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# EMU MEMBERSHIP, TRADE AND INVESTMENT FLOWS

## Enhancement Beyond The Single Market Effects?

**Bharat Barot♣ P., Nandakumar• & Cheick Wagué♠**

♣ Professor, Swedish National Institute of Economic Research, Stockholm, Sweden
• **Professor, Indian Institute of Management Kozhikode**, Calicut – 673 571, India (Email: nanda@iimk.ac.in)
♠ Professor, South Stockholm University College, Södertörn, Sweden

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## ABSTRACT

One of the key arguments advanced in support of entry into the EMU by hesitant countries is the expected increase in trade volumes. Previous work on measuring the impact of EMU membership on trade has usually captured the effect using the Gravity Model of trade and dummies representing membership status. Results obtained vary widely from a 5% trade effect to almost 200% in the original contribution. This paper adopts a new approach by analyzing the effect on trade due to increased investment flows in the wake of actual or expected membership. The final impacts on trade thus traced are close to the estimates on the higher side in the previous studies. The coefficients for country and partner GDP product, FDI product and geographical distance are all highly significant, and FDI inflows are seen to have a strong impact, with an elasticity of 0.42, on bilateral trade.



**Keywords**: EMU, trade, investments flows, FDI, single market.

# I. Introduction

One of the key arguments advanced in favor of entry into the European Monetary Union (EMU) by the countries hesitating at the threshold is the (certain) prospect of increase in trade volumes. The projected increases in trade volumes arising from a currency union membership – not restricted to the EMU or even to the current Century – differ widely between studies. In these aggregate studies, the final quantitative results on the impact on trade range from 200 percent in Rose [2000], to 15 – 66 percent in Persson [2001] and to just 5 to 10 percent in Micco et.al., [2003]. The Gravity Model underlies most of these analyses, which do not encompass the effects on the structure of trade and the underlying channels of influence. In this paper, the interaction – the substitution and the complimenting effect – between trade and foreign direct investment is highlighted as one of the driving forces at work as integration proceeds within Europe.

The plan of the paper is as follows. The next section discusses related literature and provides the backdrop of the study. The subsequent section sets up the models or equations to be estimated, describing the data and the relationships. Section IV provides details of the empirical results, relating those to existing results and conclusions in the literature. There is a final, concluding section.

# II. Related Literature and Background of the Study

Studies on the effect on currency unions on trade are of very recent vintage, probably dating back only to Rose [2000], who seems to have prompted (or provoked!) a number of further analyses as well as responses to his results. However, the topic may have been addressed in an indirect fashion even earlier, in the work that relates volatility in exchange rates to trade volumes. The 'indirect' link to currency unions arises from the observation that individual country exchange rate volatility disappears on entry into a monetary union.

However, it may be added, exchange rate volatility remains with respect to outside currencies like the dollar, though vanquished at one stroke against fellow-union members. Thus, it is not evident that *total* exchange rate variability is reduced, as Bergström [1999] points out for the case of Sweden.

## The effects of exchange rate variability

Most work on the real effects of exchange rate variability has focused on the *trade* effects. A comprehensive survey of this literature is available in Edison and Melvin [1990]. Studies have used developed country as well as developing country data, and the conclusions are not all that crystal-clear; though there may well be a preponderance of studies that throw up negative effects on trade of increased exchange rate volatility. The influential studies by Edison and Melvin [1990] as well as IMF [1984] do not substantiate these negative effects on trade, but leave open the possibility of such an influence from longer-term instability in exchange rates (in the short-term, strategic decisions have been already taken by firms).

The theoretical underpinnings of the argument in favor of the negative trade volume effects rest on risk aversion. Exchange rate volatility, quite simply, through increased risk, decreases trade volumes - and increases trade prices. The argument in favor of a positive effect on trade volumes is but a step behind: the risk of variability can be insured (hedged) against, then opening up the possibility of reaping the benefits of exchange rate volatility. Broll and Eckwert [1999] show that if the market structure allows the firm to view it's exports as an option, then larger stochastic fluctuations of the exchange rate allows a firm to view it's exports as an option, stimulating it's export production activity.

The effects of exchange rate volatility has been studied for the Bretton Woods fixed exchange rate period also, and not just for the flexible rates regimes that have been predominant since then. The first period, one of low exchange rate volatility, did not exhibit any marked relationship between instability in exchange rates and trade volumes. The analyses concentrating on the post-Bretton Woods period, such as Hooper and Kohlhagen [1978] have established the negative trade volume effect at least for *some* bilateral country trade flows involving the US, as well as between European Community members. It has been suggested that if pre-ERM levels of exchange rate volatility had prevailed in the late 1980s, German, Italian and Belgian exports would have suffered, falling as much as 4%. Another striking finding is that - even for the same kind of exchange rate regime - the choice of the period is clearly vital, with the effects even changing signs across periods. It must have to do partly with the fact that the degree of exchange rate volatility has varied across time even within arrangements such as the ERM.

It may also be worth noting that the work on the real effects of exchange rate variability has been, with just a few exceptions, time series analyses in nature. This has posed some problems. Sekkat [1998] points out that co-integration tests do not confirm a long-run relationship between exchange rate variability and trade volumes. The long-run structural determinants of the growth in trade volumes are, he points out as to be expected, costs and national incomes. He does, however, come up with short-run negative effects of exchange rate volatility on export and import volumes.

Cross-section studies on the real effects of exchange rate volatility have been conducted by De Grauwe [1987] and De Grauwe and De Bellefroid [1989] using volatility measures compiled using low-frequency, annual, exchange rate data, in contrast with the high frequency, monthly, data used in the time series studies. Their sample includes industrial countries, and trade flows are also assumed to be influenced by income variables, oil shocks and trade arrangements (isolated by dummies), and increased exchange rate variability is found to have a negative effect on the growth rate of trade.

On balance, the literature seems to show that exchange rate volatility does have a negative effect on trade volumes, but the negligible effects in some of the latest available studies may be due to the possibility of hedging actively against exchange rate risk. Thus the link from currency union through the impact on exchange rate risk through to trade volumes may be a very weak peg to hang up any firm conclusions about EMU membership and trade enhancement.

The relevance of exchange rate variability for domestic and international investment flows has also figured in the literature. The argument for a significant effect in this context hinges on exchange rate -induced incentives to locate investment outside the volatile environment. Risk-averse firms can be expected to have their utility from expected profits decreasing in increased variability, which is affected in turn by exchange rate volatility. Capa and Goldberg [1995] have found that exchange rate variability is associated with reduced manufacturing sector investment in the U.S.A. Goldberg and Kolstad [1995], working with time series data for bilateral FDI flows between the U.S., Canada, U.K and Japan, find that increased exchange rate volatility does increase the share of productive investment located abroad, i.e., outward FDI. Goldberg [1993] concludes that exchange rate volatility has had mixed effects on FDI flows, contracting investment in some sectors. Batavia, Nandakumar and Wagué

[2003] find that inward FDI flows are affected negatively by increased exchange rate variability, working with a cross-section sample of fifty-two countries. It may be noted that this effect could persist even if exchange rate volatility within the union is effectively removed, as there would be volatility against the dollar, as is also implied in the analysis by Sekkat and Galagau [2001].

## Foreign direct investment and trade volumes

Generally speaking, FDI flows can be either trade creating or trade substituting. More often than not, the representative agent's internationalization choice has been considered to involve a choice between the alternatives of trade or foreign direct investment, as in the original Mundell contribution [see, for instance, also Bartlett, 1992]. From this perspective, trade and capital movements can be traced to differences in factor endowments, with capital-rich countries producing capital-intensive goods. Technology also gets a slot as a country-specific endowment, and the approach is really suitable only for inter-industry – and not for intra-industry trade. The presence of trade barriers creates incentives for tariff-jumping FDI so that international investment flows and trade exhibit a substituting, rather than a complimentary relation. A lot of the theoretical work in this area has tended to focus on trade-replacement, such as the Product Cycle Model of Vernon [1966], and models of transition from exporting or licensing to foreign direct investment [see Buckely and Casson, 1981]. However, the empirical evidence favoring a net trade-creation effect is quite impressive, represented in studies such as Lipsey and Weiss [1981, 1984], Lipsey et al., [2000].

FDI flows which are market seeking in the host country are usually of the trade-substituting kind. But even though final-product trade between home and host countries is displaced, there could arise a new trade in intermediate and complementary products. Foreign direct investment, which is resource seeking and internationally integrating, contrasts sharply with the market-seeking type. Resource or asset -seeking flows seize upon the opportunity to exploit locational advantages, including the presence of assets such as skilled labor, to reach the widened market in a regional trading arrangement, and are usually of the trade-creating kind. So are FDI flows, which seek to internalize company-specific advantages and seek international integration of production operations. Multinational firms are found to have an advantage over purely national enterprises when globalization cuts across markets with similar (high) incomes. In the presence of multiple-product firms with differentiated technologies, trade is motivated by firm-specific differences in technological capabilities, and

is often intra-industry in nature, with exports and FDI being complementary channels [see Cantwell, 1994]. The new trade theory, representing the industrial organization approach to trade, does portray the importance of industrial structure as a major determinant of inward FDI [see Markusen and Venables, 1998].

A recent study by Sekkat and Galgau [2001] concludes that EU membership has had a strong effect on FDI flows within the Single Market[1]. Work at the OECD Secretariat [1999, 2003] also suggests that free-trade areas tend, on balance, to encourage FDI among members as well in relation to outside countries, even as the volume of trade is being greatly expanded within the union. Economies of scale are reaped through 'horizontal' FDI flows which replicate production of the same items in host and home countries. Reduction in trade costs (which in itself would depress FDI in favor of trade) in the integrated area encourages 'vertical' FDI flows which fragments the production of items into stages located in different countries, aimed at re-exports of intermediate – and final – goods into home and other member countries. Pain [1997] and Pain and Lansbury [1997] have found that FDI is increased substantially by EU membership, the accentuated response in the European Union being possible due to closer integration than in other free-trade areas like NAFTA, where there are stricter rules of origin and higher average tariffs.

The Single Market may have served to remove 'false' comparative advantages that were generated by single country home markets, affecting the structure of trade. Studies on Sweden show that prior to the process of integration she traded on the basis of such a comparative advantage in energy-based production. The structure of Swedish trade changed quite dramatically after entry into the European Union, new comparative advantages in skill and knowledge-based production being revealed as economies of scale based on the expanded 'home' market. Importantly, it could be noted that it was intra-industry trade, which stood for the lion's share of the expansion in trade once the process of integration was set rolling. The same period also witnessed a large increase in foreign direct investment flows into Sweden.

[1] They found that the FDI inflows were pronounced for the smaller EU countries, whereas larger countries like Germany and Italy did not seem to benefit from accelerated FDI inflows due to the Single Market. The authors conclude that the later FDI inflow increase into these large countries was due to country-specific structural factors.

Thus, on the face of this evidence (for a fairly late entrant into the European Union), and the analyses quoted earlier, it does seem that trade and FDI are complements, with the expansion in trade tending to be of the skill and knowledge-intensive, intra-industry type. It seems important, therefore, to introduce this link – though the direction of the causal link is not self-evident – into estimations of the trade volume impacts following the creation of the Single Market and the Single Currency. This is attempted in the present paper, the estimating equations being detailed in section IV.

There have been various attempts already, as briefly referred to in the introductory section earlier, to estimate the trade-creation effects (not a hint at trade-substituting effects, and rightly too, in the EU context!) of currency unions. These have inevitably used currency union dummies to capture the effects of union membership. Rose [2000] was the one who probably sparked off the growing amount of work in this area, with his first analysis including 186 countries, with data dating back to the early Seventies. . His first study, which was a cross-section analysis, could identify the positive impact on countries that had adopted a common currency, but is not geared to quantify the increase in trade accruing to a specific country because of the entry into a currency union. In the present paper, an attempt is made to quantify the gains accruing (to specific countries) due to EMU membership, as compared to a Single Market member status only.

Almost all the existing studies seem to have looked at the pre-EMU period. Glick and Rose use panel data for the period 1948 – 1997, and are able to compare the impact on country pairs during periods with and without currency unions, but the analysis does not provide information on the EMU as such, halting prior to the formation date. Rose and Van Wincoop [2000] also work with pre-EMU unions and non-EU nations, and arrive at a figure of a *potential positive* EMU impact on trade of around 60 percent, much lower than Rose's [2000] three-figure number.

Micco et.al., [2003] is an exception in the sense that the authors study the EU countries and evidence from the early years of the currency union in Europe. Basically they adopt the Gravity Model of Trade, as in the original Rose article, but study the effect over time, using data for the 1992-2002 period. Single Market and currency union dummies are used. The impact of shared membership for country pairs are found to range from 5 to 10 percent only.

The complementary relation between trade and investment is being stressed in this present study on EMU effects as a *new* approach, but the link does seem to have been identified in a contemporaneous paper by Yetman [2003]. An earlier study by Fontagne and Pajot [1997] also looks at the relation between trade, investment flows and competitiveness, for bilateral relations predominantly involving France.

Following Rose and Van Wincoop [2001] who argues that entering a currency union may result in a reduction in trade resistance between members, Yetman [2003] introduces the possibility of a reduction in investment resistance. With a reduction in investment resistance, entrepreneurs within the union are more likely to produce in other union countries to serve the markets within and outside the union. The result is that trade unambiguously increases between currency union countries and outsiders, while the result for the trade impact within the union is ambiguous. The effect of a reduction in investment resistance is captured by a dummy variable representing joint membership in the currency union by a country pair.

In this paper, the relation between trade and foreign direct investment flows, as well as the influence of currency union membership on attracting investment inflows, is modeled explicitly, using recent data for the period after the formation of the monetary union. The effects of the single market membership are captured separately, to see if the impacts of the final, irrevocable decision to enter the monetary union can be weeded out.

The plan of the paper is as follows. The next section sets up the models or the equations to be estimated. Section IV provides details of the empirical results, relating those to existing results and conclusions in the literature. There is a final, concluding section.

## III. Data and Econometric Methodology

The data set consists of annual observations under scrutiny, with bilateral trade data available from OECD sources while IMF sources provided all other required data. The panel data for the different EMU countries here is treated as time series by pooling the observations. The three fundamental variables under scrutiny based on the gravity model are as follows: (1) Bilateral trade, (2) foreign direct investment, and finally, (3) GDP of the EMU countries.

In the empirical verification of the pooled time series model we utilize the Error Correction Method (ECM). This approach implies linking equations formulated in levels presenting the

long-run component of the model and with those formulated in differences, representing the short-run component. The notion of the long run is inextricably linked with the concept of equilibrium in economics. The long-run steady state relationship is usually based on the solution of an inter-temporal optimization problem. The basic structure of ECM is based on two fundamental tests, i.e. the Augmented Dickey-Fuller [1981] test (the unit root test) often called the test for the order of integration and the Johansen et al. [1990] test for co-integration.

## Integration and Co-integration

As a preliminary step to co-integration analysis, the order of integration of the data set is to be tested. Several procedures are available [Dolado et al. 1990], for a survey. The results of the ADF test are presented in table 1 and for co-integration in table 2.

In the tables 1 and 2, the critical values are at 5% and 1% significance level. The asterisks * and ** denote significance at 95% and 99% significance level. The order of the VAR is 4. Variables entered unrestricted are constant. Trend has been used but did not give much different results. The results indicate that there are at least two co-integrating vector according to the Johansen's test. If there is one co integration relationship, it may be easier to interpret it as a long-run relationship. For the Johansen method, there is two test statistics for the number of co-integrating vectors: the trace and maximum eigenvalue statistics. In the trace test, the null hypothesis is that the number of cointegrating vectors is less than or equal to p, where p is 0, 1 or 2. In each case the null hypothesis is tested against the general alternative. The maximum eigenvalue test is similar, except that the alternative hypothesis is explict. The null hypothesis p = 0 is tested against the alternative that p= 1, p =1 against the alternative p = 2.

The long run relationship according to the standardized beta eigen vectors is presented below:

$$[0] \quad \ln(V_{ij}) = 0.43 * \ln(I_i * I_j) + 0.82 * \ln(Y_i * Y_j)$$

# IV. The Models for Estimation

The basic hypothesis we test relates to the link running from EMU entry through increased foreign investment flows to enhanced trade volumes. A comprehensive equation where the Gravity Model of trade, in a *cross-section analysis*, is complemented by relevant membership and distance dummies and the impact of FDI inflows is presented below. This model has

many of the elements in Rose [2000], Persson [2001] etc., together with the additional channel working through investment flows. The inclusion of investment flows into *both* the trading partners seems necessary; in fact, there is a view that even investment outflows can determine trade volumes of a country [Fontagne and Pajot, 1997]. Thus, the estimated equation, in *cross-section mode*, is

[1]

$$V_{ij} = \alpha_0 + \alpha_1 (Y_i * Y_j) + \alpha_2 (I_i * I_j) + \alpha_3 * EMUD + \alpha_4 * DISTD + \varepsilon_1$$

In equation 1), $V_{ij}$ represents the bilateral (total) trade flow between the country pairs *i* and *j*, during the chosen period, 2001 – 2003. The second term $(Y_i * Y_j)$ is the product of the country GDP figures, while the next term $(I_i * I_j)$ is the product of the foreign direct investment flows into the two trading partners. Nominal values were deflated by a common denominator, as is the common practice, the U.S GDP deflator. EMUD is a dummy representing monetary union membership for the country pair, with a value of 1 or zero. We have chosen to work with a distance dummy DISTD that takes different values for countries lying adjacent to one another and pairs that are not neighbors, instead of feeding in actual geographical distances.

Please note that equation 1 is a cross-section model, which includes all bilateral trade flows between all EMU country pairs as well as the trade relation involving other EU countries, which are not part of the monetary union. We have also chosen to include Switzerland in the sample. Equation below is a similar equation, but involving total trade flows of all European Union countries, so that the sample size is much smaller:

[2] $$V_{iT} = \beta_0 + \beta_1 * I_i + \beta_2 * Y_i + \beta_3 * EMUD + \varepsilon_2$$

Equation 2 is, again, a cross-section representation. $V_{iT}$ stands for the total trade of the respective country with the rest of the EU block. Being an equation for total, rather than bilateral trade flows, the FDI and GDP variables are single country figures rather than country products. In such equations as well as in bilateral trade equations, per capita GDP figures or products are also sometimes used, but the dominant effect is usually that of aggregate GDP, so that we do not incorporate a separate GDP per capita variable. The EMU dummy in equation 2) now represents single country membership, not that of a country pair. Exchange rate volatility has not been included as a determinant of bilateral or total trade volumes, given the inconclusive nature of results obtained using this variable in other recent studies.

We proceed now to test for the possible impact of European economic and monetary integration on foreign direct investment flows between member countries as well as from outside the union. In traditional models of the determinants of foreign direct investment inflows, usually cross-sectional in nature, fundamental macroeconomic variables like real GDP and GDP per capita figure significantly. The country GDP *may* be becoming less significant in FDI determination for European Union countries, as shown by Batavia, Nandakumar and Wagué [2003]. While host country market size has become superfluous in the era of economic integration, localization variables, which are of the asset-seeking type, such as skill-intensity in the economy, may have become more significant in the last decade. However, there is a lack of a string of such studies, which conclusively demonstrate the rising predominance of human capital and skill-intensity capturing variables as determinants of international direct investment flows.

Wage or unit labor costs also seem to be insignificant for EU countries in recent studies of the determinants of FDI inflows [Batavia, Nandakumar and Wagué 2003]. Interest rate differentials ought to be significant only for portfolio inflows. Hence we chose to work with an equation for foreign direct investment flows which incorporates the traditionally dominant variable GDP, adding on a variable, a dummy, that can capture increased investment flows arising from membership in the monetary union. We first run the test using the FDI product variable, which is used as an explanatory variable in the equation for bilateral trade flows, and then also use the relationship to estimate investment flows into individual countries.

$$[3] \quad I_i * I_j = \gamma_0 + \gamma_1 (Y_i * Y_j) + \gamma_3 * EMUD + \varepsilon_3$$

The EMU dummy in equation 3) is used to capture the possible enhancing effect of monetary union membership on investment flows from other countries in the EU block. A similar equation is run for individual country FDI inflows:

$$[4] \quad I_i = \lambda_0 + \lambda_1 * Y_i + \lambda_2 * EMUD + \varepsilon_4$$

Thus, equations 3 and 4 study the effects of monetary union membership on investment flows, while 1 and 2 analyze the impact of investment flows as well as that of any direct link from union membership on bilateral and total trade volumes.

# V. Empirical Results

Bilateral trade data was collected for the period 2001 – 2003 from the OECD publication 'Monthly Statistics of International Trade'. All other required data was available from the IMF publication 'International Financial Statistics' and from the IMF website.

Figures 1 to 11 below portray the trend in foreign direct investment flows to four countries in the EMU block, namely Belgium, Netherlands, Ireland and Spain. The diagrams are presented with a view to underline the fact that EMU membership, or, even the prospects of EMU membership, i.e., the expected entry into the monetary union, have a strong positive impact on international investment flows into the countries at the threshold of the union. It may be noted that when *expected* entry itself has an enhancing impact on FDI inflows, an EMU dummy, which captured current period effects, may not be fully appropriate to represent the phenomenon.

The impact of – imminent – membership in the monetary union on international direct investment flows can be clearly seen from these diagrams. The FDI inflows pick up sharply well before the date of entry [1999], between 1997 and 1998, after remaining fairly stagnant in the immediately preceding years. This indicates that the increase in the volume of trade attributed to the EMU dummy in earlier studies may be a lagged effect of the increased investment in anticipation of union membership. Taking a smaller sample of four countries, Belgium, Netherlands, Ireland and Spain, it may be noted that FDI inflows to these countries went up by an average of 844% between 1997 and 2000 and by 522% between 1997 and 1999. In contrast, the average increase between 1995 and 1997 in FDI inflows to these countries was only 23.5%. Thus EMU membership has had a strong effect on investment flows from abroad, with the upward trend beginning a couple of years prior to entry.

The results of the estimations of equations 1 to 4 are compactly presented in Table 3.

In Table 3, all the runs represented have been conducted in logarithmic terms. 't' values are within brackets, with three stars and two stars representing significance at 1% and 5% levels respectively.

Equation is the comprehensive equation relating bilateral trade flows in all EU countries and Switzerland to country GDPs, country FDI inflows, EMU membership and distance between trading partners. It is interesting to note, first of all, that the introduction of the FDI variable seems to make the EMU dummy insignificant, in contrast to earlier studies in this vein. The EMU membership effect may be being captured by the FDI term itself. The dummy for distance between trading pairs is strongly significant, as would be expected.

The coefficients for the GDP and the FDI inflow terms in equation 1 are also highly significant. The FDIPROD variable has a coefficient of 0.41. It may be instructive to relate this coefficient value to the observed increases in FDI flows in diagrams 1 to 11 as monetary union membership is anticipated. For the four countries (Belgium, Netherlands, Ireland and Spain) discussed earlier, FDI inflows went up by an average of 180% during 1997-98 as the entry date into the monetary union approached. Using this observed investment enhancement in equation 1 gives an effect on bilateral trade flows of 130%. Thus, the impact of – anticipated – EMU membership increases bilateral trade flows by 130% due to enhanced international investment flows. Taking the average of FDI increases to these countries for the period 1997 – 2000, the trade effect comes to more than 200%.

The version of equation 1 relating trade flows to FDI inflows alone also throw up a highly significant coefficient, with a fairly high R squared value. However, in equation 2, for total trade flows of individual countries, the coefficient for FDI inflows is lower, and it related to own FDI flows only, not to FDI inflows into trading partners. The increase in trade flows derived from this equation, for values of FDI inflows into the four countries in figures 1 to 3, would be around 75% for the year immediately preceding EMU membership – showing the effect of anticipated monetary union membership.

In equations 3 and 4, we fail to obtain any direct evidence of current EMU membership, represented by the EMU dummy, on direct investment flows, but the coefficients of the dummy are fairly close to being significant at the 10% level. This could be because, as is clear from diagrams 1 to 3, investment flows react to EMU membership even before the actual date of entry. The figures give an unambiguous picture of the positive fashion in which moving towards the monetary union enhances foreign direct investment flows into individual countries.

Our results point to a substantial effect of monetary union membership on trade flows, amounting to between 130 to 200%. These estimates are close to that obtained in Rose [2000], and much more than that obtained in other studies such as Persson [2001] and Micco et.al.[2003]. It may be noted that the effects in this study are derived through the reasoning through the impact of EMU membership on direct investment flows, and not captured solely through a dummy representing monetary integration.

# VI. Concluding Remarks

The experiences of countries at the time of entry into the European Union ought to have prepared the ground for analyses of the effects of the monetary union as well. In the case of Sweden for instance, entry into the European Union in 1994 gave rise to a large increase in foreign direct investment inflows, as 'false' comparative advantages formed due to the restrictive size of the home market were removed. There were also important structural effects with long-run implications, as investment flows seem to have been directed into knowledge and skill-intensive sectors.

It has been noted in this study that entry or anticipated entry into the EMU has increased FDI inflows just as experienced during the time of the formation of the Single Market. These enhanced investment inflows would have had a positive effect on trade volumes. In this paper, the relationship of trade flows to investment inflows has been modeled explicitly, and found to be strong and highly significant.

In contrast to other studies on this topic, which have used very large samples including countries in several continents and sometimes with non-union status, this study is limited to the countries within the EU – and Switzerland. One result of this sample choice has been that the dummy representing EMU membership does not give significant results; the effects of union membership is, instead, captured through the enhancement of investment flows, which in turn increases trade volumes. The effect of expected and actual membership in the monetary union on direct investment inflows is clearly noted for the countries in the sample, and the final impact on trade is obtained from the estimated equations relating trade and FDI inflows, along with other relevant variables.

The results of monetary union membership, working through enhanced investment flows, are quite large. The effect of anticipated EMU membership on trade works out to around 130%, while the longer-run [1997-2000] yearly average effect may be as high as 200%. In this respect, our results are closer to that of the original article by Rose [2000], than in studies that followed. It may be emphasized, however, that the effects on investment flows – and hence on trade volumes – seem to be tapering off, though not returning back all the way to pre-EMU levels.

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# APPENDIX

Figure 1

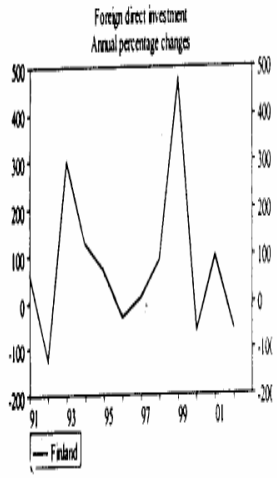


Figure 2

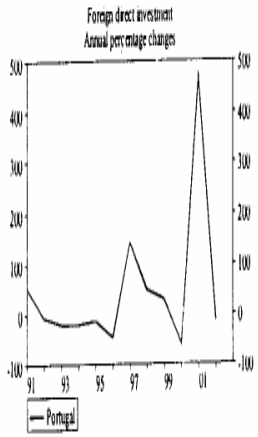


Figure 3

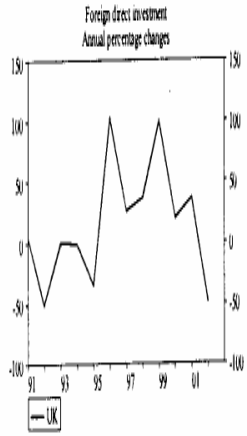


Figure 4

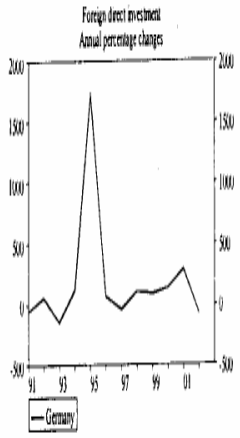


Figure 5

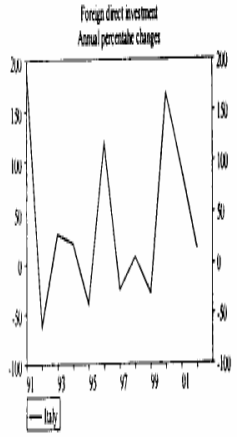


Figure 6

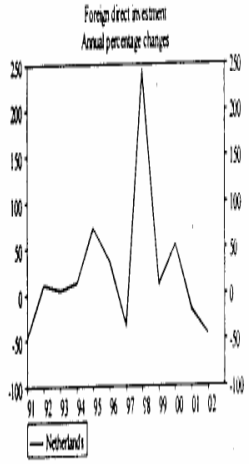


Figure 7

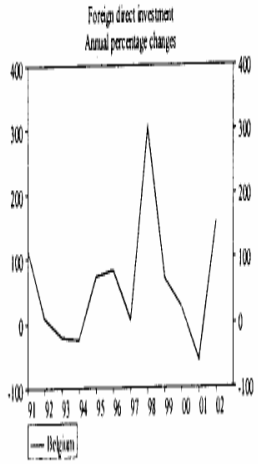


Figure 8

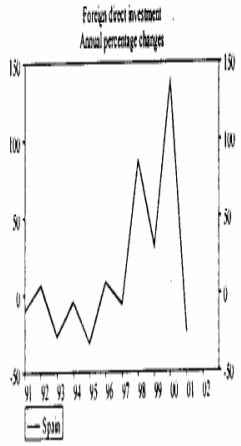


Figure 9

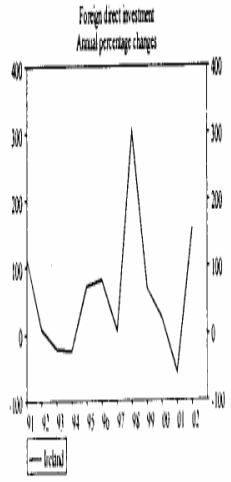


Figure 10

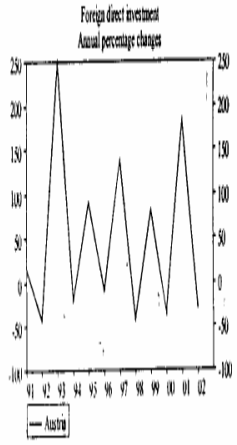


Figure 11

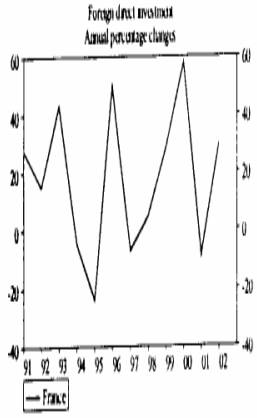

**Table 1: Augmented Dicky Fuller test**

| Variable | Constant | Constant and Trend |
|---|---|---|
| Bilateral trade ($V_{ij}$) | -3.20* | -3.33 |
| FDIPRODUCT ($I_i * I_j$) | -3.49** | -3.79* |
| GDPPRODUCT ($Y_i * Y_j$) | -2.70 | 2.70 |
| Critical Values | 5%=-3.43,1%=-4.00 | 5%=-2.87,1%=-3.46 |

**Table 2: Co-integration test**

| Null hypothesis | Max test | 95% critical values | Trace test | 95% critical values |
|---|---|---|---|---|
| p = = 0 | 44.62** | 21.0 | 86.19** | 29.7 |
| p < = 1 | 30.87** | 14.1 | 41.57** | 15.4 |
| p < =2 | 13.36** | 3.8 | 12.56** | 3.8 |

**Table 3: Estimates, Equations 1-4**

| Equation | Dependent variable | Constant | GDPPROD $(Y_i * Y_j)$ | FDIPROD $(I_i * I_j)$ | EMUD | DISTD | Adj R Squared |
|---|---|---|---|---|---|---|---|
| 1 | Bilateral Trade $V_{ij}$ | -7.66 (17.9***) | 0.629 (15.20***) | 0.4149 (11-.59***) | 0.13 (0.7234) | 0.5572 (6.03***) | 0.856 |
| 1 | Bilateral Trade $V_{ij}$ | -5.71 (9.039***) | | 0.8138 (18.93***) | | | 0.631 |
| 2 | Total Trade $V_i$ | 3.603 (7.20***) | (GDP) 0.5266 (5.145***) | (FDI) 0.349 (3.603**) | 0.1234 (0.698) | | 0.901 |
| 3 | FDIPROD $I_i * I_j$ | 5.6438 (7.811***) | 0.7434 (12.642***) | | -0.063 (0.399) | | 0.431 |
| 4 | FDI $(I_i)$ | -0.599 (0.177) | (GDP) 0.984 (1.699) | | 1.9304 (1.502) | | 0.255 |

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