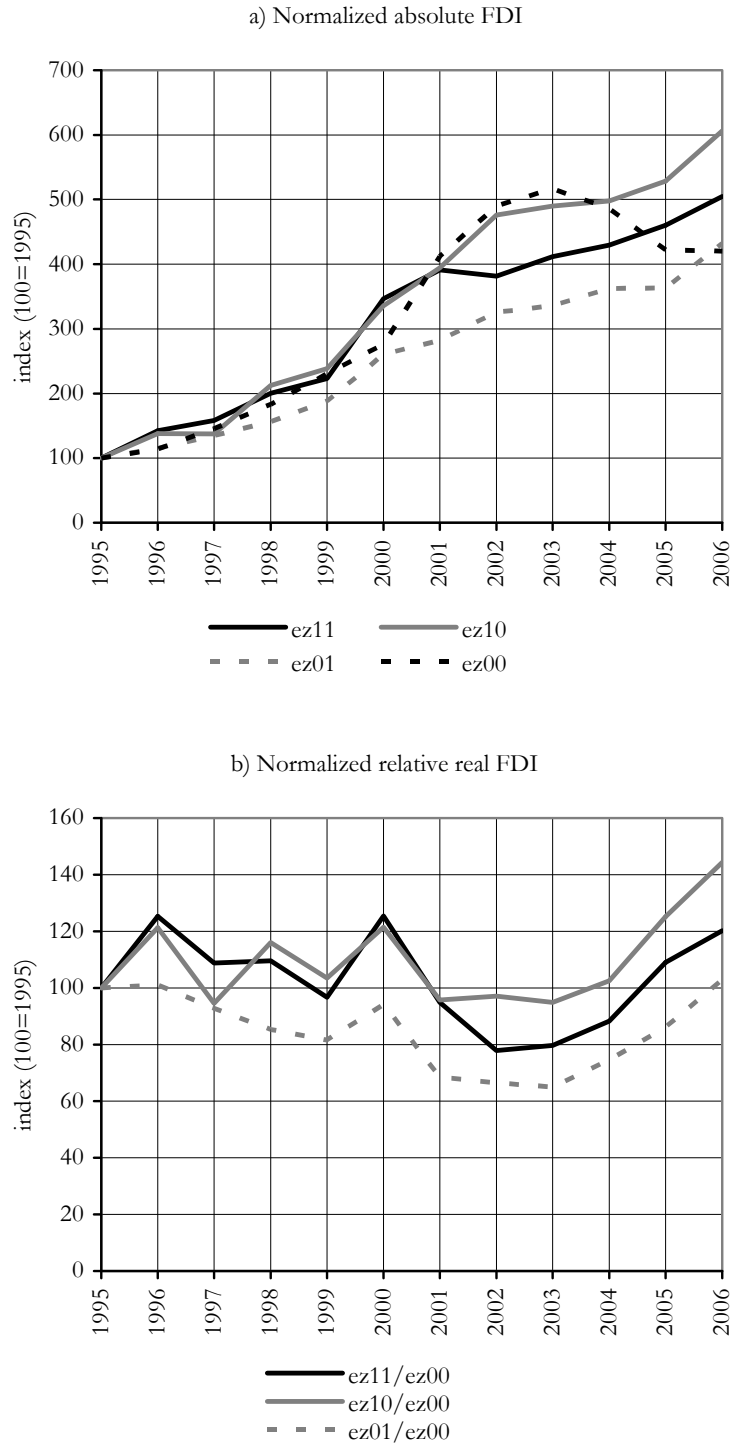


Table 1 Gravity estimates for FDI

	[1]	[2]	[3]	[4]	[5]	[6]
Within euro area	-0.163	0.115	0.083	-0.161	-0.202*	-0.164
1999-2001	[0.103]	[0.078]	[0.079]	[0.103]	[0.104]	[0.104]
Within euro area	-0.062	0.302***	0.270***	-0.097	-0.1	-0.063
2002-2006	[0.093]	[0.070]	[0.072]	[0.092]	[0.094]	[0.094]
From euro area	-0.052	0.159**	0.152**	-0.05	-0.139	-0.041
1999-2001	[0.094]	[0.071]	[0.071]	[0.094]	[0.095]	[0.096]
From euro area	-0.135	0.176**	0.168**	-0.167*	-0.201**	-0.123
2002-2006	[0.089]	[0.071]	[0.071]	[0.088]	[0.090]	[0.090]
To euro area	-0.293***	-0.092	-0.1	-0.303***	-0.260***	-0.281***
1999-2001	[0.087]	[0.065]	[0.065]	[0.087]	[0.088]	[0.088]
To euro area	-0.191**	0.078	0.071	-0.205***	-0.174**	-0.179**
2002-2006	[0.075]	[0.059]	[0.059]	[0.074]	[0.076]	[0.076]
Within Single Market	0.524***			0.540***	0.528***	0.503***
1999-2001	[0.103]			[0.104]	[0.103]	[0.106]
Within Single Market	0.745***			0.754***	0.789***	0.724***
2002-2006	[0.104]			[0.105]	[0.104]	[0.106]
From Single Market	0.403***			0.416***	0.381***	0.360***
1999-2001	[0.112]			[0.112]	[0.112]	[0.115]
From Single Market	0.653***			0.650***	0.708***	0.609***
2002-2006	[0.113]			[0.113]	[0.113]	[0.114]
To Single Market	0.419***			0.424***	0.443***	0.377***
1999-2001	[0.105]			[0.105]	[0.106]	[0.107]
To Single Market	0.601***			0.606***	0.599***	0.557***
2002-2006	[0.100]			[0.101]	[0.101]	[0.101]
Within Single Market			0.161**			
1995-2006			[0.073]			
Source country GDP	1.675***	1.720***	1.731***		1.950***	1.672***
	[0.391]	[0.398]	[0.396]		[0.390]	[0.391]
Host country GDP	0.056	0.054	0.042		-0.022	0.059
	[0.233]	[0.234]	[0.233]		[0.235]	[0.229]
Real exchange rate	0.677***	0.755***	0.762***	0.742***		0.678***
	[0.116]	[0.115]	[0.114]	[0.115]		[0.115]
Distance	-0.712***	-0.660***	-0.630***	-0.711***	-0.713***	
	[0.083]	[0.085]	[0.086]	[0.084]	[0.083]	
Contiguity	0.253	0.297	0.323*	0.255	0.253	
	[0.186]	[0.193]	[0.192]	[0.186]	[0.185]	
Common language	0.871***	0.875***	0.875***	0.870***	0.869***	
	[0.190]	[0.197]	[0.196]	[0.190]	[0.189]	
R-squared within	0.47	0.45	0.45	0.46	0.46	0.47
Observations	2660	2660	2660	2660	2660	2660
Number of panels	236	236	236	236	236	236

Random effects GLS estimates. Controls for year effects and country-host and country-source effects.

Robust clustered standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2 Gravity estimates for trade

	[1]	[2]	[3]	[4]	[5]
Within euro area	0.185***	0.145***	0.231***	0.185***	0.185***
1999-2001	[0.023]	[0.019]	[0.024]	[0.024]	[0.023]
Within euro area	0.233***	0.167***	0.275***	0.233***	0.233***
2002-2006	[0.023]	[0.018]	[0.024]	[0.024]	[0.023]
From euro area	0.092***	0.096***	0.106***	0.124***	0.094***
1999-2001	[0.021]	[0.019]	[0.021]	[0.022]	[0.021]
From euro area	0.113***	0.132***	0.126***	0.136***	0.115***
2002-2006	[0.022]	[0.019]	[0.022]	[0.023]	[0.022]
To euro area	0.079***	0.066***	0.110***	0.046*	0.081***
1999-2001	[0.025]	[0.020]	[0.026]	[0.025]	[0.025]
To euro area	0.109***	0.052***	0.138***	0.086***	0.111***
2002-2006	[0.024]	[0.019]	[0.025]	[0.025]	[0.024]
Within Single Market	-0.025		-0.016	-0.026	-0.03
1999-2001	[0.032]		[0.033]	[0.035]	[0.037]
Within Single Market	-0.074**		-0.081**	-0.075**	-0.079**
2002-2006	[0.031]		[0.032]	[0.033]	[0.034]
From Single Market	0.021		0.026	0.003	0.013
1999-2001	[0.036]		[0.037]	[0.039]	[0.041]
From Single Market	-0.060*		-0.065*	-0.048	-0.068*
2002-2006	[0.035]		[0.036]	[0.036]	[0.037]
To Single Market	0.046		0.047	0.061*	0.038
1999-2001	[0.032]		[0.033]	[0.036]	[0.037]
To Single Market	0.065**		0.062*	0.051	0.057*
2002-2006	[0.031]		[0.033]	[0.034]	[0.034]
Source country GDP	0.535***	0.531***		0.498***	0.535***
	[0.078]	[0.081]		[0.081]	[0.079]
Host country GDP	1.110***	1.118***		1.147***	1.110***
	[0.071]	[0.071]		[0.076]	[0.072]
Real exchange rate	-0.599***	-0.584***	-0.608***		-0.599***
	[0.033]	[0.033]	[0.035]		[0.033]
Distance	-0.952***	-0.942***	-0.952***	-0.952***	
	[0.041]	[0.042]	[0.041]	[0.042]	
Contiguity	0.221***	0.230***	0.221***	0.221***	
	[0.083]	[0.086]	[0.081]	[0.084]	
Common language	0.314***	0.314***	0.314***	0.314***	
	[0.095]	[0.099]	[0.097]	[0.097]	
R-squared within	0.49	0.48	0.44	0.44	0.49
Observations	4560	4560	4560	4560	4560
Number of panel	380	380	380	380	380

Random effects GLS estimates. Controls for year effects and country-host and country-source effects. Robust clustered standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3 Robustness check: Excluding single countries

	Incl. ALL	Austria	Belgium	Finland	France	Germany	Ireland	Italy	Holland	Portugal	Spain
Within euro area	-0.163	-0.063	-0.15	-0.190*	-0.115	-0.174	-0.151	-0.215**	-0.198*	-0.225**	-0.142
1999-2001	[0.103]	[0.102]	[0.104]	[0.110]	[0.115]	[0.114]	[0.106]	[0.109]	[0.116]	[0.097]	[0.109]
Within euro area	-0.062	-0.023	-0.047	-0.042	-0.032	-0.043	-0.027	-0.019	-0.122	-0.174*	-0.05
2002-2006	[0.093]	[0.094]	[0.094]	[0.100]	[0.102]	[0.100]	[0.095]	[0.100]	[0.104]	[0.089]	[0.098]
From euro area	-0.052	-0.125	-0.049	-0.069	-0.102	-0.004	-0.046	-0.042	0.018	-0.08	-0.053
1999-2001	[0.094]	[0.096]	[0.095]	[0.094]	[0.097]	[0.100]	[0.095]	[0.098]	[0.100]	[0.096]	[0.095]
From euro area	-0.135	-0.182**	-0.134	-0.043	-0.296***	-0.097	-0.137	-0.064	-0.1	-0.176*	-0.137
2002-2006	[0.089]	[0.089]	[0.090]	[0.092]	[0.091]	[0.094]	[0.090]	[0.092]	[0.096]	[0.091]	[0.090]
To euro area	-0.293***	-0.281***	-0.298***	-0.279***	-0.293***	-0.273***	-0.318***	-0.257***	-0.340***	-0.252***	-0.293***
1999-2001	[0.087]	[0.088]	[0.088]	[0.089]	[0.089]	[0.090]	[0.088]	[0.088]	[0.090]	[0.088]	[0.089]
To euro area	-0.191**	-0.182**	-0.195**	-0.214***	-0.171**	-0.190**	-0.195**	-0.141*	-0.207***	-0.136*	-0.218***
2002-2006	[0.075]	[0.076]	[0.076]	[0.076]	[0.076]	[0.078]	[0.076]	[0.077]	[0.078]	[0.075]	[0.076]
Within Single Market	0.524***	0.505***	0.527***	0.514***	0.532***	0.509***	0.524***	0.533***	0.538***	0.552***	0.531***
1999-2001	[0.103]	[0.103]	[0.104]	[0.104]	[0.104]	[0.106]	[0.104]	[0.104]	[0.106]	[0.104]	[0.104]
Within Single Market	0.745***	0.717***	0.750***	0.769***	0.728***	0.733***	0.749***	0.703***	0.748***	0.810***	0.749***
2002-2006	[0.104]	[0.103]	[0.104]	[0.104]	[0.104]	[0.107]	[0.105]	[0.105]	[0.106]	[0.104]	[0.105]
From Single Market	0.403***	0.428***	0.407***	0.404***	0.396***	0.399***	0.401***	0.424***	0.406***	0.419***	0.402***
1999-2001	[0.112]	[0.113]	[0.112]	[0.112]	[0.114]	[0.115]	[0.112]	[0.114]	[0.115]	[0.113]	[0.112]
From Single Market	0.653***	0.681***	0.656***	0.664***	0.660***	0.663***	0.648***	0.665***	0.668***	0.671***	0.650***
2002-2006	[0.113]	[0.113]	[0.113]	[0.114]	[0.115]	[0.116]	[0.114]	[0.115]	[0.116]	[0.114]	[0.114]
To Single Market	0.419***	0.408***	0.417***	0.432***	0.427***	0.431***	0.410***	0.385***	0.409***	0.405***	0.405***
1999-2001	[0.105]	[0.105]	[0.106]	[0.106]	[0.106]	[0.107]	[0.106]	[0.106]	[0.107]	[0.105]	[0.106]
To Single Market	0.601***	0.599***	0.595***	0.618***	0.586***	0.599***	0.589***	0.599***	0.581***	0.582***	0.589***
2002-2006	[0.100]	[0.100]	[0.100]	[0.101]	[0.101]	[0.102]	[0.101]	[0.101]	[0.102]	[0.100]	[0.101]
R-squared within	0.47	0.49	0.48	0.45	0.46	0.46	0.47	0.47	0.44	0.49	0.46
Observations	2660	2384	2593	2385	2307	2306	2527	2393	2300	2420	2503
Number of panels	236	211	230	212	205	204	224	213	205	214	222

Random effects GLS estimates. Controls for year , country-host and country-source, GDP or host and source country, real exchange rate, distance, language, cont..

Robust clustered standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3 Robustness check: Excluding single countries [continued]

	Denmark	Sweden	UK	Norway	Switzerland	Australia	Canada	Japan	New Zeal.	U.S.A.
Within euro area	-0.269**	-0.011	-0.176	-0.18	-0.143	-0.177*	-0.172	-0.151	-0.180*	-0.183
1999-2001	[0.116]	[0.108]	[0.131]	[0.122]	[0.108]	[0.105]	[0.108]	[0.103]	[0.104]	[0.112]
Within euro area	-0.077	0.137	-0.300**	-0.083	-0.034	-0.081	-0.047	-0.053	-0.062	-0.085
2002-2006	[0.105]	[0.097]	[0.118]	[0.109]	[0.097]	[0.095]	[0.097]	[0.094]	[0.094]	[0.102]
From euro area	-0.104	-0.05	-0.059	-0.014	0.037	-0.068	-0.058	-0.046	-0.075	-0.075
1999-2001	[0.109]	[0.101]	[0.125]	[0.109]	[0.099]	[0.096]	[0.101]	[0.098]	[0.097]	[0.106]
From euro area	-0.137	-0.135	-0.348***	-0.007	-0.037	-0.14	-0.104	-0.148	-0.13	-0.167*
2002-2006	[0.103]	[0.096]	[0.112]	[0.103]	[0.092]	[0.091]	[0.094]	[0.093]	[0.091]	[0.100]
To euro area	-0.373***	-0.139	-0.397***	-0.189*	-0.330***	-0.302***	-0.314***	-0.290***	-0.303***	-0.336***
1999-2001	[0.103]	[0.086]	[0.121]	[0.103]	[0.096]	[0.089]	[0.093]	[0.083]	[0.088]	[0.102]
To euro area	-0.263***	0.006	-0.447***	-0.071	-0.202**	-0.221***	-0.175**	-0.183**	-0.190**	-0.237***
2002-2006	[0.088]	[0.075]	[0.103]	[0.085]	[0.082]	[0.077]	[0.081]	[0.075]	[0.076]	[0.088]
Within Single Market	0.624***	0.368***	0.522***	0.544***	0.516***	0.551***	0.512***	0.515***	0.462***	0.624***
1999-2001	[0.116]	[0.108]	[0.132]	[0.122]	[0.115]	[0.118]	[0.114]	[0.115]	[0.100]	[0.127]
Within Single Market	0.756***	0.552***	0.981***	0.772***	0.740***	0.892***	0.685***	0.746***	0.527***	0.871***
2002-2006	[0.114]	[0.107]	[0.127]	[0.117]	[0.109]	[0.122]	[0.117]	[0.124]	[0.099]	[0.134]
From Single Market	0.417***	0.386***	0.422***	0.339***	0.373***	0.376***	0.405***	0.433***	0.371***	0.474***
1999-2001	[0.124]	[0.115]	[0.139]	[0.122]	[0.122]	[0.125]	[0.125]	[0.129]	[0.112]	[0.137]
From Single Market	0.644***	0.658***	0.892***	0.444***	0.589***	0.751***	0.601***	0.705***	0.431***	0.812***
2002-2006	[0.124]	[0.116]	[0.132]	[0.122]	[0.115]	[0.131]	[0.129]	[0.138]	[0.110]	[0.146]
To Single Market	0.482***	0.287***	0.546***	0.362***	0.448***	0.474***	0.386***	0.416***	0.348***	0.532***
1999-2001	[0.118]	[0.098]	[0.137]	[0.116]	[0.124]	[0.121]	[0.118]	[0.110]	[0.101]	[0.136]
To Single Market	0.645***	0.415***	0.859***	0.536***	0.703***	0.749***	0.474***	0.574***	0.382***	0.803***
2002-2006	[0.111]	[0.096]	[0.123]	[0.107]	[0.109]	[0.119]	[0.116]	[0.118]	[0.094]	[0.134]
R-squared within	0.48	0.45	0.47	0.47	0.48	0.48	0.48	0.49	0.49	0.46
Observations	2382	2511	2287	2365	2308	2426	2292	2381	2536	2274
Number of panels	208	223	204	209	206	215	204	211	225	203

Random effects GLS estimates. Controls for year , country-host and country-source, GDP or host and source country, real exchange rate, distance, language, cont.. Robust clustered standard errors in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4 Robustness check: Number of observations per panel

	1 to 12	9 to 12	10 to 12	11 to 12	12
Within euro area	-0.155*	-0.163	-0.13	-0.168	-0.018
1999-2001	[0.093]	[0.103]	[0.112]	[0.105]	[0.133]
Within euro area	-0.092	-0.062	-0.052	-0.131	-0.011
2002-2006	[0.091]	[0.093]	[0.099]	[0.095]	[0.119]
From euro area	-0.014	-0.052	0.005	0.001	0.057
1999-2001	[0.087]	[0.094]	[0.105]	[0.105]	[0.127]
From euro area	-0.027	-0.135	-0.095	-0.096	0.094
2002-2006	[0.090]	[0.089]	[0.098]	[0.098]	[0.121]
To euro area	-0.233***	-0.293***	-0.226**	-0.233**	-0.029
1999-2001	[0.080]	[0.087]	[0.093]	[0.093]	[0.094]
To euro area	-0.217***	-0.191**	-0.228***	-0.230***	0.009
2002-2006	[0.075]	[0.075]	[0.078]	[0.078]	[0.083]
Within Single Market	0.480***	0.524***	0.472***	0.471***	0.445***
1999-2001	[0.101]	[0.103]	[0.111]	[0.112]	[0.139]
Within Single Market	0.833***	0.745***	0.702***	0.679***	0.561***
2002-2006	[0.111]	[0.104]	[0.109]	[0.110]	[0.136]
From Single Market	0.387***	0.403***	0.335***	0.333***	0.296**
1999-2001	[0.106]	[0.112]	[0.122]	[0.123]	[0.141]
From Single Market	0.668***	0.653***	0.616***	0.594***	0.241
2002-2006	[0.119]	[0.113]	[0.122]	[0.122]	[0.149]
To Single Market	0.366***	0.419***	0.401***	0.395***	0.262**
1999-2001	[0.104]	[0.105]	[0.108]	[0.109]	[0.110]
To Single Market	0.628***	0.601***	0.602***	0.578***	0.353***
2002-2006	[0.110]	[0.100]	[0.101]	[0.102]	[0.117]
Source country GDP	1.447***	1.675***	1.722***	1.733***	1.294**
	[0.415]	[0.391]	[0.398]	[0.396]	[0.529]
Host country GDP	-0.036	0.056	0.208	0.292	0.379
	[0.236]	[0.233]	[0.242]	[0.237]	[0.263]
Real exchange rate	0.741***	0.677***	0.645***	0.637***	0.687***
	[0.118]	[0.116]	[0.118]	[0.113]	[0.141]
Distance	-0.960***	-0.712***	-0.640***	-0.687***	-0.663***
	[0.095]	[0.083]	[0.085]	[0.086]	[0.107]
Contiguity	0.052	0.253	0.395**	0.372*	-0.405
	[0.187]	[0.186]	[0.195]	[0.201]	[0.320]
Common language	0.894***	0.871***	0.784***	0.711***	1.025***
	[0.198]	[0.190]	[0.198]	[0.208]	[0.259]
R-squared within	0.4	0.47	0.47	0.49	0.52
R-squared between	0.83	0.85	0.86	0.87	0.89
R-squared overall	0.8	0.82	0.83	0.83	0.85
Observations	3161	2660	2444	2394	1404
Number of panels	328	236	212	207	117

Random effects GLS estimates. Controls for year effects and country-host and country-source effects.

Robust clustered standard errors in brackets.

* significant at 10%; ** significant at 5%; *** significant at 1%