Preliminary
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The Euro and Trade: Is there a Positive Effect?

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1. Introduction

Recently, there have been several studies that have examined the impact of the adoption of the euro on 1 January 1999 on intra-eurozone trade.[1] Despite there being only 5-6 years of data, a few studies find a positive impact in the range of 5-10%, which is both economically and statistically significant. These results are open to question, however, because they are not consistently confirmed by other research. This early outburst of empirical research, not only reflects the importance of this issue for prospective Economic and Monetary Union (EMU) members such as Sweden, the United Kingdom and the 10 countries that recently joined the European Union (and must eventually adopt the euro), but also that the formation of the EMU represents the ideal experiment with which to test the controversial finding of Andrew Rose (2000) that the existence of a common currency between two countries has a huge (over 300%) effect on their bilateral trade flows.[2] The EU is an economic union with relatively few barriers to trade, and from 1999-2004 consisted of 12 EMU members and 3 non-EMU members (the U.K. Sweden and Denmark); thus, in theory, it should be possible to identify the impact of the euro on trade.

The purpose of this paper is to review critically these recent studies and to probe the robustness of the results of the most well known of these studies, Micco, Stein and Ordonez (2003) [hereafter MSO], who find a significantly positive impact of 4-16% of the euro on intra-eurozone trade, depending on the specification of their equation and comparison group they choose.[3] They also find that intra-eurozone trade began to increase in 1998, the year before the euro came into force. In this paper, we focus on three issues with respect to this study: one, we add three more years of EMU data, 2003-5, to their sample of 1999-2002; two, we also extend the sample backwards from 1992 to 1980; and three we try alternative specifications to control for different trends in trade integration among the EU countries that joined the EMU and between the EMU members and the three countries that did not adopt the euro.

[1] In 1999, 11 countries adopted the euro (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Portugal, and Spain). Greece joined the EMU in 2001.
[2] Rose's original (and incredible) estimate of the impact of a common currency on bilateral trade flows published in Rose (2000) has since been reduced to somewhere between 50-100%. See Rose (2004) for more details.
[3] Baldwin (2006) also provides a comprehensive of these euro-centred studies as well as of the "Rose effect".

We find that the results of MSO (2003) on the timing of the EMU effect on trade are very sensitive to the sample length. In particular, a serious problem with their short sample length and their methodology is that they are unable to discriminate between the effect of the euro and the effect of EU integration on trade. Indeed, too much of the impact of ongoing economic integration in Europe via the liberalization of trade and factor flows seems to be attributed to the adoption of a common currency. In most of their preferred specifications, being a member of the EU or an FTA has no significant impact on trade. We find, however, that if the starting point of their sample is extended back from 1992 to 1980 that most of the increase in eurozone trade (i.e., among the EMU joiners) took place in the mid-1980s as result of the liberalization of trade within the European Union and that, after properly controlling for trends in trade integration among the joiners and nonjoiners, the impact of the euro was nonexistent. This result is similar to that of Berger and Nitsch (2006), who examine an even longer time span, 1948-2003, and is in the spirit of the recent work of Engel and Rogers (2004) who find no tendency for prices to converge after January 1999 and that most of reduction in price dispersion in EU took place in the early-to-mid 1990s, well before the advent of the euro. In addition, by extending the sample to 1980, we find an economically and statistically large trade impact of the formation of the EU and its predecessors the European Economic Community and European Free Trade Area.[4]

Our results also are generally consistent with a "two-track" view or hypothesis of European integration. On the "fast track" we find the EMU members, consisting of the core countries plus the lower-income periphery countries, which have been committed to more rapid integration for different reasons. The core countries want further economic and political integration to avoid future conflicts and the periphery countries want to raise living standards quickly via integration with the richer core countries. The "slow track" countries are more affluent northern periphery countries, chiefly the U.K. and Sweden, which have well established trade links with the rest of the world; they neither have the economic nor the political incentives to integrate rapidly with the rest of Europe. The fact that these countries have chosen not to adopt the euro is coherent with their ongoing level

[4] Côté and Graham (2004) find that European interest rates converge several years before the formation of the EMU in 1999.

of commitment to European integration. Thus, the critical message is that the decisions the EU countries have taken to adopt or refuse the euro are not significant breaks from past polices but are consistent with their overall levels of commitment to European integration.

To outline the paper briefly, the next section contains a literature review that critically examines the recent studies and attempts to reconcile their findings. This will be followed by a brief analysis of the qualitative evidence concerning the adoption of the euro and trade within the eurozone relative to other comparison groups of countries. We will then use the gravity model to replicate and extend the results of MSO (2003). A final section provides some concluding remarks and discusses future steps in the research program.

2. Literature Review

The "gravity" model, so-called for its core dependence on country size and relative distance, has been a popular tool in international economics since the seminal works of Tinbergen (1962) and Linnemmann (1966). The adoption of the euro in 1999 sparked interest in the possible effect of a common currency on trade. While trade data were not yet available for the members of the EMU, a preliminary assessment could be made using data from other currency unions. To this end, Rose (2000) applies the gravity model framework to a dataset of existing currency union members, most of which were small and/or poor countries.[5] In an attempt to isolate the effect of the currency union on trade, Rose (2000) controls for a host of other trade determinants such as a common border, common language, a free-trade agreement and a common coloniser. To measure the impact of currency union on bilateral trade, Rose (2000) includes a dummy variable to denote a situation in which the two countries share a common currency. Pooling observations for each fifth year from 1970 to 1990 into a cross-sectional dataset, the results suggest that members of a currency union trade over 300% more than non-currency union members. The effect of currency union outweighed that of a free trade area.

[5] The "gravity model" of trade, is similar to the gravity model from physics in that volume of bilateral trade is dependent on country size and relative distance; it has been a popular tool in international economics since its independent inception by Tinbergen (1962) and Poyhonen (1963a, 1963b). For a recent derivation from economic theory, see Feenstra (2004, Chapter 5)

Subsequent research in this field, has largely been driven by an attempt to refine the methodology used by Rose (2000). More specifically, efforts have been made to correct for possible omitted variable bias, selection bias and endogeneity bias while adding a time-series dimension to examine the direct effects of currency union on trade. Nevertheless, earlier studies were still restricted to using datasets that did not include EMU directly.

In an effort to correct for potential omitted variable bias and investigate the intertemporal effects of a common currency, Glick and Rose (2001) apply fixed-effects estimation to a panel dataset from 1948 to 1997. Allowing the fixed-effects component to essentially pick up all country pair- specific factors not already specified in the model, the authors find that sharing a currency union roughly doubles bilateral trade.[6] Rose and van Wincoop (2001) also address potential omitted variable bias, but in a different fashion. Using the structural model developed by Anderson and van Wincoop (2002) they include a measure of multilateral trade resistance (bilateral barriers versus average barriers with all other countries), the authors find that a currency union between current Eurozone members would increase trade almost 60%.

Selection bias is a second potential problem with Rose's initial methodology. Many of the countries that have a common currency are very small or poor and thus are not representative of the industrialised countries of most interest. Acknowledging that characteristics of currency union members and non-members differ systematically, Persson (2001) and Kenen (2001) use techniques to construct comparable samples of countries to determine the "treatment effect" of a common currency. Both studies use the original dataset of Rose (2000) and find that trade is not significantly higher in a statistical sense between countries that have a common currency.

Another important criticism of Rose's methodology is endogeneity or simultaneity bias wherein the adoption of a currency union may not be independent from the amount of trade between its members (i.e., countries with more trade adopt a common

[6] The Glick and Rose dataset includes 146 switches: 13 into and 130 out of a common currency, but most of these switches take place before 1975, often as a result of colonial independence. Pakko and Wall (2001) have some reservations about these switches because many are not in the original Rose dataset. Thom and Walsh (2001) find little evidence of a significant decline in trade when Ireland abandoned the British pound to adopt its own currency, the punt, to enter the European Community's Exchange Rate Mechanism (ERM).

currency to lower the cost of these transactions). Tenreyro (2001) applies the gravity model within a two equation system, using a cross-section of 5-year data points from 1980 to 1995. While allowing the second equation to explain the probability of a currency union, the author finds that trade is about 60% larger between members of a common currency.

Against this background of research based primarily on small/poor countries, MSO (2003) took advantage of new data available since the establishment of EMU and applied the gravity model framework specifically to the Eurozone countries. Using annual data from 1992 to 2002, MSO (2003) initially estimate real merchandise trade using a traditional gravity model specification controlling for the following factors: real GDP, standard of living, distance, area, shared borders, membership in a free trade area, membership in the European Union, landlocked location, island location, common language, real exchange rate volatility, a trend to capture the deepening integration of the EU and, finally, membership in a currency union. This specification is estimated using two samples, the first includes the 22 developed countries in the IMF's Direction of Trade database and the other is comprised of only the EU15 countries. These estimates suggest that EMU countries trade roughly 26% more versus developed countries and 30% more versus the EU15. Following Glick and Rose (2001), the authors then re-estimate their equation, substituting many control variables in favour of a fixed-effects panel estimator.[7] With this specification, the trade effect of EMU is reduced to 5.5% in the large country sample and 7.6% in the EU15 sample, remaining both statistically and economically significant. Interestingly, the authors note that fixed-effects, along with a relatively short sample period, aid but do not completely remove the risk of endogeneity bias. Indeed, an earlier version of MSO (2003) estimates that the effect of EMU may drop by as much as half when the sample begins in 1992 rather than 1980. This result suggests that endogeneity bias may be a serious problem.

By extending their analysis to control for trade between EMU members and non-members, MSO (2003) also find no evidence of trade diversion away from non-EMU

[7] GDP, membership in a free trade agreement, real exchange rate volatility, membership in the European Union and a trend for the deepening of the EU are retained in this specification, along with the fixed-effect component.

members. This specification marginally increases the estimated Eurozone trade effect from EMU to 13% in the 22-country sample against 8% using the EU15 sample. It is possible, however, that variable omission may still bias the estimates on trade diversion, as well as the general estimates on intra-Eurozone trade, given that no account is taken for the positive effects on Eurozone trade caused by increased trade with developing nations (e.g. China, Central and Eastern European nations). Along these lines, Alho (2002) uses the gravity model and cross-sectional data from 1999 to explore the regional effects of trade agreements on Eurozone imports and exports. While providing evidence that Eurozone trade is more intense than typical EU trade, the results also suggest that exports from the Eurozone to CEE countries are also stronger than the EU average. However, one cannot be certain as to what extent this effect is a result of the trade-enhancing effects of EMU or of the European agreements with the CEE countries.

To address directly the key question of the intertemporal trade effects from EMU, MSO (2003) rerun their equations including separate annual dummy variables. This allows them to state that the trade effects of EMU on the Eurozone began in 1998 and gathered steam by 2002. Providing additional evidence for a lack of trade diversion, the same conclusion holds true for the effect of EMU on trade between EMU and non-EMU countries, though to a lesser degree. It is questionable, however, whether the year dummies are clearly picking up the effects of EMU, given that trade jumps significantly in 1998, a full year before the common currency was adopted. The authors then go on to estimate a dynamic version of their fixed-effect specification. The short- run effect of EMU on Eurozone trade is found to be between 9 and 12% while the long-run effect totals 21 to 34%. Bun and Klaassen (2002) also estimate a dynamic fixed effects model, obtaining similar estimates for the short and long-run effects of EMU. It is not clear, however, whether the inclusion of lagged dependent variables in a gravity model can be justified. In particular, the growing importance of domestic and international trade in intermediates due to increased specialization and out-sourcing means that there is likely to be an upward trend in the ratio of exports (and total sales) to GDP because exports are measured on the basis of sales, whereas GDP is measured on the basis of value-added. In the absence of a proper representation of this trend in the gravity model, the inclusion of a lagged dependent variable would produce a spurious positive coefficient.

In general, MSO (2003) find their results robust with respect to the exclusion of individual countries and country-groups. Of note, the authors find the European Union trend variable is statistically insignificant in all specifications. Although not surprising, it is questionable whether this trend can adequately account for the general rise in trade (as a share of GDP) over recent decades. To this end, an alternative specification of a general time trend (e.g. a non-linear trend) could be a valuable addition to ensure unbiased estimates of the effect of EMU on trade. Along these lines, de Souza (2002) estimates a basic gravity model for the EU15 countries including a linear time trend common to all country-pairs. The author finds no statistically significant evidence of a positive EMU effect on trade using regular panel estimation, fixed effects or random effects. However, when the time trend is removed, the effect of EMU becomes positive and statistically significant in most regressions, possibly highlighting a potential upward bias in other estimates that do not include a general time trend. More recently, Bun and Klaassen (2004) find that adding country-pair-specific time trends to the standard, fixed effect specification (including GDP, GDP per capita, and dummies for free trade areas and EMU) reduces the euro effect significantly and renders it robust to the length of the sample period. More specifically, over their full annual sample of 19 countries from 1967 to 2002, they find that, by adding these time trends, the euro effect falls from 51% to only 3%. A similar exercise over the 1992-2002 subsample approximates the MSO results and reduces the estimated EMU effect to 2% from 18%.

In an effort to verify the robustness of an earlier version of MSO (2003) that considers two samples (1980 - 2001 and 1992 - 2001), Piscitelli (2003) sets out to replicate their findings. Adding a control for the euro depreciation after 1999 (which is accounted for in MSO (2003), but not their earlier version), Piscitelli (2003) estimates the EMU trade effect on Eurozone countries to be 30% versus the sample of developed nations and 28% as compared to the EU15, slightly higher than the early estimates of Micco, et al.. However, when Piscitelli uses the 1992 to 2001 sample, these estimates fall to 12 and 5%, respectively, providing further evidence of the potential endogeneity bias suspected by Micco, et al. Furthermore, Piscitelli (2003) suggests that the results of Micco et al. may be somewhat dependent the choice of trade data used. If estimates are based on OECD trade data as opposed to the IMF trade data used in MSO (2003), the

estimated effect of EMU on trade is found to fall by nearly half versus the developed-country sample.[8]

Since MSO (2003), other studies have been published that take advantage of methodological refinements and recent Eurozone trade data. Focusing primarily on the problem of endogeneity, Barr, Breedon and Miles (2003) start by reestimating a model similar to that of Rose (2000), using a panel sample of European countries from 1978 to 2002. This methodology yields an EMU trade effect of about 29% (a similar fixed-effects model reports an effect of 27%) with some evidence against trade diversion. The authors then go a step further in addressing potential endogeneity bias by estimating with instrumental variables. More specifically, output and price co-movements are used to explain EMU membership. Using this technique gives an estimated EMU trade effect of 21%. MSO (2003) note, however, that the instrumental variables used in Barr, Breedon and Miles (2003) may be correlated with trade intesity and thus may not be optimal instruments. De Nardis and Vicarelli (2003), use an alternative method to control for endogeneity bias, using an EMU country-group fixed effect to isolate any impact on trade between EMU members before the euro was introduced. Using a dynamic model, the authors find a somewhat smaller short-run intra-EMU trade effect of about 10%. The long-run effect is estimated to be about 19%. However, these results are subject to the criticism mentioned previously regarding dynamic specification of the gravity model. More recently, after finding evidence of cointegration, Faruqee (2004) took account of potential endogeneity bias by using the dynamic OLS estimator put forth in Kao and Chiang (2000).[9] The author finds that correcting for endogeneity lowers the estimated parameters moderately, while raising their standard errors. Using the MSO developed-country dataset (and including a general time effect), Faruqee (2004) suggests that the euro effect on trade falls from about 9% to 8% when the DOLS estimator is used, while the standard error of the estimate nearly doubles.

With an aim to isolating the effects on trade within as well as to and from the Euro Area, Flam and Nordstrom (2003) use exports (as opposed to total trade) as the

[8] As noted in Piscitelli (2003), IMF trade data are calculated on the basis of "free on board" (f.o.b.) while OECD data are based on the "cost, insurance and freight" (c.i.b.) methodology.

[9] Similar to the time-series technique of Stock and Watson (1993), DOLS attempts to correct for endogeneity bias by including leads and lags of the first difference of trade, GDP and GDP per capita.

dependent variable in their standard gravity model specification. While potentially providing a more accurate picture than MSO (2003) of any trade diversion resulting from EMU, the authors note that this method gives less precise estimates due to the fact that each country-pair uses the same independent variables to explain two very different values of the dependent variable (exports from country A and country B). With this in mind, the authors conclude that, based on data from 1989 to 2002, EMU increased trade within Eurozone countries by 15% on average, while trade with non-EMU developed countries rose about 8%. In other words, they find no evidence of trade diversion. Interestingly, in contrast to the results of MSO (2003), Flam and Noordstrom find that reducing the pre-EMU sample size may increase the EMU trade effect. However, this upward trend only takes place when the entire sample of annual data is ten or fewer years in length. As such, these estimates may be subject to small-sample inefficiency. The authors also find that, although EU membership is estimated to increase trade by about 15%, there is no evidence of a rising trend reflecting increased EU integration. This runs counter the the results of MSO (2003), who found a significant and positive EU trend effect. Flam and Nordstrom also suggest, as did MSO (2003), that the EMU effect within the Eurozone took flight in 1998, noting that they cannot find any other explanation for this besides the start of the common currency the following year.[10]

Taking a more general approach, Anderton, et al (2002) draw conclusions regarding the effect of EMU on extra- and intra-Eurozone imports. Using simultaneous equations three-stage least squares to estimate import demand functions for intra- and extra-Eurozone imports from 1989 to 2000, they find no direct evidence that EMU stimulated trade based on the estimated parameters of quarterly dummy variables. Given the relatively small number of post-EMU observations in this dataset and the "catch-all" nature of time dummy variables, however, this conclusion may not be especially informative. Nonetheless, reduced-exchange rate volatility is estimated to have a positive effect on intra-Eurozone trade leading the authors to speculate that EMU should spur intra-Eurozone imports while causing some trade diversion from non-Eurozone countries.

[10] For this reason, the aforementioned trade effect of EMU was estimated with EMU dummy variables that take a value of one starting in 1998 as opposed to 1999.

Baldwin (2006) argues that there are a number of significant theoretical, econometric and data issues associated with the use of gravity models to study the euro effect. In particular, he reviews and agrees with many of the theoretical and empirical criticisms of the Rose (2000) result. With respect to data, he notes that since intra-EU borders were abolished (in accordance with the Single European Act), the incidence of VAT fraud has increased substantially and tended to inflate trade volumes. He also finds other measurement problems with the EU trade data, such as the Rotterdam effect and distortions caused by rules of origins. Despite these significant concerns, he nonetheless concurs with the MSO estimate of a 5-10% impact of the euro on intra-eurozone trade. To avoid some of the problems Baldwin (2006) identifies with the Rose methodology, he estimates a gravity model using a sectoral trade data set and only exports as his dependent variable. He uses a Tobit estimation procedure to handle the zero trade flows that result from the disaggregated data and he finds a Euro effect of 10 percent on average between 1999 and 2003.

Berger and Nitsch (2006) extend the MSO data sample backward to1948 in order to examine any long-term trends in bilateral trade among EMU members. They posit that the EMU is the continuation of a long-term economic integration in Europe beginning after World War II. They note a strong positive long-term trend in bilateral tendency to trade among (later) EMU members and find that the addition of a time trend controlling for this completely eliminates the euro effect found by MSO when using the shorter sample. The "euro effect" becomes statistically insignificant from zero and is robust to alternative specifications of the trend variable.

Overall, although the methodology used in estimating the trade effects of a common currency has been refined over time, the results of applications to the Economic and Monetary Union remain diverse and have not been fully reconciled.

3. Qualitative Evidence

Before considering the specification and results from empirical gravity model, it is useful to examine the data on the volume of trade among the original 11 countries in the eurozone and vis-à-vis different comparison groups of countries. In Figure 1, there are four plots of real trade volumes for the eurozone for a few years before and after the

adoption of the euro in 1999.[11] For clarity, the data are indexed to 100 in 1999. The plot for intra-eurozone trade indicates that trade volumes fell from 1995 to 1997, increased approximately 5% from 1997 to 1999 and then declined slightly until 2001 before recovering to the 1999 level in 2002. Over the years, 2003 and 2004, intra-eurozone trade grew by almost 40%. Much of this sizable increase is caused by the 25% real appreciation of the euro relative to the U.S. dollar over this period (since the data are measured in real U.S. dollars and virtually of the intra-eurozone trade is denominated in euros) and by the recovery from the recession of 2001-2.[12] The two lines in Figure 1 showing the volume of trade between the eurozone and the rest of the EU (Denmark, Sweden and the U.K.) and between the eurozone and the rest of the non-EU OECD (Australia, Canada, Iceland, Japan, New Zealand, Norway, Switzerland and the U.S.) was broadly similar to that of intra-eurozone trade in the first part of the sample; the lines diverge, however, over the period 2002-2005, due in part to the movement in the euro/US dollar exchange rate and the difference in the currency compositions of the trade baskets. Thus, compared to trade with other industrialized or developed country groups since the adoption of the euro in 1999, intra-euro zone trade was consistently higher only over the years 2002-2005 and part of this deviation is due to exchange rate movements, which are controlled for in our regression analysis. MSO (2003) claim that the euro effect started in 1998; there is no obvious evidence from the aggregate trade data to support this finding. The fourth line shows a large increase since 1999 in trade between the eurozone and rest of the non-OECD world (in particular, East Asia), which is not largely due to exchange rate valuation effects as much of this trade is likely denominated in U.S. dollars. Clearly, the EMU cannot be the cause of this growth because from Figure 2, we see that trade with these countries has risen even faster for the non-EMU countries of the EU.

In Figure 2, the analysis focuses on the three non-eurozone EU countries. What is most striking is the plot of trade among the non-eurozone EU countries: it grew by 50%

[11] Following MSO (2003), real trade volumes are constructed from the nominal values given in the IMF Direction of Trade database and deflated by the U.S. CPI. The data until the first half of 2005 are actual data. For the second half of the year the data are constructed using the method employed by MSO (2003) for their 2002 data. See the Data Appendix for more details.

[12] Baldwin (2006) discusses the problems associated with comparing data measured in U.S. dollars for the purpose of assessing the impact of the euro. He notes that this distortion can be controlled by including time dummies in the gravity regressions; we, like MSO (2003) include these dummies in our analysis as well as exchange rate variables.

more than intra-eurozone trade over 2002-2005 period (roughly 60% versus 40%). This deviation cannot be explained by exchange rate movements because the euro appreciated by more than the British and Swedish currencies. Thus, it seems that trade among these three countries has not been hampered by them retaining their own currency. As in Figure 1, trade between these countries and the non-OECD countries has risen sharply. Indeed, since the adoption of the euro in 1999, trade with non-OECD countries has risen twice as fast for the non-eurozone countries than for the EMU members (roughly 80% versus 40%). Interestingly, this trade was increasing rapidly in the mid-1990s before declining in 1997-99 due to the Asian crisis. The fact that these countries (especially the U.K.) have seen their trade rise faster with East Asia is a reflection of the fact that they are not "core" European countries and their overall trade patterns are fundamentally different.

In sum, from the trade volume data alone, there is some evidence that trade among the eurozone members rose in the last 2-3 years of the euro sample, 1999-2005; however, the evidence is far from compelling, especially given the much larger increase in trade among the three non-eurozone countries over the same period. This analysis, however, is partial because there are other factors that influence trade that are not being controlled. The gravity model of trade, which we discuss in the next section, incorporates some of these variables and thus provides a more complete analysis.

4. Empirical Model and Results

The gravity model has traditionally been used to explain bilateral trade by controlling for a host of country-pair specific factors such as income levels, distance, contiguity and common language. More recently, panel dataset applications of the model have allowed the use of a "fixed-effects" specification where all attributes specific to a given country-pair are captured by that pair's "fixed effect". In general, the latter specification is thought to provide estimates less prone to omitted variable bias. To this end, our benchmark specification of the gravity model reflects the fixed-effect model of MSO (2003) and takes the following form:

$$\ln T_{ij} = \alpha_{ij} + \beta_1 \ln Y_i Y_j + \beta_2 FTA_{ij} + \beta_3 EU_{ij} + \beta_4 EUTREND_{ij} + \beta_5 RER_i + \beta_6 RER_j + \beta_7 EMU2_{ij} + \gamma + \varepsilon_{ij}$$

where T_{ij} is the value of trade from country *i* to country *j*, Y_i and Y_j denote the gross domestic product of countries *i* and *j*, respectively. FTA_{ij} and EU_{ij} are dummy variables that take the value of one in a given year if both countries are in a free trade agreement or are members of the European Union in that year, respectively (and zero otherwise). Thus, if both countries are EU members then both dummy variables would take a value of one because the EU is an economic union and thus there should be an incremental effect on trade beyond that of being a free-trade area. $EUTREND_{ij}$ is a time trend that measures increasing economic integration within the EU. MSO (2003) use a measure developed by the Internal Market scoreboard which only becomes available in 1992; see the data appendix for more details. *RER* is the real exchange rate, which is included to capture the effects of movements in a country's currency relative to the U.S. dollar. Because trade volumes are measured in U.S. dollars, exchange rate movements would have an impact on the value of trade. That is, a real depreciation would tend to lower the U.S. dollar value of its trade; thus, the sign would be expected to be negative. The key variable for the purpose of analyzing the effects of EMU on trade is $EMU2_{ij}$, which is a dummy variable that takes the value of one in the year in which both countries are members of the EMU. Finally, γ denotes year dummies, α_{ij} is a constant and ε_{ij} is a white noise disturbance term. As in Micco et al (2003), we apply this model to a sample of 22 industrialized or developed countries and to the sample of EU countries

The first step of our analysis is to replicate the fixed-effect results of MSO (2003) using their original dataset of annual observations from 1992 to 2002.[13] These results are presented in the first and third columns of Table 2, with and without the inclusion of the real exchange rate variables.[14] As noted by MSO, these estimates suggest that Eurozone countries trade about 4% or 5.5% more relative to the control group of 11 other developed economies, ceteris paribus.[15]

The fact that MSO (2003) used post-EMU data to investigate the effects of monetary union on trade set their work apart from other studies. Nonetheless, the amount

[13] In replicating the original results of MSO (2003), we use their estimates for 2002 trade and GDP variables even though the actual values are now available.
[14] These replicated results are identical to those reported in the second and fourth columns of Table 1 in MSO (2003).
[15] MSO (2003) treat Belgium and Luxembourg as one country, thus leaving 11 EMU members and 11 non-EMU members in their sample of 22 industrialized countries.

of post-EMU data were limited to only 3 years of actual data and a fourth year of estimated data, allowing the authors to draw only preliminary conclusions. Since their study, three more years of data have become available. Thus, we extend the sample to include 2005 in an effort to obtain a more efficient and up-to-date estimate of the trade effects of Europe's common currency. The results from this exercise are given in the second and fourth columns of Table 2.[16] Generally speaking, the impact of the additional years of data is to increase by approximately 50% the estimated effect of the euro on intra-EMU trade.

In Table 3, the exercise of Table 2 is repeated using a sample consisting of the EU15 members only. Again, the addition of the 2003-5 data raises the estimated impact of the euro on trade.

One of the disconcerting results in Tables 2 and 3 is the large drop in the estimated coefficient on the real GDP term with the addition of the 2003-5 data. The explanation is that the 2002 trade data used by MSO (2003) were estimates based on recent trends and these estimates turned out to be very inaccurate, partly because of the 2002 economic slowdown. Re-estimating the empirical model with the actual 2002 data obtains a coefficient on the real GDP variable for the 1992-2002 sample that is much lower than that based on the estimates from MSO (2003) and comparable to that found using the sample extended to 2005.[17]

What is puzzling from the original and extended MSO results of Tables 2 and 3 is that the FTA, EU and EU Trend variables, which are supposed to represent the effect of increased trade liberalization, primarily within Europe, often have negative signs and are rarely statistically significantly positive. Even if one were to believe that the euro should have a positive impact on intra-EMU trade by reducing trade barriers, one would also believe that free trade, the formation of an economic union and the ongoing economic integration in Europe should have had a larger impact because these variables represented, on average, larger reductions in transactions costs. The fact that they are not statistically significant raises questions regarding the ability of this specification of the

[16] In extending the results of MSO (2003) we use the actual trade and GDP values for 2002-2004, but estimates for 2005. See the data appendix for more details.
[17] Detailed results are available from the authors.

gravity model to distinguish between the effects of economic integration via trade liberalization and other policy initiatives and via the monetary union.

Table 4 reports results obtained by extending the sample backward to cover the period of 1980 to 2005. In comparison with the 1992 to 2005 sample, this raises the estimated trade effect of EMU for both the developed country sample and the EU15 sample. At the same time, the free trade agreement dummy and EU dummy variables are now positive and statistically significant in most cases and, combined, represent a greater increase in trade than is attributed to EMU. Taken together, these results suggest that the primary factor behind increasing trade within the European Union has been the removal of the usual barriers to trade, rather than adoption of the euro.

Following MSO (2003), we also include yearly EMU dummies to assess the trade effect of the EMU over time. The results are given in Table 5. Using the 1992 to 2005 sample, which is three years longer than that used by MSO (2003), we almost replicate their results. In particular, we also find that the effect of EMU becomes statistically significant in 1998, one year before the technical introduction of the euro currency. Interestingly, our estimates of the yearly EMU effect are slightly larger than for MSO (2003).

Table 6 reports the results of a similar exercise for the entire 1980 to 2005 sample period for the two samples of countries. In this case, the estimated effect of EMU is found to be statistically significant beginning in 1986 for the developed country sample and 1988 for the EU15 sample, a full 13 and 11 years, respectively, before the euro was introduced. These results cast further doubt on whether the trade effect of the euro has been properly identified in MSO (2003); in particular, it is not clear that the euro effect is distinguished from impact influence other factors, namely, trade liberalization, that could have served to increase intra-EMU trade since the mid-1980s. Indeed, the early significance of the yearly dummies generally coincide with the enactment of the Single European Act (1987) which formalized, among other things, the plan to establish a single European market for goods, services, capital and labour.[18]

[18] The Act also included plans for a monetary union, but the commitment was further into the future and was less credible.

It is interesting to note as well from Table 6 that the EMU2 dummy is increasing in magnitude over the sample period. Thus, the members of EMU seem to have become progressively more and more integrated in terms of trade flows over time.

To contrast this finding, it would be useful to consider the impact on trade for those countries not joining the EMU. For this purpose, we introduce a new dummy variable, EMUNJ, which takes a value of one for observations of bilateral trade that include at least one of the three EU countries, the U.K., Sweden and Denmark that decided not to adopt the euro in 1999. As in the previous exercise, we allow the estimated coefficient on the EMUNJ dummy to vary over time. The results for the two samples of countries are given in Table 7 and they show that EMUNJ was progressively becoming more negative over time, especially in the EU sample, indicating that the nonjoiners were becoming less and less integrated in terms of trade with the other EU members. Thus, if one were to compare the average magnitude of the estimated coefficients on the EMUNJ dummies in the post-euro period (1999-2005) to an average value before the euro, one would find strong statistical evidence that the adoption of the euro reduced trade between the nonjoiners and the countries that adopted the euro, but this conclusion would be incorrect, because the three countries not adopting the euro have experienced a trend decline in their relative trade with the other EU countries that had little, if anything, to do with the event of not joining the EMU.

In an attempt to summarize the empirical findings shown in the last two tables, which show the EMU joiners and the nonjoiners moving in opposite directions, we introduce three deterministic trends into our empirical model. The first is a common trend for all countries in the sample, the second is a trend specific to those countries that did not adopt the euro, and the last is a trend for the latter group of countries but only for the post-euro period. The post-euro trend is introduced to determine if the non-adoption of the euro accelerated the growing difference in trade integration between the joiners and the nonjoiners. The results are given in Table 8. The common trend is negative and statistically significant indicating that trade among the countries in the sample did not grow as fast as the product of their national outputs, due perhaps to increasing trade with other countries not included in the sample, such as China and the rest of East Asia. The nonjoiner's trend is negative and statistically significant, especially in the EU sample,

indicating that their trade with other countries in the EU sample was growing more slowly, by roughly 2.0% per year. Finally the post-euro nonjoiners trend is very small, positive (not negative) and statistically significant at the 1% level. Thus, after controlling, albeit somewhat crudely, for trends, it appears that the implementation of euro has had no negative consequences on trade for those countries that did not join EMU. In addition, our findings are consistent with a "two track" approach to European integration, with the EMU members being on the "fast track" and the non-euro EU members being on the "slow track".

5. Concluding Remarks

The key results of this paper are:

1. We were able to replicate the MSO (2003) finding of a significant impact the euro on intra-EMU trade and at the same time confirm their finding that membership in an FTA, the EU or further ongoing EU integration had only a weak effect on intra-EMU trade.
2. We extended their sample back to 1980 and found that the apparent effect of the euro on intra-EMU trade actually began in 1986 or 1988 well before the EMU came into being in 1999. Moreover, with this extended sample we found that trade liberalization had an economically and statistically significant impact on trade.
3. We found evidence consistent with the "two track" hypothesis of Europe integration for EMU members and non-EMU members.

The third finding addresses the inconsistency between the first two results. Namely, MSO (2003) finds a positive effect of the adoption of the euro on intra-eurozone trade because of the endogeneity of EMU self-selection.[19] The countries most committed to the goal of European integration and thus the ones most likely to promote ardently trade among euro members are exactly the same countries that would adopt the euro because joining the EMU is but another step in their ongoing commitment to European integration. Although MSO recognized the possibility of endogeneity, they responded to it by keeping the sample relatively short.

[19] This is consistent with the finding of Mongelli, Dorrucci and Agur (2005) that look at institutional and trade integration in Europe since 1957 and find evidence of causality running in both directions.

To consider this endogeneity issue more fully, however, it is useful to recognize that EMU consists of two groups of countries: the seven core European countries: Austria, Belgium/Luxembourg, Germany, France, Italy, and The Netherlands, and five periphery countries: Finland, Greece, Ireland, Portugal and Spain. The core EMU countries are geographically proximate and thus ones that are likely to see the large increases in trade as a result of policies geared towards economic integration because local demand and supply networks will form.[20] They also are generally the ones most committed to European integration for political reasons. On the other hand, the periphery countries (excluding Finland) began the process of European integration at the lower end of the economic ladder, and thus, knew that in the long run they had to attract foreign investment and trade (as well as EU financial support) in order to converge to the living standards of the core. Consequently, they wanted to promote intra-European trade by entering the EU and EMU. Indeed MSO (2003) finds that the EMU had the largest impact on Spain.

The three countries that did not join the EMU, in particular, the UK and Sweden and to a lesser extent, Denmark, do not naturally fit into either of these two EMU groupings. They are relatively affluent, geographically peripheral countries with established non-EMU trade patterns and thus are not reliant on trade with EMU countries to maintain their income levels. Their overall commitment to European integration has been less. Sweden only joined the EU in 1995. While the UK joined the EEC in 1972, it has not participated in the exchange rate arrangements apart from a brief and tumultuous period in the early 1990s. Indeed, statements by leading politicians in both countries against further integration with Europe would lead one to believe that the country's commitment to promoting trade within Europe is less than that of the other EU countries that adopted the euro. (This evidence is reviewed in more detail in Appendix C.)

Hence, the MSO (2003) findings of a significant post-1999 EMU effect on trade and a weak EU impact on trade and our finding of an early EMU effect implies that countries that adopted the euro did so realizing that their trade with other EMU countries was likely to increase as a result of their ongoing efforts to promote economic (and

[20] MSO (2003) find that the euro effect on trade is largest for the deutschemark block, which they define as Austria, Belgium/Luxembourg, Germany, France, and The Netherlands.

political) integration and that a common currency would serve to enhance further this integration. In contrast, the three nonjoiners did not have the same incentives or the same outlook and thus viewed the price of joining the EMU as being too high to pay. Hence, the MSO conjecture that the euro "caused" increased trade has not been proven by their results.

Indeed, our results are consistent with this "two track" hypothesis to European integration with the EMU joiners and nonjoiners integrating in terms of trade flows at different rates. Further research needs to be conducted to obtain more evidence of different levels of commitment to European integration over the sample period by these two groups of EU countries. Such evidence would deepen our understanding of their decisions to adopt or not adopt the euro.

Appendix A: Data

Drawing mainly on the data used by Micco et al (2003), a description of our estimation dataset is presented below.

Trade: Trade data are taken from the International Monetary Fund's Direction of Trade statistics and measured in millions of U.S. dollars. Bilateral trade is calculated as the average of imports and exports as reported by each country. If only one country reports bilateral trade, then the observation is calculated as the average of those available data. Exports are reported as "free on board" (fob), while exports are recorded as "cost, insurance and freight" (cif). All trade figures are deflated using the United States consumer price index as reported in the IMF's International Financial Statistics. Data for trade in the second half of 2005 were derived by calculating the ratio of 2004H1 trade as a share of overall 2004 trade and applying that share to the first half of 2005.

Real GDP: In replicating the results of Micco et al (2003), output data are taken from the World Bank's World Development Indicators database. All observations were converted by the World Bank from constant domestic currency to U.S. dollars using 1995 exchange rates, except in some cases where the World Bank uses a more suitable alternative conversion method. Data for 2002 were calculated as in Micco et al (2003) using growth rates as reported in the OECD's Main Economic Indicators. In all estimations including 2003 data, domestic-currency GDP are taken from the International Monetary Fund's World Economic Outlook (April 2006) and converted to U.S. dollars using exchange rate data from the Bank for International Settlements.

Free Trade Agreements: This dummy variable takes the value of one when a country pair belongs to a given free trade area, and zero otherwise. Data are taken from Frankel and Rose (1999) and supplemented by data from the International Development Bank's Integration Department. (See Appendix B)

European Union: This dummy variable takes the value of one during the period in which a country pair belongs to the European Union, and zero otherwise. (See Appendix B)

European Union Trend: For estimation beginning in 1992, this variable is the negative of November observations of the "transposition deficit" as published by Internal Market Scoreboard (http://europa.eu.int/comm/internal_market/en/update/score). For 2005 the transposition deficit is based on the latest available estimate for the year (May 2005). This variable takes a value of zero for all country pairs in which at least one country is not a member of the European Union. (See Appendix B)

Real Exchange Rate versus the United States: Real exchange rates are calculated as the ratio between the nominal exchange rate of each country and that country's GDP deflator. All exchange rate data is taken from the Bank for International Settlements and all GDP deflator data was taken from the IMF's World Economic Outlook (April 2006).

EMU2 Dummy: This variable takes a value of one for country-pairs in which both countries belong to the Economic and Monetary Union, and zero otherwise. The value of one is applied only over the period in which the country-pair belongs to EMU (See Appendix B), except in estimations that investigate the effect of EMU over time, in which case the dummy takes the value of one over the entire period.

EMUNJ Dummy: This variable takes a value of one for all country-pairs in which at least one country is the United Kingdom, Sweden or Denmark, and zero otherwise.

Appendix B: Free Trade Area and Monetary Union Membership[21]

Country	European Union	Economic and Monetary Union	Other Free Trade Agreements
Australia	-	-	CER[22] (1965), APEC[23] (1989)
Austria	1995	1999	EFTA[24] (1960, left 1995), EEA[25] (1994)
Belgium-Luxembourg	1992	1999	EEC[26] (1957), EEA (1994)
Canada	-	-	FTA[27] (1989), APEC (1989), NAFTA[28] (1994)
Denmark	1992	-	EFTA (1960, left 1972), EEC (1973), EEA (1994)
Finland	1995	1999	EFTA (1961, left 1995), EEA (1994)
France	1992	1999	EEC (1957), EEA (1994)
Germany	1992	1999	EEC (1957), EEA (1994)
Greece	1992	2001	EEC (1981), EEA (1994)
Iceland	-	-	EFTA (1970), EEA (1994)
Ireland	1992	1999	EEC (1973), EEA (1994)
Italy	1992	1999	EEC (1957), EEA (1994)
Japan	-	-	APEC (1989)
New Zealand	-	-	CER (1965), APEC (1989)
Netherlands	1992	1999	EEC (1957), EEA (1994)
Norway	-	-	EFTA (1960), EEA (1994)
Portugal	1992	1999	EFTA (1960, left 1985), EEC (1986), EEA (1994)
Spain	1992	1999	EEC (1986), EEA (1994)
Sweden	1995	-	EFTA (1960, left 1995), EEA (1994)
Switzerland	-	-	EFTA (1960)
United Kingdom	1992	-	EFTA (1960, left 1972), EEC (1973), EEA (1994)
United States	-	-	FTA (1989), APEC (1989), NAFTA (1994)

[21] Source: Frankel (1997).
[22] Australia-New Zealand Closer Economic Relations.
[23] Asia Pacific Economic Cooperation.
[24] European Free Trade Association.
[25] European Economic Area.
[26] European Economic Community.
[27] Free Trade Agreement.
[28] North American Free Trade Agreement.

Appendix C: Sweden, the United Kingdom and Denmark – A Brief History of their Euro-skepticism

The purpose of this appendix is two-fold: firstly, to provide a brief narrative of the history of euro-skepticism in the three major non-eurozone EU members, Sweden, the United Kingdom and Denmark, and secondly, to argue that their decision not to adopt the euro is consistent with other policies that have resisted deeper economic and political integration in Europe.

There are various reasons for this resistance to deeper integration, but it partially reflects the fact that these countries, in particular Sweden and the United Kingdom, have historically, been less trade-oriented with the euro-12, who represent most of continental Western Europe. In particular, both Sweden and the U.K. have had significant trading relationships outside of continental Western Europe. The United Kingdom relied on its empire not only as a destination market but also as a supplier of raw materials. Sweden had a dominant economic position in Scandinavia. The rest of the appendix briefly examines in country in turn because the circumstance differ across these countries.

Sweden:

Sweden resisted joining the European much longer than did the United Kingdom, only becoming a full member in 1995 (see Appendix B) while the United Kingdom applied for membership in the European Economic Community in 1961 and became a member state in 1972. The primary reason for Sweden's opposition to joining the EEC was the perceived conflict with her policy of neutrality. Hence, for a long time, full membership was rejected on the grounds that Sweden's sovereignty could not be compromised as the EEC membership not only overlapped with the North Atlantic Treaty Organization, but also had supranational features, such as the Common Commercial Policy (CCP).[29] An investigation into EEC membership yielded the following assessment:

> "The country cannot participate in such forms of cooperation involving foreign political, economic, monetary and other questions, which, according to Swedish assessment, could jeopardize the possibilities of pursuing a

[29] Miles, Lee (1997). *Sweden and European Integration,* Ashgate Publishing Ltd., Aldershot, p. 42.

> consistent policy of neutrality. This means that Sweden cannot undertake binding responsibilities in international cooperation within any group of states with the objective of forming common positions.[30]

The disintegration of the U.S.S.R. and a severe recession in the early 1990's, however, sparked a reconsideration of Sweden's strict policy of neutrality as the balance between the economic losses of not integrating and security gains from remaining neutral shifted. In 1994, a general referendum on EU membership was held and Sweden voted 52.3 percent in favour of joining the EU, and became an official member in 1995. Despite membership in the EU, public opinion remained lukewarm towards deeper integration. In a 1995 Eurobarometer survey, Sweden was 54 percent against a European currency. It is noteworthy that in this survey the only countries that voted more strongly against a common currency were the U.K. and Denmark.[31] In 1999, Sweden held European direct elections at the same time as the other EU member states. Despite strong efforts on the part of the political parties, only 38 percent of the electorate turned out to vote - an indication of the EU's weak significance to the average Swedish voter.[32]

In 1997, the Riksbank took a favourable position on EMU membership, in response to a study prepared by a commission headed by Lars Calmfors.[33] Sweden, however, decided in 1997 not to adopt the euro. In 2003, a national referendum was held; most of the main political parties, the Riksbank and business communities supported the "yes" vote. Despite this support, 56.1% of the vote was against adoption of the euro. The "no" voters cited Sweden's more favourable economic position vis-à-vis the EU and fears of the erosion of the welfare state as prime reasons for their vote. While the Danish Prime Minister stated that the Swedish vote had no impact on Denmark's attitude towards the euro (who in 2000, voted 53.1 % against adoption of the euro), it undoubtedly influenced the anti-euro camp in the U.K.[34]

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[30] Handelsdepartementet, *Inför Sveriges EEC föhandling,* Stockholm, 1971.

[31] 56% and 60% against, respectively. European Commission Survey Research Unit, "European Citizens and the Euro," Standard Eurobarometer, 15 October - 15 December 1995, htttp://europa.eu.int/comm/public_opinion/archives/ebs/ebs_091_en.pdf

[32] Lindahl, Rutger. (2000) Swedish Public Opinion and the EU in Miles, L. (ed.) *Sweden and the European Union Evaluated*, Continuum, London, pp. 97-124

[33] Calmfors, Lars (together with Harry Flam, Nils Gottfries, Magnus Jerneck, Rutger Lindahl, Janne Haaland Matlary, Christina Nordh Berntsson, Ewa Rabinowicz and Anders Vredin*),* EMU - A Swedish Perspective, Kluwer Academic Publishers, 1997.

[34] "Sweden turns back on euro," BBC News, Monday, 15 September, 2003, http://news.bbc.co.uk/2/hi/europe/3108616.stm.

United Kingdom:

Britain's tradition of "splendid isolation" from affairs on the Continent had waned considerably during the twentieth century, especially with her involvement in the two World Wars. Nevertheless, membership in the EU was not viewed favourably, by both politicians and the public. Britain's trade relationships with the Commonwealth and with the United States were seen as priorities and the U.K. instead formed the European Free Trade Area (EFTA) as an alternative to full-fledged integration with Europe. Concerns over the decline of British influence over European affairs grew, however, and the U.K. lodged an application for EEC membership in 1961. The application was submitted with several conditions on membership, including guarantees for British agriculture. The U.K.'s application was vetoed by the French in 1963, stating that, among other things, British agricultural policies were incompatible with the EEC's Common Agricultural Policy (CAP), which came in existence in 1962. A second British application for membership was submitted in 1967 and it became a member in 1973, after agreeing to accept the terms of the Common Agricultural Policy.

The economic turmoil of the 1970's brought the issue of EEC membership to the fore in the United Kingdom. The benefits of British membership were questioned by all political groups, except industry. The debate culminated in a referendum on the U.K.'s continued membership in 1975, which produced a 'yes' vote of 67 percent. Regardless of this outcome, many British remained skeptical of the benefits of European integration.

While the other EU countries joined the European Monetary System (EMS) in 1979, Britain did not join until 1990. Shortly thereafter, the pound came under intense speculative pressure, resulting in the 1992 exchange rate crisis and the pound's exit from the system. The move to a floating rate proved beneficial as the UK economy responded strongly to the depreciation.

For Britain to adopt the euro in the future, there are several hurdles in place. In 2003, the Chancellor of the Exchequer published the "Five Economic Tests" for adoption of the euro, stating that since four of the five tests had failed, membership should not be considered. Membership must also pass through three levels of approval: Cabinet, Parliament and a general referendum of the people. Studies cited lack of convergence with Euroland as the main obstacle to euro adoption; fixing their exchange rate to the

euro and adopting EMU monetary policy were seen to be detrimental to the U.K.'s long-term economic performance. The loss of flexibility in fiscal policy was also noted, stemming from the restrictions of a "one size fits all" monetary policy.[35]

Denmark:

In the case of Denmark, it was once put, "It's not Europe that's the problem, it's integration that's the problem."[36] The Danish relationship with the EU has always been one of greater integration than that of Sweden or the UK. Prior to the introduction of the euro, the Danish krone was pegged to the German mark since 1982 and, in 1992, Denmark became a member of the ERMI, pegging the value of the krone to the ecu, the forerunner of the euro. In 1998, Denmark krone joined the ERMII. Denmark, as an EU member, participates in the Growth and Stability Pact, but is not subject to any sanctions should they not meet the requirements, thus retaining some degree of independence in fiscal policy.

The striking feature of Danish attitudes towards European integration is the polarity of opinion between the government and the voting public. Save for the extreme left and right parties, the government has always been strongly supportive of integration with Europe. The business community and trade unions have also consistently thrown their support behind the process. The fear of the voting public seems to lie mainly in the perceived threats in the form of increased taxation levels, reductions in unemployment and welfare benefits, and a loss of decision-making sovereignty.

The first public referendum on European integration in Denmark was held in October 1972, when Danes voted 63.3 percent in favour of joining the EEC. The second was held in February 1986 to ratify the Single European Act, which laid down the goal of a single market by 1992.

Approval of the Maastricht Treaty (or the Treaty on the European Union) was put to the Danish public in June 1992. The main features of the Treaty include the creation of the euro as well as the introduction of the three-pillar structure: the Economic and

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[35] 9 June 2003. "Statement by the Chancellor of the Exchequer on UK Membership of the Single Currency" http://www.hm-treasury.gov.uk/documents/international_issues/the_euro/assessment/euro_assess03_speech.cfm

[36] Hans Joergen Nielsen, political scientist at Copenhagen University, as quoted in "Danes defy experts to reassert nationhood," Financial Times, October 11, 2000.

Social Policy pillar, the Common Foreign and Security Policy pillar and the Justice and Home Affairs pillar. The Danes voted to reject the Treaty of Maastricht, 50.7 percent against versus 49.3 percent in favour (with a turnout of over 82 percent). Based on the rejection, the Conservative-Liberal coalition produced an eight-point solution to the deadlock, deemed the "National Compromise" and managed to secure four opt-outs from the Treaty. The four opt-outs include: an official derogation from mandatory adoption of the euro; exemptions from common defence plans; non-participation in certain areas of EU judicial cooperation and; abstention from union citizenship.[37] These four opt-outs, known as the Edinburgh Agreement, were approved by 56.8 percent of the voting population in 1993, although it led to two days of riots by disillusioned voters.

All of the main political parties in Denmark, as well as the business sector and trade unions supported the adoption of the euro. Opposition came from the far left and far right parties as well as the centre-right Christian Peoples' Party, which campaigned on safeguarding Danish culture and values. The existing peg to the euro was put forth by the "yes" campaign as proof against further loss of sovereignty, although many voters took this as proof that Denmark could exist just as well outside the system.[38] The "no" side focused on loss of sovereignty, the importance of safe-guarding the Danish welfare system, as well as the relative weakness of the euro as an international currency. In September 2000, the referendum on the adoption of the euro was held, drawing a voting turnout of over 90 percent; Danes voted 53.1 percent against adopting the euro. The victory for the "no" vote was seen as a triumph of nationalism.

Despite the fact that this was the second time that the Danes had rejected a major element of EU integration, the governing party continued to hold a strong position in the country and remained in favour of further integration with Europe. The question of euro adoption was put on the back burner with the Laeken Declaration in December 2001. The September 2005 referendum on "Constitution for Europe" was indefinitely postponed after it was rejected by the French and Dutch voters in May and June 2005.

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[37] Denmark's position on union citizenship was that it was a supplement to "national citizenship and not a replacement;" this wording was incorporated into the 1997 amendments to the Maastricht Treaty as well as later on in the Amsterdam Treaty.

[38] Miller, Vaughn (2000). "The Danish Referendum on Economic and Monetary Union," UK House of Commons Research Paper 00/78, UK House of Commons Library, September 2000. This reference includes excellent appendix detailing political parties' stance on euro campaigns across EU countries.

Sweden and the U.K. have long demonstrated ambivalent attitudes towards integration with continental Europe. Denmark is more integrated, but has done so grudgingly; the adoption of the euro, however, seems to represent the step towards further integration that Danish voters are unwilling to take. In the cases of Sweden and Denmark, the potential loss of political and economic sovereignty, including maintaining an independent voice and the protection of the welfare state, remain the dominant arguments against further integration. In the U.K., the reasons against integration remain primarily economic; the move away from the pound and the loss of independent monetary policy do not seem to outweigh the touted benefits of euro adoption. In all three cases, the non-adoption of the euro was generally consistent with previous policy stances and thus, it is unlikely that it by itself would have a significant effect on trade flows with euro zone members. The level of bilateral trade largely depends on the overall commitment to integration; the adoption or non-adoption of a common currency rarely represents a significant departure from this policy commitment and hence cannot properly identify the impact of a common currency on trade.

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Table 1: Estimates of the Effect of the Eurp on intra-Eurozone Trade

	Short-Run (%)	Long-Run (%)	Comments
Micco, et al. (2003) Sample: 1992 - 2002 Dep. Variable: Total Trade	6 - 30	21 - 34	Traditional gravity model; fixed-effects model; dynamic model; no evidence of trade diversion.
Bun and Klaassen (2002) Sample: 1965 - 2001 Dep. Variable: Exports	4	40	Dynamic fixed-effects gravity model.
Piscitelli (2003) Sample 1: 1980 - 2001 Sample 2: 1992 - 2001 Dep. Variable: Total Trade	5 - 30	-	Replicated early results of Micco, et al.; suggests former study may be sensitive to trade data used.
Barr, Breedon & Miles (2003) Sample: 1978 - 2002 Dep. Variable: Total Trade	21 - 29	-	Traditional gravity model; fixed-effects model; instrumental variables estimation.
De Nardis & Vicarelli (2003) Sample: 1980 - 2000 Dep. Variable: Total Trade	10	19	Use country-group fixed- effects to correct for endogeneity bias.
Flam & Nordstrom (2003) Sample: 1989 - 2002 Dep. Variable: Bilateral Exports	15	-	Fixed-effects gravity model using exports as dependent variable.
De Souza (2002) Sample: 1980 - 2001 and 1995 - 2001 Dep. Variable: Total Trade	Nil	-	Fixed-, random-and between- effects models; includes general time trend.
Anderton, et al. (2002) Sample: 1989 - 2000 Dep. Variable: Total Trade	Nil	-	Simultaneous equations, 3- stage least squares; imports as dependent variable.
Bun & Klaassen (2004) Sample: 1967 - 2002 Dep. Variable: Total Trade	3	-	Include country-specific time trends in their fixed-effect estimation.
Faruqee (2004) Sample: 1992 - 2002 Dep. Variable: Total Trade	8	-	Use Dynamic OLS estimation with leads and lags to correct for edogeneity bias.
Berger and Nitsch (2006) Sample: 1948-2003 Dep. Variable: Total Trade	Nil		Include time trend to control for increasing volume of trade between Eurozone countries; found insignificant common currency effect.
Baldwin (2006) Sample: 1999-2003 Dep. Variable: Exports	10		Uses sectoral data to investigate “new goods” hypothesis, estimated by Tobit regressions

Table 2. The impact of the euro on trade: Extending the sample to 2005– developed country sample

	1992-2002[a]	1992-2005	1992-2002	1992-2005
EMU2	0.039***	0.069***	0.054***	0.079***
	(0.013)	(0.011)	(0.013)	(0.012)
Real GDP	1.220***	0.983***	1.145***	0.884***
	(0.056)	(0.050)	(0.059)	(0.051)
Free Trade Agreement	-0.012	0.013	-0.005	0.014
	(0.021)	(0.023)	(0.021)	(0.023)
EU	0.042**	-0.161***	0.043**	-0.125***
	(0.021)	(0.042)	(0.021)	(0.044)
EU Trend	0.001	0.002***	0.001	0.0015***
	(0.001)	(0.0004)	(0.001)	(0.0004)
Real Exchange Rate of Country 1			-0.158***	-0.143***
			(0.044)	(0.046)
Real Exchange Rate of Country 2			-0.270***	-0.260***
			(0.057)	(0.046)
Implied proportional impact on trade:				
EMU2 Impact[b]	0.040***	0.071***	0.055***	0.082***
(s.e.)	(0.014)	(0.015)	(0.014)	(0.015)
Observations	2541	3234	2541	3234
Within R-squared	0.45	0.6885	0.46	0.6929
Country Pair Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
[a] The first and third columns contain Micco et al's results using actual data from 1992 to 2001 and estimated data for 2002. The second and fourth columns contain our results using actual data from 1992 to 2004 and estimated data for 2005.
[b] The EMU2 impact is calculated as exp(EMU2)-1; standard error by delta method.

Table 3. The impact of the euro on trade: Extending the sample to 2005 – EU sample

	1992-2002[a]	1992-2005	1992-2002	1992-2005
EMU2	0.060***	0.092***	0.073***	0.106***
	(0.013)	(0.012)	(0.014)	(0.0130)
Real GDP	0.996***	0.788***	1.073***	0.852***
	(0.074)	(0.066)	(0.077)	(0.071)
Free Trade Agreement	0.042	0.052*	0.047	0.047
	(0.029)	(0.031)	(0.030)	(0.031)
EU	-0.073	-0.142	-0.045	-0.039
	(0.053)	(0.290)	(0.053)	(0.284)
EU Trend	-0.003	0.001	-0.001	0.000
	(0.004)	(0.003)	(0.004)	(0.003)
Real Exchange Rate of Country 1			-0.130**	-0.080
			(0.060)	(0.061)
Real Exchange Rate of Country 2			0.368***	0.293***
			(0.099)	(0.080)
Implied proportional impact on trade:				
EMU2 Impact[b]	0.062***	0.096***	0.076***	0.112***
(s.e.)	(0.014)	(0.017)	(0.015)	(0.018)
Observations	1001	1274	1001	1274
R-squared	0.64	0.7964	0.65	0.8278
Country Pair Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

[a] The first and third columns contain Micco et al's results using actual data from 1992 to 2001 and estimated data for 2002. The second and fourth columns contain our results using actual data from 1992 to 2004 and estimated data for 2005.

[b] The EMU2 impact is calculated as exp(EMU2)-1; standard error by delta method.

Table 4. The impact of the euro on trade: Longer sample period 1980-2005

	Developed countries	Developed countries	EU countries	EU countries
EMU2	0.140***	0.156***	0.183***	0.210***
	(0.016)	(0.015)	(0.017)	(0.017)
Real GDP	1.174***	1.131***	1.100***	1.012***
	(0.038)	(0.038)	(0.049)	(0.050)
Free Trade Agreement	0.063***	0.062***	0.096***	0.108***
	(0.016)	(0.016)	(0.024)	(0.023)
EU	0.005	0.067**	0.321***	0.278***
	(0.032)	(0.033)	(0.052)	(0.048)
EU Trend	0.002***	0.001***	-0.004***	-0.003***
	(0.0003)	(0.0003)	(0.0006)	(0.0006)
Real Exchange Rate of Country 1		-0.384***		-0.695***
		(0.037)		(0.072)
Real Exchange Rate of Country 2		-0.301***		-0.237***
		(0.028)		(0.041)
Implied proportional impact on trade:				
EMU2 Impact[b]	0.150***	0.169***	0.201***	0.233***
(s.e.)	(0.023)	(0.023)	(0.027)	(0.027)
Observations	6006	6006	2366	2366
R-squared	0.7377	0.7489	0.8704	0.8806
Country Pair Dummies	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
[b] The EMU2 impact is calculated as exp(EMU2)-1; standard error by delta method.

Table 5. The impact of the euro on trade over time: Extending the sample 1992-2005

	Developed sample		EU sample	
	Coefficient	(s.e.)	Coefficient	(s.e.)
EMU2 - 1993	-0.020	(0.037)	-0.0002	(0.041)
EMU2 – 1994	0.027	(0.037)	0.031	(0.039)
EMU2 – 1995	0.037	(0.037)	0.022	(0.039)
EMU2 – 1996	0.022	(0.035)	0.007	(0.038)
EMU2 – 1997	0.031	(0.034)	0.023	(0.035)
EMU2 – 1998	0.088***	(0.033)	0.071**	(0.036)
EMU2 – 1999	0.104***	(0.033)	0.079**	(0.036)
EMU2 – 2000	0.101***	(0.035)	0.088**	(0.038)
EMU2 – 2001	0.140***	(0.034)	0.181***	(0.036)
EMU2 – 2002	0.148***	(0.039)	0.170***	(0.041)
EMU2 – 2003	0.171***	(0.039)	0.164***	(0.041)
EMU2 – 2004	0.178***	(0.043)	0.190***	(0.044)
EMU2 – 2005	0.162***	(0.053)	0.199***	(0.047)
Real GDP	0.893***	(0.053)	0.879***	(0.072)
Free Trade Agreement	0.012	(0.023)	0.047	(0.030)
EU	-0.084*	(0.044)	-0.038	(0.281)
EU Trend	0.0009**	(0.0004)	-0.0001	(0.003)
Real Exchange Rate of Country 1	-0.153***	(0.046)	-0.104*	(0.060)
Real Exchange Rate of Country 2	-0.249***	(0.047)	0.313***	(0.079)
Observations	3234		1274	
Within R-squared	0.7553		0.8366	

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
[b] The EMU2 impact is calculated as exp(EMU2)-1; standard error by delta method.

Table 6. The impact of the euro on trade over time: Longer sample period 1980-2005

	Developed sample		EU sample	
	Coefficient	(s.e.)	Coefficient	(s.e.)
EMU2 – 1981	0.005	(0.059)	0.052	(0.070)
EMU2 – 1982	0.031	(0.058)	0.047	(0.067)
EMU2 – 1983	0.057	(0.057)	0.032	(0.064)
EMU2 – 1984	0.058	(0.054)	0.062	(0.061)
EMU2 – 1985	0.080	(0.054)	0.083	(0.062)
EMU2 – 1986	0.120**	(0.052)	0.048	(0.061)
EMU2 – 1987	0.157***	(0.049)	0.090	(0.057)
EMU2 – 1988	0.193***	(0.047)	0.157***	(0.055)
EMU2 – 1989	0.214***	(0.047)	0.153***	(0.055)
EMU2 – 1990	0.237***	(0.049)	0.167***	(0.056)
EMU2 – 1991	0.271***	(0.049)	0.192***	(0.056)
EMU2 – 1992	0.269***	(0.049)	0.183***	(0.056)
EMU2 – 1993	0.255***	(0.049)	0.164***	(0.056)
EMU2 – 1994	0.298***	(0.050)	0.197***	(0.057)
EMU2 – 1995	0.259***	(0.051)	0.177***	(0.060)
EMU2 – 1996	0.248***	(0.051)	0.185***	(0.060)
EMU2 – 1997	0.265***	(0.050)	0.236***	(0.058)
EMU2 – 1998	0.317***	(0.051)	0.281***	(0.060)
EMU2 – 1999	0.337***	(0.051)	0.298***	(0.060)
EMU2 – 2000	0.345***	(0.053)	0.324***	(0.063)
EMU2 – 2001	0.381***	(0.053)	0.396***	(0.061)
EMU2 – 2002	0.387***	(0.058)	0.376***	(0.066)
EMU2 – 2003	0.409***	(0.059)	0.362***	(0.067)
EMU2 – 2004	0.419***	(0.062)	0.394***	(0.069)
EMU2 – 2005	0.408***	(0.063)	0.384***	(0.070)
Real GDP	1.098***	(0.038)	0.938***	(0.050)
Free Trade Agreement	0.052***	(0.016)	0.090***	(0.022)
EU	0.084***	(0.032)	0.277***	(0.046)
EU Trend	0.0007**	(0.0003)	-0.003***	(0.0006)
Real Exchange Rate of Country 1	-0.353***	(0.037)	-0.700***	(0.073)
Real Exchange Rate of Country 2	-0.277***	(0.029)	-0.293***	(0.041)
Observations	6006		2366	
Within R-squared	0.7553		0.8856	

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7. The impact of the euro on nonjoiners: 1980-2005, using dummies

	Developed sample		EU sample	
	Coefficient	(s.e.)	Coefficient	(s.e.)
EMUNJ – 1981	0.011	(0.052)	-0.015	(0.067)
EMUNJ – 1982	-0.003	(0.051)	-0.038	(0.064)
EMUNJ – 1983	0.006	(0.049)	-0.060	(0.063)
EMUNJ – 1984	-0.016	(0.047)	-0.069	(0.059)
EMUNJ – 1985	-0.016	(0.046)	-0.071	(0.059)
EMUNJ – 1986	-0.024	(0.044)	-0.090	(0.057)
EMUNJ – 1987	-0.034	(0.044)	-0.127**	(0.055)
EMUNJ – 1988	-0.045	(0.043)	-0.151***	(0.054)
EMUNJ – 1989	-0.061	(0.042)	-0.191***	(0.053)
EMUNJ – 1990	-0.041	(0.044)	-0.202***	(0.054)
EMUNJ – 1991	-0.048	(0.044)	-0.213***	(0.054)
EMUNJ – 1992	-0.054	(0.043)	-0.217***	(0.054)
EMUNJ – 1993	-0.063	(0.043)	-0.201***	(0.055)
EMUNJ – 1994	-0.035	(0.043)	-0.222***	(0.055)
EMUNJ – 1995	-0.087*	(0.045)	-0.227***	(0.057)
EMUNJ – 1996	-0.103**	(0.044)	-0.237***	(0.057)
EMUNJ – 1997	-0.106**	(0.044)	-0.241***	(0.055)
EMUNJ – 1998	-0.139***	(0.045)	-0.290***	(0.058)
EMUNJ – 1999	-0.135***	(0.045)	-0.307***	(0.058)
EMUNJ – 2000	-0.130***	(0.046)	-0.338***	(0.060)
EMUNJ – 2001	-0.184***	(0.046)	-0.394***	(0.059)
EMUNJ – 2002	-0.160***	(0.048)	-0.361***	(0.064)
EMUNJ – 2003	-0.167***	(0.050)	-0.391***	(0.066)
EMUNJ – 2004	-0.172***	(0.053)	-0.408***	(0.068)
EMUNJ – 2005	-0.141***	(0.055)	-0.375***	(0.070)
Real GDP	1.108***	(0.038)	0.985***	(0.050)
Free Trade Agreement	0.045***	(0.016)	0.129***	(0.021)
EU	0.254***	(0.018)	0.046**	(0.021)
Real Exchange Rate of Country 1	-0.408***	(0.037)	-0.649***	(0.073)
Real Exchange Rate of Country 2	-0.340***	(0.028)	-0.207***	(0.040)
Observations	6006		2366	
Within R-squared	0.7452		0.8854	

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8. The impact of the euro on nonjoiners: 1980-2005, comparing trends

	Developed sample		EU sample	
	Coefficient	(s.e.)	Coefficient	(s.e.)
EMUNJConstant	-0.096***	(0.032)	-0.088**	(0.038)
EMUNJTrend	-0.011***	(0.001)	-0.020***	(0.001)
EMUNJTrend1999	0.004***	(0.0008)	0.005***	(0.0009)
CommonTrend	-0.045***	(0.002)	-0.027***	(0.002)
Real GDP	1.166***	(0.036)	1.026***	(0.045)
Free Trade Agreement	0.028*	(0.016)	0.082***	(0.019)
EU	0.253***	(0.018)	0.066***	(0.020)
Real Exchange Rate of Country 1	-0.347***	(0.026)	-0.554***	(0.042)
Real Exchange Rate of Country 2	-0.358***	(0.023)	-0.247***	(0.035)
Observations	6006		2366	
Within R-squared	0.7448		0.8850	

Note: Robust standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 1. European Monetary Union Trade

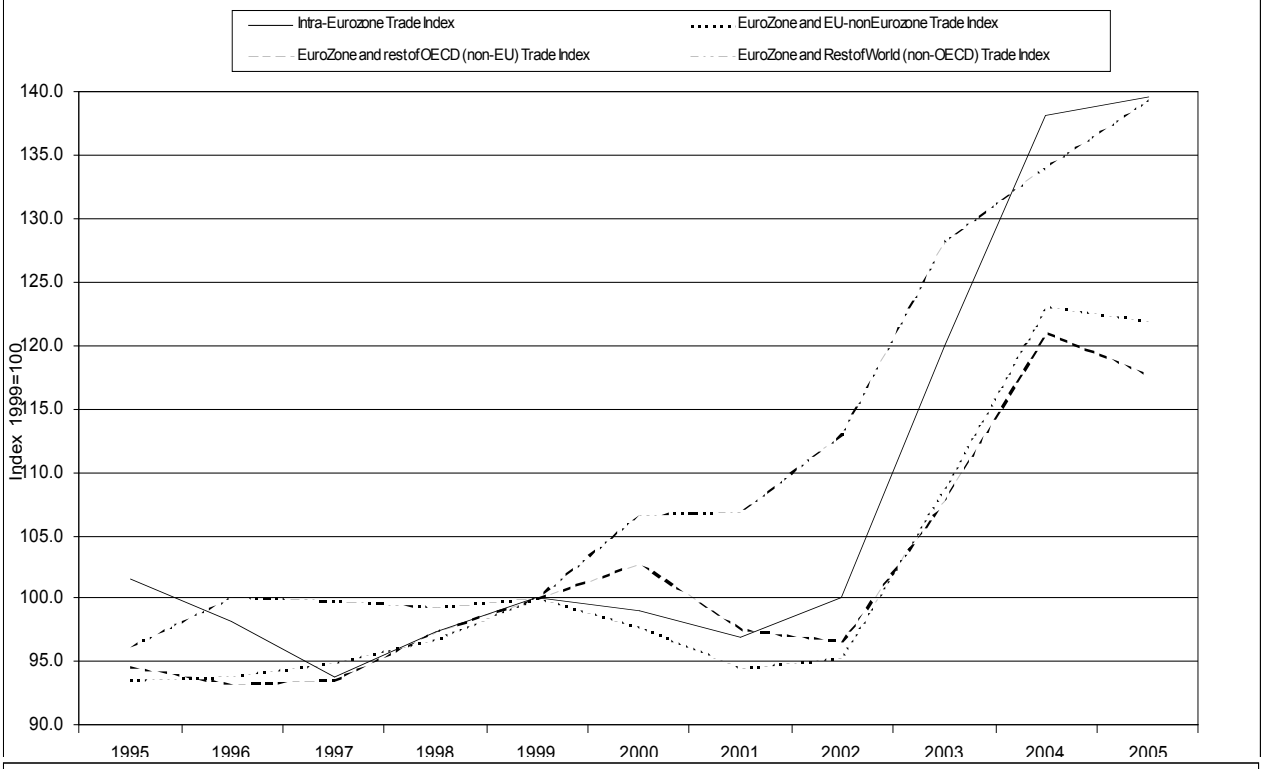


Figure 2. European Union (non-EMU countries) Trade

