# EMU effect on Trade:
# What's in it for the UK?

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## *Abstract*

In this paper we estimate the early effect of the European Monetary Union (EMU) on trade and its possible effects on the UK. We use a panel data set that includes the most recent information on bilateral trade for 22 developed countries from 1992 through 2001. After 1999, 12 European countries formally entered into a currency union. Controlling for a host of other factors, we find that a pair of countries that joined the EMU experiences an increase in trade around 14 percent. Furthermore, we found that EMU increases trade not only among members, but also with non-members. Focusing on the UK, our results suggest that if Britain had joined the EMU its trade would have been 7 percent larger in 2001, an additional 15 billion US dollars of 1995.

# I. Introduction

A common question these days, in Europe in general and in Great Britain in particular, is whether the UK should join the European Monetary Union (EMU). The introduction of the single currency in Europe raises issues that are of vital importance to UK interests, whether it decides to participate or not. The decision could potentially have an important impact on trade and on growth, as well as on aspects as diverse as financial services, employment, monetary and fiscal policy, etc.[1]

In the last few years, the debate on the UK regarding EMU has been polarized to an extraordinary degree. For those who oppose the EMU, the idea of participating in the single currency is not merely a dangerous possibility but a disastrous one. As an example, Margaret Thatcher insisted Britain must never join the 'doomed' euro in a March 2002 Times On Line interview. In particular, Lady Thatcher said that the abolition of the pound "would constitute a major loss of Britain's power to govern herself and thus an unacceptable blow to democracy". She added: "But more, I am convinced that the fundamentals of euroland are irredeemably unsound. The single currency is bound to fail, economically, politically and indeed, socially, though the timing, occasion and consequences are necessarily still unclear." "It therefore follows that countries which have not already joined the project would be well-advised to keep out."

Instead, for those who advocate in favor of joining the Euro, the participation not only represents a good opportunity to improve economic conditions, but also an important step to acquire an influential role in the process of European Integration. As an example, in a December 2001 speech to the European Research Institute in Birmingham, British Prime Minister Tony Blair referred to the UK's "history of missed opportunities". "We vacated a decisive role in shaping the single currency, its timing, the Maastricht convergence criteria and the European Central Bank," Blair noted. "We will not have influence if we only ever see Europe as in opposition to Britain," he said.

At the center of this debate, the Chancellor, Gordon Brown, devised five economic tests that must be met before any decision to join can be made. These tests are:

1) *Convergence Test:* Are business cycles and economic structures compatible so that the UK could live comfortably with euro interest rates on a permanent basis?
2) *Flexibility Test:* If problems emerge is there sufficient flexibility to deal with them?
3) *Investment Test:* Would joining EMU create better conditions for firms making long-term decisions to invest in Britain?

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[1] Currie (1997) discusses the broad impact that the Euro could have on the UK.

4) *Financial Services Test:* What impact would entry into EMU have on the competitive position of the UK's financial services industry, particularly the City's wholesale markets?

5) *Growth, Stability and Jobs Test:* Will joining EMU promote higher growth, stability and a lasting increase in jobs?

In this paper, we will address a different, but related issue: that of the impact of EMU on trade. The adoption of a common currency could potentially reduce transaction costs in trade between the member countries, leading to increased trade flows. In fact, the potential increase in trade associated to this reduction in transaction costs was one of the main hopes of the EC Commission as Europe advanced toward monetary unification.

While none of Gordon Brown's tests deals directly with the issue of trade, we believe that the impact of monetary union on trade may play a role in several of the tests listed above. Take for example the convergence test. There is evidence, drawn from the experience of industrial countries, suggesting that increased trade integration leads to increased cycle correlation.[2] If this is so, monetary union, through its impact on trade, could lead to increased convergence ex-post, even if convergence is not high enough to justify UK membership ex-ante.[3] Similarly, there is ample evidence of complementarities between trade and foreign direct investment (test 3), as well as between trade and financial services (test 4).[4] With regards to the fifth test, Frankel and Rose (2000) have provided evidence of the positive impact that the monetary union, through the trade channel, can have on growth.

The issue of the impact of currency union on trade is not a new one. In fact, this issue has been the subject of a large literature, beginning with Rose (2000a), who found that common currency increased trade among countries by a factor of three. However, most of the empirical literature to date draws its conclusions from the analysis of the currency union experience of very small and poor economies. There are important reasons to believe that the currency union effects discussed in the literature may not be the most relevant for the case of the countries in the EU, so very different from the previous currency union members in terms of both size and level of development.

An exception is a recent paper by Micco, Stein and Ordoñez (2002) which, using data on bilateral trade up to 2001, shows that common membership in EMU increases trade by

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[2] See Frankel and Rose (1997, 1998).
[3] Frankel (2002) analyzes this issue for the specific case of the UK decision.
[4] Grosse and Goldberg (1991), Brealey and Kaplanis (1996), Williams (1998) and Galindo et al (2003) find a positive and significant correlation between proxies of the flow of foreign direct investment in banking and the level of bilateral trade and FDI.

about 15 percent. Furthermore, these authors find no evidence of trade diversion. In this note we expand the exercise of Micco, Stein and Ordoñez (2002) by looking more closely at the impact EMU would have had on the UK, had this country become a member of the EMU in 1999. After briefly reviewing the literature on the currency union effect on trade in Section II, in Section III we present our empirical methodology and results. Finally, in Section IV we conclude.


## II. Empirical literature on the Currency Union effect on trade.[5]

In the last couple of years there has been a growing literature on the impact of common currencies on trade. The first paper to tackle this issue directly was Rose (2000a), who added a currency union dummy to a gravity model of bilateral trade. In order to have enough country pairs with common currencies to allow an estimation of the effect, he included in his sample all the dependencies, territories, colonies and overseas departments for which the United Nations collects international trade data. In this way, he put together a sample of 186 counties.[6] Rose found that two countries that share a common currency trade over three times as much as do otherwise similar countries with different currencies. In terms of the relevance of this finding for EMU, one important shortcoming is that most currency unions in the sample are either formed by very small or very poor countries (such as those in the Eastern Caribbean Currency Area) or by very small or poor countries adopting the currency of larger ones (such as Tonga adopting the Australian dollar).

Rose's first study was based on cross-section analysis. Therefore, the question it answers is whether countries that share a common currency trade more than others that do not. As Glick and Rose (2001) argue, this is not exactly the right question from a policy perspective. What one would want to know, as a policymaker, is the impact of a currency union on those countries that adopt it. In order to respond this question, Glick and Rose (2001) study the impact of common currency using panel data from 1948 through 1997.[7] Glick and Rose's answer is that adopting currency unions nearly doubles bilateral trade among member countries.[8] Notice, however, that the sample ends in 1997, before the

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[5] This literature review draws heavily on Micco, Stein and Ordoñez (2002)

[6] Within this sample, there are over 300 observations for which two countries trade and share a common currency, which allows for the estimation of the currency union effect.

[7] The long sample period is crucial in order to have enough country pairs with periods in which they shared currencies and periods in which they did not.

[8] Actually, the sample used by Glick and Rose includes mostly countries that exited currency unions, rather than countries that joined them. In addition, these authors do not differentiate countries that formed currecy unions from others that simply adopted the currency of another, such as Panama. For a discussion of these issues, as well as an analysis of the difference between the impact of currency unions and the unilateral adoption of the currency of other countries, see Levy Yeyati (2002).

creation of the EMU. Thus, while Glick and Rose answer the right policy question, their answer is relevant mostly for the case of very small and/or poor countries, which are primarily the ones that have had currency unions (or have adopted the currency of others) in their sample.

These controversial findings by Rose and his co-authors were followed by a large number of studies, some of them criticizing their work on methodological grounds, and seeking to "shrink" the currency union effect.[9] Papers worth mentioning, among Rose's critics, are those of Persson (2001) and Tenreyro (2002). Persson argues that the fact that some of the explanatory variables (such as country size) may have non-linear effects, combined with the fact that the selection of country pairs into currency unions is non-random (and may depend on those same explanatory variables) biases the results in Rose (2000a). Tenreyro, in turn, emphasizes problems of endogeneity. After correcting for these problems, both authors find the effect of shared currency on trade to be smaller, of the order of 60 percent. Yet, neither of this papers address the issue that concerns us: their results are based on the experiences of very small and poor countries.

Two papers that provide some hints about the currency effect on trade in large countries using historical data are Estevadeordal, Frantz and Taylor (2002) and López-Cordova and Meissner (2002). Both of these papers look at the experience of countries during the gold standard, using smaller samples that consist primarily of industrial countries and a small group of large developing countries. Estevadeordal, Frantz and Taylor, using data from 1870 through 1939, find that common participation in the gold standard increased trade between 34 and 72 percent, depending on the specification used. López-Córdova and Meissner, using data from 1870 through 1910, find the gold standard effect to be 60 percent. In addition, they find that currency unions double trade, a result that is very similar to that found by Glick and Rose (2001).

Another recent paper that has addressed this problem is Rose and van Wincoop (2000). This paper, which is in turn based on a model of bilateral trade developed by Anderson and van Wincoop (2000), estimates the *potential* EMU effect on trade, using data on pre-EMU currency unions. According to the theory, bilateral trade between a pair of countries depends on their bilateral trade barrier *relative* to average trade barriers with all trading partners (i.e., their multilateral trade barrier or "multilateral resistance."). Since reducing barriers vis a vis an important trading partner also reduces multilateral resistance, the impact of the currency union on trade should be smaller in the case of countries which are large and proximate. Taking this into consideration, Rose and van Wincoop estimate that

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[9] The prize for best title among Rose's critics goes to Volcker Nitsch, for his paper "Honey, I just shrank the currency union effect."

the increase in trade for the case of EMU would be of the order of 60 percent. These estimates, however, depend crucially on assumptions made regarding the elasticity of substitution between goods

A lot has been written with regards to the question of whether the UK should join EMU.[10] Some papers, such as Artis (2000) analyze the issue from an optimal currency area perspective. Others, such as Mather (2002) have focused on political economy considerations, stressing the political interests of the different actors involved. Yet others, such as Currie (1997), George (1997) consider a wide variety of aspects to be taken into account. Efforts to measure the potential impact of EMU on British trade, however, have been rather scant.

One of the few attempts to measure the EMU's potential impact on UK trade was Rose (2000b).[11] In his paper, he extrapolates the results of his original cross-section gravity equations to the case of the UK, estimating that "joining EMU might eventually triple the UK's trade with Euroland, leading to an overall doubling of British external trade." In addition, extrapolating the results of his paper with Jeff Frankel on the impact of currency unions on trade and growth (2000), Rose estimates that joining the EMU would boost British GDP by 20 percent in the long run. While Rose does not analyze the channels through which the currency union would have such a large effect, he argues that "even if we do not know *why* a common currency makes a big difference, it is plausible *that* it does". Rose, however, warns the reader that none of the previous currency unions matched the EMU in terms of size and scope, that data on EMU was still insufficient, that only time would tell what the actual effect of EMU on trade would be, and that in the meantime his estimation results should not be taken too literally.

We now have three years of trade data since the creation of the EMU. For this reason, it is now possible to estimate with actual EMU data (rather than pre-EMU data, as in Rose and van Wincoop, 2000) the impact of currency union on trade for the specific case of the European Monetary Union. Likewise, it is now possible to look more precisely at the potential impact on a country such as the UK. In a recent paper, Micco, Stein and Ordoñez (2002) estimate the effects of EMU on trade between its members in a direct way. They find that the EMU effect is positive and significant, although much smaller than that suggested by the previous literature. Furthermore, they find no evidence that

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[10] A complete survey of this literature exceeds the scope of the present paper.
[11] Rose (2000c) made a similar exercise for Sweden and arrives at a similar conclusion that EMU potentially could increase its trade significantly.

EMU diverts trade away from non-members.[12] In the next section, we will present some of the results in Micco, Stein and Ordoñez, and then extend them to analyze the specific case of the UK.

## III. Methodology, data and empirical results

### 1. The EMU effect on trade

In this section, we reproduce some of the results in Micco, Stein and Ordoñez (2002). While in the previous paper we worked with two different samples of countries (developed country sample and EU sample), for our present purposes it is more convenient to concentrate on the developed country sample alone.[13] In order to provide an estimate of the impact of EMU on trade, we first work with a difference-in-difference model. This methodology allows us to capture the currency union effect in a single estimate, comparing the changes in bilateral trade among EMU (or "treated") country pairs before and after the creation of the monetary union to changes in bilateral trade among non-EMU country pairs, which are used as "controls". In order to address the trade diversion issue, we also compare changes in bilateral trade among country pairs in which only one is a member of EMU with those corresponding to the control group.[14] Specifically, we estimate the following panel model:

$$LnT_{ijt} = \beta_{ij} + \beta_t + \beta_1 \ln Y_{it} Y_{jt} + \beta_2 Lny_{it} y_{jt} + \beta_3 FTA_{ijt} + \beta_4 EU + \beta_5 EMU\ 2_{ijt} + \beta_6 EMU\ 1_{ijt} + \varepsilon_{ijt} \quad \textbf{(1)}$$

where $T$ represents bilateral trade[15], $Y$ is GDP , $y$ is GDP per capita, $FTA$ is a dummy that takes the value one when the countries in the pair belong to the same Free Trade Area,

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[12] In fact, trade of EMU countries also tends to increase vis a vis non members, a result that is consistent with previous evidence provided by Frankel and Rose (2000), who look at the same issue for a much larger sample.

[13] The reason is that the EU country sample does not have enough country pairs conformed by non-EMU countries in order to study the impact of EMU on the UK. In fact, not counting the UK pairs, we would be left with just one pair of non-EMU countries (Denmark-Sweden) from which to identify the EMU effect.

[14] The use of the term "trade diversion" here requires some clarification, since it does not correspond exactly to the concept of trade diversion developed by Viner (1950). In Viner's work, trade diversion involves a geographical shift in the origin of imports for the country that is considering a trade agreement as a result of the preferential treatment, in favor of the partners in the trading bloc, and away from the most efficient producers of the goods in question. Here, a currency union could also potentially shift trade away from non members and in favor of members, but unlike the traditional trade diversion case, here there is no distortion involved. In fact, it is useful to think about the reduction in transaction costs as akin to a reduction in transportation costs between the currency union members. In spite of this, in the rest of the paper we will use the term trade diversion understood as a shift in trade away from non-members, since other papers in this literature have used the term in this way (see for example, Frankel and Rose 2000).

[15] We define trade as the average value of bilateral imports and exports in current US dollars.

and *EU* is a dummy variable that takes the value one when both countries in the pair belong to European Union. Our currency union variables are *EMU2$_{ijt}$* which takes a value of one when the two countries in the pair (i and j) belong to the EMU in the current year (t) and zero otherwise, and *EMU1$_{ijt}$* (Just one in EMU), a dummy that takes the value one when just one of the countries in the pair belongs to EMU, and zero otherwise. Notice that since the EMU was formally created in 1999, both EMU2 and EMU1 are zero for all country pairs before 1999. The model includes country-pair and year fixed effects. In our empirical exercises we also allow for a trend in the effect of EU on trade.[16] The reason is that we do not want to attribute to EMU possible trade effects associated to the deepening of the European Union.

We work with bilateral trade data from the IMF Direction of Trade Statistics, between 1992 and 2001. Bilateral trade is defined as the average value of bilateral imports and exports in current US dollars.[17] Our sample includes all 22 industrial countries included in the DOTS dataset (see Appendix for list of countries). The sample results in a total of 231 (22X21/2) country pairs. Out of these, 11 of them (counting Belgium and Luxembourg as one) are members of the European Monetary Union. Thus there are 55 country pairs (11X10/2) that share a common currency, 121 country pairs (11X11) composed by an EMU member and a non-EMU member and 55 country pairs of non-EMU members. We exploit this variation to estimate the effect of EMU on trade. The sample does not contain observations with zero trade, which saves us the trouble of dealing with this aspect of the gravity model.

Our explanatory variables are taken from different sources. Population and GDP data come from "World Development Indicators". Most country-specific variables (coordinates, borders, etc) are taken from CIA's "World Factbook". Finally, we obtain the information on trade agreements from Frankel (1997).

An important methodological question is whether we should use nominal or real GDP and GDP per capita as controls in the model, particularly since large shifts in real

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[16] Beside the EU dummy we include a variable that is the interaction of this dummy and the year.
[17] Since the model includes year fixed effects, it is not necessary to deflate trade with US inflation.

exchange rates around the time of the creation of EMU may cause the results to be sensitive to changes in the definition of the GDP variables. The answer to this question, in our view, is not obvious, and may depend on the way prices are set. Consider, for example, the impact of the depreciation of the Euro following the creation of EMU. Let us assume that this depreciation had no effects on real GDPs. If all prices are set in dollars, the depreciation should have no effect on the value of bilateral trade among countries. In this case, real GDP seems to be the way to go. The use of nominal GDP in dollars would reduce the value of GDP for the Euro countries following the depreciation. Since trade flows do not change, the Euro countries would appear to be trading more among themselves, after controlling for GDP, and thus the impact of the Euro on trade would be overestimated.

Consider instead the case in which prices are set in the currency of the producer. In these case, bilateral flows between two EMU countries, measured in dollars, would decline following the depreciation, even if the volume of trade were unchanged.[18] Bilateral trade between an EMU country and a non-EMU country will also decline, although to a lesser extent. The use of real GDP, in this case, would underestimate the Euro effect on trade, since the decline in the dollar value of bilateral trade would be erroneously attributed to the Euro. In this case, using nominal GDP may be more appropriate, since the decline in trade flows is accompanied by corresponding declines in nominal GDP in the Euro countries.[19] Similar considerations would apply to the case in which there is "pricing to market", i.e., where prices are set in the currency of the buyer. In the end, which is the ideal variable to use may depend on the way in which prices are set. In a sample dominated by developing countries, which tend to be price takers, it may be more appropriate to consider that prices are set in dollars, in which case using real GDPs appears to be more appropriate. In contrast, for a sample of industrial countries such as the one we use here, in which a larger portion of trade is associated to activities with increasing returns to scale and firms have market power, it may be more appropriate to

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[18] We are abstracting here from substitution effects, and concentrating only on valuation issues.
[19] On the other hand, the use of nominal GDP in dollars may overestimate the EMU effect, depending on the coefficient of GDP.

use nominal GDP.[20] Rather than choosing one or the other, here we start by using both, with the idea that, due to the depreciation of the Euro following the creation of EMU, the results using nominal GDP may be an upper bound, and the result using real GDP a lower bound, of the impact of EMU on trade. After comparing the results with nominal and real GDP, we attempt to control for the movements in the real exchange rate in a more explicit way.

The first two columns in Table 1 present the results of our difference-in-difference regressions, using nominal and real GDP variables, respectively. In both cases, the EMU2 variable is positive and significant, suggesting that the currency union has a positive effect on trade. Compared to the control group (i.e., trade between two non-EMU countries), common membership in EMU increases bilateral trade by nearly 22 percent when we use nominal GDP variables,[21] and by 10 percent if we use real GDP variables instead. The coefficient for EMU1, i.e, for the case of country pairs when just one is in EMU, suggests that there is no trade diversion. On the contrary, both for the nominal and the real cases, these coefficients are positive and significant, suggesting that EMU countries also increased trade with non-members, relative to trade within the control group. The EMU1 effect ranges between 8 percent and 15 percent, depending on the specification. It is interesting to note that while using Nominal GDP EMU1 is significantly smaller than the EMU2 effect, this is not the case using Real GDP.[22] Notice that the coefficient for the EU trend is positive and significant in all specifications. This suggests that, had we omitted it from the regressions, we would have been overestimating the impact of the EMU.[23]

In the third column of Table 1, we attempt to control for the movements in exchange rates, as a way to improve on the nominal/real GDP choice discussed above. We do this by adding to the model an index of the real exchange rate for each of the countries in the

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[20] We find it difficult to believe that German exporters would set the price of their exports to France, for example, in dollars.

[21] Exp (0.201)-1

[22] The F test is reported at the bottom of Table 1.

[23] The lack of significance of the FTA and EU dummies does not mean that trade integration does not play a role. For the most part, the impact of the trade integration on trade is captured by the country pair fixed effects, at least for the countries that were partners in trade agreements throughout the period.

pair (in logs).[24] Once we control for this, using nominal or real GDP and GDP per capita yields identical results for the trade effect. Reassuringly, the table shows that, in this case, both the coefficient for EMU2 and EMU1 lie somewhere in between those obtained with the nominal or the real versions of the model. Specifically, trade between two countries that share membership in the EMU increased by 14 percent, compared to the control group, while trade between an EMU and a non-EMU country increased by 10 percent. Furthermore, in this specification the difference between EMU2 and EMU1 is statistically significant. In the rest of the paper, we will work with specifications that include the nominal GDP and GDP per capita, but also control for the swings in exchange rates.

The fact that EMU increases trade not only among members, but also with non-members, is somewhat surprising. The results suggest that EMU may act more as a "trade booster", rather than just reducing transactions costs among its members.[25] A potential explanation is that the use of the Euro, a more liquid currency, makes it easier for member countries to hedge exchange rate risk, even in their transactions vis-à-vis non members. The fact that the coefficient for EMU2 is bigger that of EMU1 provides support to the "trade booster" hypothesis: it appears that membership in EMU increases trade with all partners by around 10 percent. If both countries are in EMU, however, their bilateral trade flows benefit roughly from a double boost. Our result suggests that countries that trade with EMU partners have already obtained some benefits from EMU, in the form of increased trade. The size of these benefits would depend on the extent to which they trade with the EMU bloc. For a country like Canada, for which EMU represented around 5 percent of trade (as of 1996), the boost in total trade would be quite small (of the order of 0.5 percent). In contrast, for the UK, for which EMU represented 64 percent of total trade prior to EMU, the increase in total trade due to the creation of EMU would be around 6.5 percent.

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[24] We construct this index as the ratio between the nominal exchange rate with respect to the US dollar and the GDP deflator. Since time dummies are included in the model, this in effect would be equivalent to multiplying this index by the US GDP deflator (to get bilateral real exchange rates vis a vis the US), or by any country's GDP deflator, for that matter.

[25] We are indebted to Richard Baldwin for suggesting this interpretation of our results.

# Table 1: Difference in Difference Model

| Dependent Variable: Log of Bilateral trade | Developed Sample 1992-2001 | | |
| --- | --- | --- | --- |
| | *Nominal GDP* | *Real GDP* | *Real GDP* |
| **EMU 2 / 1** | **0.201** | **0.099** | **0.129** |
| | **(0.020)\*\*\*** | **(0.019)\*\*\*** | **(0.020)\*\*\*** |
| **EMU 1 /2** | **0.138** | **0.080** | **0.095** |
| | **(0.016)\*\*\*** | **(0.017)\*\*\*** | **(0.016)\*\*\*** |
| Log of GDP | 3.093 | 2.391 | 2.165 |
| | (0.327)\*\*\* | (0.322)\*\*\* | (0.330)\*\*\* |
| Log of GDP per capita | -2.648 | -1.330 | -1.172 |
| | (0.343)\*\*\* | (0.362)\*\*\* | (0.368)\*\*\* |
| Free Trade Agreement | 0.028 | -0.006 | 0.002 |
| | (0.020) | (0.020) | (0.020) |
| European Union | -0.010 | 0.020 | 0.015 |
| | (0.021) | (0.021) | (0.021) |
| EU Trend | 0.014 | 0.007 | 0.007 |
| | (0.003)\*\*\* | (0.003)\*\* | (0.003)\*\* |
| Real Exchange Rate Country 1 | | | -0.187 |
| | | | (0.048)\*\*\* |
| Real Exchange Rate Country 2 | | | -0.305 |
| | | | (0.058)\*\*\* |
| F Test between /1 and /2 | (18.44)\*\*\* | (1.89) | (5.48)\*\* |
| Year Dummy | Yes | Yes | Yes |
| Country Pair Dummy | Yes | Yes | Yes |
| Observations | 2310 | 2310 | 2310 |

Robust t-statistics in parentheses

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

Source: Micco, Stein and Ordoñez (2002).

While the difference in difference analysis has the advantage of producing a single estimate for the EMU effect, it does not provide information on whether the jump in trade was abrupt or smooth, whether the trade increased in anticipation of the EMU, or whether the impact is only obvious after a lag. In order to analyze these issues in more detail, we estimated the following panel model:

$$LnT_{ijt} = \beta_{ij} + \beta_t + \beta_1 \ln Y_{it}Y_{jt} + \beta_2 \ln y_{it}y_{jt} + \beta_3 RER_{it} + \beta_4 RER_{jt} + \beta_5 FTA_{ijt} + \beta_6 EU_{ijt}$$
$$+ \sum_{\tau \in (1992,2001]} \beta_{7\tau} I(\tau = t) EMU2B_{ij} + \sum_{\tau \in (1992,2001]} \beta_{8\tau} I(\tau = t) EMU1B_{ij} + \varepsilon_{ijt} \qquad (2)$$

where I($\tau$=t) is an indicator function that is one if $\tau$ is equal to t and zero otherwise, the rest of the variables are defined as before. The definition of EMU2B (EMU2-bound countries) in this model is different than its definition in the difference in difference model. In that case, the EMU2 dummy took a value of one only during the years in which the country pair *formally* belonged to EMU. Before 1999, the dummy had a value of zero for all pairs. Here, in contrast, EMU2B will be will take a value of one for a pair of countries that will be part of EMU, *even before* the formal creation of EMU. For example, EMU2B takes a value of one for the pair Germany-Spain for 1995, even when these countries only became part of EMU in 1999. For this reason, while the EMU1 and EMU2 dummies had subscripts *ijt* in the difference in difference model, EMU2B and EMU1B only have subscripts *ij* in the panel model.[26] The idea is to follow the evolution of trade in these countries over time, and check whether there is a jump around 1999. The interaction of the EMU2B variable with the indicator function discussed above allows us to follow the behavior of trade among the EMU countries year by year. The EMU effect in this specification is not captured directly by the estimated year-coefficients ($\beta_\tau$) for *EMU2B*. Rather, it is captured by the jump in these coefficients around the formal creation of the EMU. Similar considerations apply to the EMU1B dummy. As discussed above, the model also includes a EU trend, and the real exchange rate in both countries in the pair. GDP and GDP per capita are included in their real versions.[27]

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[26] In this model we leave Greece out of EMU countries because it only joined the monetary union in 2001
[27] By construction, results do not change whether we use the real or nominal GDP.

## Table 2: - Panel Model

| Dependent Variable: Log of Bilateral trade | Nominal GDP | Developed Sample<br>1992-2001<br>Real GDP | Real GDP |
|---|---|---|---|
| Log GDP | 3.244 | 2.617 | 2.370 |
| | (0.327)*** | (0.314)*** | (0.326)*** |
| Log of GDP per capita | -2.804 | -1.603 | -1.420 |
| | (0.344)*** | (0.353)*** | (0.362)*** |
| Free Trade Agreement | 0.020 | -0.012 | -0.005 |
| | (0.020) | (0.020) | (0.020) |
| European Union | 0.002 | 0.026 | 0.025 |
| | (0.021) | (0.021) | (0.021) |
| EU Trend | 0.008 | 0.002 | 0.001 |
| | (0.003)** | (0.003) | (0.003) |
| Real Exchange Rate Country 1 | | | -0.206 |
| | | | (0.049)*** |
| Real Exchange Rate Country 2 | | | -0.291 |
| | | | (0.058)*** |
| 1993*EMU 2B | -0.043 | -0.063 | -0.043 |
| | (0.041) | (0.037)* | (0.039) |
| 1994*EMU 2B | 0.039 | 0.028 | 0.047 |
| | (0.039) | (0.036) | (0.037) |
| 1995*EMU 2B | 0.078 | 0.086 | 0.088 |
| | (0.042)* | (0.039)** | (0.040)** |
| 1996*EMU 2B | 0.060 | 0.053 | 0.061 |
| | (0.040) | (0.037) | (0.038) |
| 1997*EMU 2B | 0.121 | 0.059 | 0.093 |
| | (0.042)*** | (0.038) | (0.039)** |
| 1998*EMU 2B | 0.213 | 0.177 | 0.187 |
| | (0.043)*** | (0.039)*** | (0.040)*** |
| 1999*EMU 2B | 0.272 | 0.193 | 0.223 |
| | (0.040)*** | (0.036)*** | (0.037)*** |
| 2000*EMU 2B | 0.316 | 0.156 | 0.223 |
| | (0.047)*** | (0.043)*** | (0.045)*** |
| 2001*EMU 2B | 0.347 | 0.225 | 0.270 |
| | (0.048)*** | (0.044)*** | (0.046)*** |
| 1993*EMU 1B | -0.037 | -0.047 | -0.037 |
| | (0.039) | (0.036) | (0.037) |
| 1994*EMU 1B | 0.010 | 0.003 | 0.013 |
| | (0.037) | (0.035) | (0.035) |
| 1995*EMU 1B | 0.045 | 0.047 | 0.047 |
| | (0.040) | (0.038) | (0.038) |
| 1996*EMU 1B | 0.026 | 0.019 | 0.022 |
| | (0.037) | (0.035) | (0.036) |
| 1997*EMU 1B | 0.067 | 0.032 | 0.047 |
| | (0.039)* | (0.037) | (0.037) |
| 1998*EMU 1B | 0.124 | 0.101 | 0.105 |
| | (0.039)*** | (0.037)*** | (0.037)*** |
| 1999*EMU 1B | 0.151 | 0.105 | 0.119 |
| | (0.036)*** | (0.034)*** | (0.034)*** |
| 2000*EMU 1B | 0.181 | 0.094 | 0.125 |
| | (0.041)*** | (0.040)** | (0.040)*** |
| 2001*EMU 1B | 0.200 | 0.131 | 0.151 |
| | (0.041)*** | (0.040)*** | (0.040)*** |
| Year Dummy | Yes | Yes | Yes |
| Country pair Dummy | Yes | Yes | Yes |
| Observations | 2310 | 2310 | 2310 |

Robust t-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

<u>Source</u>: Micco, Stein and Ordoñez (2002).

The results are reported in Table 2. These coefficients show that the impact of EMU on trade among members is around 17%, and that there is no evidence of trade diversion. On the contrary, the coefficients for the EMU1B dummy increase around 1999, and this increase is statistically significant. As can be seen in Table 3, this exercise allows us to obtain alternatives measures of the EMU impact. In fact, it may have an advantage over the estimates obtained in Table 1 because those estimate may potentially be more tainted by changes in bilateral trade that occurred at the beginning of the sample period, which probably have very little to do with monetary unification. The more compact period in which the yearly coefficients are compared reduces the chances of having the results contaminated by developments that happened several years before. In Table 3, we present four other estimates of the currency union effect on trade, which are drawn from the regressions presented in Table 2, and result from the comparison of the before and after coefficients of the yearly EMU 2 variables, leaving the year 1998 out.[28]

### Table 3: Alternative measures of the EMU 2 and EMU 1 impact

|  | Alternative measures | |
| --- | --- | --- |
|  | EMU 2 | EMU 1 |
| 1999-2000 vs. 1996-97 | 15.7*** | 9.1*** |
| 1999-2001 vs. 1995-97 | 17.1*** | 9.7*** |

*** Significant at 1 percent.. The impacts are obtained using the coefficients of Column 3 in Table 2

Results in Table 2 confirm our findings using the difference in difference method, but what is somewhat surprising is that that the effect of EMU on trade started in 1998 and not after its formal creation in 1999.[29]

The obvious question is why the jump in 1998, given that EMU was formally created in 1999. While the road to the EMU started with the elimination of capital controls, and intensification of policy and central bank coordination in 1990 (Stage 1 of the EMU), the year 1998 was a pivotal year in the process of monetary unification. In fact, whether or not the EMU would become a reality was still in doubt as late as 1997. Italy and Belgium had levels of debt that exceeded the convergence criteria by a wide margin. In France, a

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[28] For example, the first of the four estimates is calculated averaging the yearly EMU 2 coefficients corresponding to 1996 and 1997 in regression 1, Table 2, and doing the same for the years 1999-2000. The estimate is simply calculated as *exp (avg coef 96-97 - avg coef 99-00) – 1*.

[29] Preliminary results annualizing the first 10 months of trade data for 2002 suggests that the EMU effect in 2002 is similar to that in the previous year.

socialist government had come into power, amid campaign promises to focus more on the lingering unemployment problem, and less on meeting the convergence criteria.[30] Even Germany had trouble meeting the convergence criteria, as deficits increased as a result of the unification efforts.[31] In 1998, any lingering concerns regarding the future of EMU were put to rest. On March 25, 1998, the European Commission and the European Monetary Institute published their convergence reports, recommending that 11 countries –Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain-- be admitted into the EMU. At the beginning of May, the decision was formally announced during a meeting of the Heads of State in Brussels, during which the bilateral irrevocable conversion rates were set among the member currencies. This was followed on June 1, 1998, with the official creation of the European Central Bank.

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[30] Once in office, however, the Jospin government committed itself to monetary unification.

[31] These difficulties were reflected in Franco Modigliani's Financial Times article, March 14, 1997: "The news that Germany risks failing the exam for admission to economic and monetary union (EMU) has shaken Europe."

## 2. UK Analysis

An important question is whether the UK's trade experience in the past few years is similar to that of other non-EMU countries. This question is interesting because, had the UK's trade experienced an evolution similar to that of EMU members, it would be harder to argue that this country missed important trade opportunities by staying out of the monetary union. To answer this question, in this section we extend the models presented above, in order to look more closely at the experience of the UK.

We expand the difference-in-difference model by splitting the EMU1 dummy into two different dummies. The first one is a dummy *EMU1-UK* that takes the value one for trade between the UK and a country that is formally in EMU[32]. The second dummy (*EMU1-non-UK)* takes the value one for all country-pair composed by an EMU country and a non-EMU country other than the UK. Finally, we also add a UK dummy that takes the value one when UK is a country in the pair *after the EMU creation.* The reason is that we want to control for other factors, contemporaneous but unrelated to EMU, which may have affected UK trade more generally

The key to this exercise is the comparison of the coefficients for *EMU1-UK* and *EMU1-non-UK*. Similar coefficients would suggest that the behavior of the UK was similar to that of other non-EMU countries. Table 4 shows the results of the difference in difference approach. In order to make the results comparable to those in the previous section, in column 1 we reproduce, as a benchmark, the result in which the –EMU-non EMU pairs are grouped together under the EMU1 dummy. Column 2 shows the same regression, but splitting the *EMU1* dummy into *EMU1-UK* and *EMU1-non-UK*. In Column 3 we add the *UK* dummy to see what happened with total UK trade after the formal creation of EMU.

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[32] As in the difference in difference model of the previous section, this dummy takes a value of zero for all country pairs before the 1999 creation of the EMU.

## Table 4: Difference in difference model – Splitting UK

| Dependent Variable: Log of Bilateral trade | Real GDP | Developed Sample 1992-2002 Real GDP | Real GDP |
|---|---|---|---|
| EMU 2 | 0.129 | 0.128 | 0.131 |
| | (0.020)*** | (0.020)*** | (0.022)*** |
| EMU 1 | 0.095 | | |
| | (0.016)*** | | |
| EMU 1-UK | | 0.078 | 0.063 |
| | | (0.026)*** | (0.030)** |
| EMU 1-non UK | | 0.096 | 0.099 |
| | | (0.017)*** | (0.018)*** |
| UK | | | 0.019 |
| | | | (0.027) |
| Log of GDP | 2.165 | 2.169 | 2.192 |
| | (0.330)*** | (0.330)*** | (0.335)*** |
| Log of GDP per capita | -1.172 | -1.178 | -1.202 |
| | (0.368)*** | (0.368)*** | (0.373)*** |
| Free Trade Agreement | 0.002 | 0.002 | 0.002 |
| | (0.020) | (0.020) | (0.020) |
| Post Maastricht | 0.015 | 0.013 | 0.014 |
| | (0.021) | (0.021) | (0.021) |
| EU Trend | 0.007 | 0.007 | 0.007 |
| | (0.003)** | (0.003)** | (0.003)** |
| Real Exchange Rate Country 1 | -0.187 | -0.195 | -0.187 |
| | (0.048)*** | (0.051)*** | (0.053)*** |
| Real Exchange Rate Country 2 | -0.305 | -0.304 | -0.303 |
| | (0.058)*** | (0.058)*** | (0.058)*** |
| F Test between EMU 2 and EMU 1 | (5.48)** | | |
| F Test between EMU 2 and EMU 1-UK | | (4.13)** | (3.83)** |
| F Test between EMU 1-UK and EMU 1-non UK | | (0.60) | (1.10) |
| Year Dummy | Yes | Yes | Yes |
| Country Pair Dummy | Yes | Yes | Yes |
| Observations | 2310 | 2310 | 2310 |

Robust t-statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%
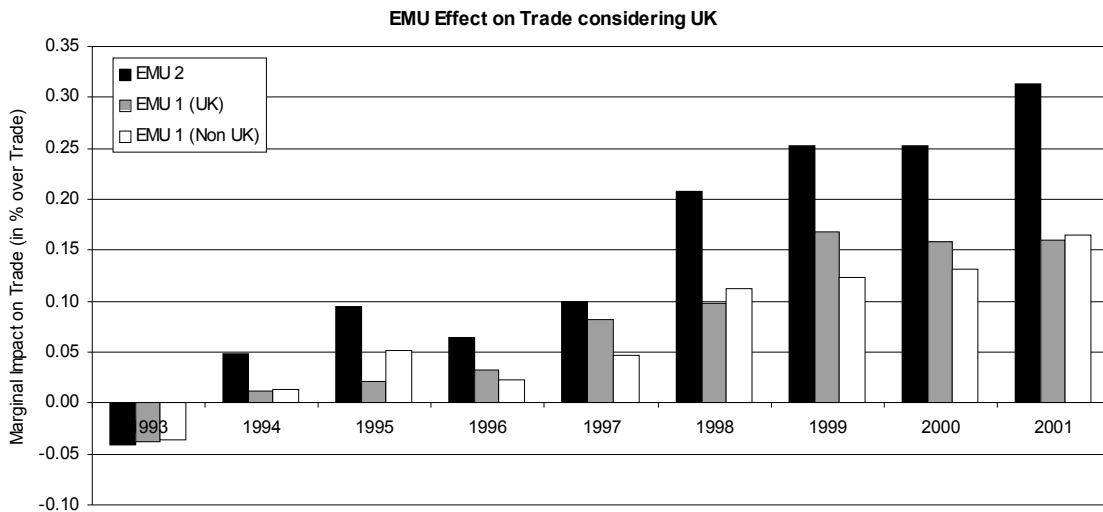
Source: Authors' calculations.

The results shown in columns 2 and 3 suggest that the UK behaved as a typical non-EMU member. Actually, as can be seen in the F-tests reported at the bottom of Table 3, the *EMU1-UK* coefficient is not statistically different from *EMU1-non-UK* but it is statistically different from the *EMU2* dummy. This result holds in column 3 when we

control for total UK trade after the formal creation of EMU using a dummy that takes the value 1 for UK after 1999.

Our analysis suggests that, had the UK been a part of EMU since 1999, its trade with *all countries* (both those in EMU and those outside of EMU) would have been boosted by around 5.3%. While much smaller than previous estimates by Rose (2000), this increase would represent a sizable gain for the UK. Around two thirds of this increase would be associated to trade flows with EMU members. [33]

As in the previous section, it is interesting to follow the evolution of the EMU effect on trade over time, splitting the EMU1 dummy into trade of EMU countries with the UK, and with the rest of the non-EMU developed world. For this reason, we now replicate the model described in equation (2), augmented by splitting the EMU1 dummy into *EMU1d-UK* and *EMU1d-non-UK*, as described above. Results are presented in Table 5, as well as in Figure 1.

**Figure 1**



Source: Authors' calculations

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[33] If we analyze the effect of EMU on UK exports and imports separately we find that the relative impact of EMU is highly sensitive to changes in the specification.

## Table 5: Panel data analysis – Splitting UK

| Dependent Variable: Log of Bilateral Trade | | Developed Countries 1992-2001 | |
| --- | --- | --- | --- |
| | | Real GDP | |
| | | Coefficient | Standard Dev. |
| Log GDP | | 2.376 | (0.327)*** |
| Log of GDP per capita | | -1.425 | (0.363)*** |
| Free Trade Agreement | | -0.005 | (0.020) |
| European Union | | 0.028 | (0.021) |
| EU Trend | | 0.001 | (0.003) |
| Real Exchange Rate Country 1 | | -0.194 | (0.055)*** |
| Real Exchange Rate Country 2 | | -0.294 | (0.059)*** |
| *EMU 2B* | 1993 | -0.042 | (0.039) |
| . | 1994 | 0.048 | (0.037) |
| . | 1995 | 0.090 | (0.040)** |
| . | 1996 | 0.063 | (0.038)* |
| . | 1997 | 0.095 | (0.039)** |
| . | 1998 | 0.189 | (0.040)*** |
| . | 1999 | 0.225 | (0.038)*** |
| . | 2000 | 0.225 | (0.045)*** |
| . | 2001 | 0.272 | (0.046)*** |
| *EMU 1B - UK* | 1993 | -0.039 | (0.049) |
| . | 1994 | 0.012 | (0.046) |
| . | 1995 | 0.021 | (0.047) |
| . | 1996 | 0.032 | (0.044) |
| . | 1997 | 0.078 | (0.045)* |
| . | 1998 | 0.094 | (0.049)* |
| . | 1999 | 0.155 | (0.047)*** |
| . | 2000 | 0.147 | (0.052)*** |
| . | 2001 | 0.148 | (0.056)*** |
| *EMU 1B-nonUK* | 1993 | -0.037 | (0.038) |
| . | 1994 | 0.013 | (0.037) |
| . | 1995 | 0.050 | (0.039) |
| . | 1996 | 0.022 | (0.037) |
| . | 1997 | 0.045 | (0.038) |
| . | 1998 | 0.106 | (0.038)*** |
| . | 1999 | 0.116 | (0.035)*** |
| . | 2000 | 0.123 | (0.041)*** |
| . | 2001 | 0.152 | (0.040)*** |
| Year Dummy | | Yes | |
| Country pair Dummy | | Yes | |
| Observations | | 2310 | |

Robust t-statistics in parentheses

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

<u>Source</u>: Authors' calculations.

Table 5 and Figure 1 confirm the results of the previous exercise. While the propensity to trade among EMU-countries increases by around 16% after the formal creation of the

EMU, the increase in trade between EMU and non-EMU countries is about half that figure. While the increase for the case of the UK is slightly larger (and has a different temporal pattern) than that for other non-EMU countries, this difference is not statistically significant. Again we can see that the EMU impact appears to have been started in 1998.

In Table 6 we present the same alternatives measures coming from the Table 5 that allow us to compare the EMU effect immediately before and after EMU creation, do not allowing the early years in the sample contaminate the results

*Table 6: Alternative measures of the EMU 2 and EMU 1 impact, splitting UK*

|  | Alternative measures | | |
|---|---|---|---|
|  | EMU 2B | EMU 1B (UK) | EMU 1B (Non UK) |
| 1999-2000 vs. 1996-97 | 15.7*** | 10.1*** | 9.0*** |
| 1999-2001 vs. 1995-97 | 17.1*** | 11.2*** | 9.6*** |

*** Significant at 1 percent. The impacts are obtained using the coefficients of Column 1 in Table 5

The results from this Table suggests that, had the UK been a part of EMU since 1999, its trade with *all countries* would have been boosted by around 7% if we consider the two years before and after EMU (row 1 in Table 6) or 8% if we consider the three years before and after the EMU (row 2 in Table 6).

This measure of the impact that would have had UK in case of joining the EMU is less dependent on the early years in the sample. That is why we can say that had the UK been a part of EMU since its beginning, its trade with *all countries* would have been boosted by around 15 billion of 1995 dollars.

## IV. Conclusions

In this paper we use a panel data set that includes the most recent information on bilateral trade to estimate the early effect of the European Monetary Union on trade. Our data set includes annual bilateral trade for 22 developed countries from 1992 through 2001. During this period 12 European countries formally entered into a currency union. This is a unique event that allows us to study the effect of currency union on trade among a relatively homogenous group of industrial countries.

In Micco, Stein and Ordoñez (2002) we have found that a pair of countries that joined the European Monetary Union experienced an increase in trade around 14 percent, depending on the sample used. Furthermore, in that paper we found that EMU increases trade not only among members, but also with non-members. The results suggest that EMU may act more as a "trade booster", rather than just reducing transactions costs among its members. A potential explanation is that the use of the Euro, a more liquid currency, makes it easier for member countries to hedge exchange rate risk, even in their transactions vis-à-vis non-members. The channels through which EMU matters for trade, however, are not entirely clear, and should be subject to further research. Regardless of the channel, our results suggest that EMU represented a significant improvement in trade for its member countries.

In this paper we analyze the UK case in particular, trying to isolate the UK trade experience after the formal creation of EMU. In focusing on the impact on trade alone, we leave out a number of other important considerations that can play a role in the UK decision of whether or not to join the Euro. For this reason, our paper should not be seen as advocating EMU, but rather as providing a key piece of the puzzle in the UK-EMU debate. In this regard we found that UK behaves as a typical non-EMU country. We estimate that, had the UK joined EMU in 1999, its total trade each year would have increased by around 7 percent, or 15 billion dollars of 1995. This increase in trade is statistically significant, economically important, and probably would have represented an improvement in welfare for the UK.

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## APPENDIX A.

### List of countries in the sample

| Country | EU Country (Year of Affiliation) | EMU Country (Year of Euro Adoption) |
|---|---|---|
| Australia | | |
| Austria | 1995 | 1999 |
| Belgium-Luxembourg | 1952 | 1999 |
| Canada | | |
| Denmark | 1973 | |
| Finland | 1995 | 1999 |
| France | 1952 | 1999 |
| Germany | 1952 | 1999 |
| Greece | 1981 | 2001 |
| Iceland | | |
| Ireland | 1973 | 1999 |
| Italy | 1952 | 1999 |
| Japan | | |
| New Zealand | | |
| Netherlands | 1952 | 1999 |
| Norway | | |
| Portugal | 1986 | 1999 |
| Spain | 1986 | 1999 |
| Sweden | 1995 | |
| Switzerland | | |
| United Kingdom | 1973 | |
| United States | | |

Source: European Union Commission.

Notes: Countries that appear as affiliated in 1952 in fact created that year the European Coal and Steel Community (ECSC) that was extended to all economic sectors in 1958, creating the European Community (EC). Formally, the European Union (EU) was created in 1992 when the countries that were part of the EC ratified the Treaty on European Union (Maastricht).

On 1 January 1999 eleven European Union Member States adopted the euro as their national currency, being selected by the European Council to participate in the European Monetary Union (EMU) since they had fulfilled the convergence criteria laid down in the Maastricht Treaty.

On 19 June 2000, the EU Council assessed that Greece fulfills the requirements of the Treaty, approved its accession to the euro area as a twelfth member as from 1.1.20