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The Euro's Effects on Trade in a Dynamic Setting

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Abstract

This paper provides an update on estimates of the euro effect on trade integration among EMU economies, taking into account the aggregate bilateral exports of 23 OECD countries for the sample period 1988-2004. We consider 13 exporting European countries and 23 importing industrialized countries We utilize the dynamic panel data estimator proposed by Blundell and Bond (1998) and introduce controls for heterogeneity. The results of our dynamic specification of the gravity equation yield an estimate of the short run intra-Eurozone pro-trade effect, following the adoption of the single currency, which is as high as around 4% (17% in the long run). This finding, slightly lower than the results set out in our previous studies, is in line with those of very recent empirical analyses using dynamic specification of the gravity equation. It is also consistent with the already tight trade links characterizing the economies that have adopted the euro.

JEL codes. F14, F15, F4, F33, C33

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Introduction

The argument that the euro has brought both benefits and costs, in economic terms, to the countries that gave up their currencies (and their independent monetary policies) to adopt the single currency in 1999 should by now be clear even to the layman. Yet, while indicating the main advantages (related to the positive consequences of deeper market integration) and disadvantages (the one-size-fits-all monetary policy applied to a set of still heterogeneous economies) may be relatively easy, drawing a balance between them is a much more demanding exercise.

As part of this exercise, an important strand of the empirical analysis on the euro experience has focused on the trade effects of the single currency, drawing on the findings and the suggestions of studies on the links between currency unions and trade. Why the euro should promote more trade integration is quite comprehensible in principle: reduction of transaction costs, via the elimination of national currencies, would be trade-enhancing. Indeed, the effect would extend over and above the simple zeroing of the exchange-rate variability, achievable also by means of a fully credible fixed-exchange-rate mechanism.

As a matter of fact, a currency union implies such a degree of transparency (all prices are named in the same currency) and commitment (breaking up a currency union is not the same as breaking up a exchange-rate mechanism) that it is able to transform international trade between member countries into something very close to domestic trade. But, even independently of the impact on transaction costs, an impulse to trade from the single currency can be expected to the extent that the euro increases the exchange of goods at the extensive margin, favoring the introduction into the euro market of new products formerly sold only within national borders.

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Despite these expectations, analysis of the first few years of the euro's existence has generally pointed out a modest, although statistically significant, trade effect that came about quite quickly (already in 1999 if not before, and thanks to, it is alleged, behaviors that anticipated the introduction of the single currency). This evidence is at odds with the assumption of important reductions of transaction costs following the replacement of many currencies with one single money. It may depend, inter alia, on the fact that the euro came at the very end of a long-term path of European integration, adding (maybe) little to a process whose main drivers had been various former economic policy decisions (e.g. the common market, the EMS, the single market).

However, as time has passed since the inception of the euro, researchers have been able to draw on an increasing amount of information and to take stock of the important refinements and advances achieved in empirical methodologies. Both these conditions make it worthwhile to return to the issue and verify the resilience of previous findings to scrutiny in light of extra data and using more suitable methodology. This is what is done in this study, which updates, at a four-year distance, the analysis conducted in a previous paper devoted to this kind of investigation (see de Nardis and Vicarelli, (2003)).

This paper is organized as follows. The first and the second sections conduct a critical survey of the most recent empirical literature and describe the empirical strategy. The third and the fourth sections decribe the data and the estimates results. Conclusions finally follow.

1. The recent empirical literature on the euro's trade effects in gravity models.

This section provides a brief overview of recent developments in the empirical literature on the euro's trade effects. The survey is not intended to be exhaustive;[1] rather, its purpose is to point out critically the main elements common to the "post-Rose"[2] empirical literature for the euro area in the past five years. Tables 1 and 2 schematize a selection of the most recent papers. Three main issues emerge from this very recent empirical literature:

I) The gravity model in the framework of panel data analysis. The first element common to the literature on the "euro effect" is the use of the panel data analysis technique. It should be noted that all the empirical papers, starting from Glick and Rose (2001), use panel data methodology, instead of pooled cross sectional data, in order to emphasize the time dimension of trade in standard or augmented gravity equations[3] used to estimate trade flow determinants.[4]

[1] For an exhaustive survey on this issue see Baldwin (2006)

[2] The empirical literature on the effect of currency unions on trade has been boosted by the work of A. Rose (2000). For a survey, see Rose and Stanley (2005).

[3] The gravity model has been extensively used in the empirical and theoretical literature to explain bilateral trade. See Anderson (1979), Deardorff (1998) and Helpman and Krugman (1985), Evenet and Keller (2002) and Baldwin (2006).

[4] In the aggregate model, following the practice established by Glick and Rose (2001), the dependent variable is the log of total trade (export plus import) between pairs of countries deflated by US CPI.

Table 1 Static models:

	Authors	Empirical Strategy	Main findings -sample period
Euro's effect on aggregate trade	De Souza (2002)	Fixed effect panel data estimator. Dep. Variable: real bilateral trade 15 EU	Sample period: 1980-2001 Intra area Euro effect: not significant
	Barr et al. (2003)	Fixed effect panel data estimator Accounting for potential endogeneity of euro dummy by using instrumental variable estimation. Dep. variable: real bilateral trade	Sample period: 1988-2001 Intra area Euro effect: 20%.
	Micco et al * (2003)	Fixed effect panel data estimator. Gravity model. Difference in difference technique. Dep variable: unilateral trade data, 22 developed countries	Sample period: 1992-2002 Intra area effect: ranging between 8-16%.
	Bun and Klaasens (2006)	Fixed effect panel data estimator including country pair specific time trends. Gravity model. Dep. Variable: real bilateral trade 19 OECD countries	Sample period: 1967-2002 Intra area Euro effect: 3%.
	Faruquee (2004)	Panel data OLS and DOLS estimator, Gravity model. Dep variable: real bilateral trade . 22 OECD countries	Sample period: 1992-2002 Intra area Euro effect: 7-8%.
	Berger and Nitsch (2005)	Country pair fixed effect,panel data estimator Gravity model. Dep. Variable: real bilateral trade 22 OECD countries	Sample period: 1948-2003 Intra area Euro effect: not significant once time trend is controlled for. Sample period: 1992-2003 Intra area Euro effect: 5%
Euro's effect on trade, sectoral data	Flam and Nordstrom (2003)	Fixed effect panel data estimator , 1 digit ISICS rev.3 sectors. Gravity model Dep variable: bilateral exports, Exchange rate as regressor in the gravity equation. 14 EU countries (excluding Greece)	Sample period: 1995-2002. Intra area Euro effect aggregate: 15%, 7% increase of trade with non members. Effect not widespread across sectors ranging between 7-50%.
	Baldwin et al. (2005)	Fixed effect panel data. Gravity model Dep variable: bilateral imports, ISIC 2 and 3 digit 18 OECD countries	Sample period: 1988-2003. Intra area Euro effect: aggregate 70-112%, Euro effect not widespread across sectors ranging between 40-177%.
	Flam and Nordstrom (2006)	Fixed effect panel data estimator for six-digit level HS product categories. Gravity model Dep variable: bilateral exports. 20 OECD countries	Sample period: 1999-2005. euro increased intra area trade by 26% and trade between the eurozone and outsiders by 12% in 2002-2005 compared to 1995-1998. The effects are concentrated among semi-finished and finished products, and industries with highly processed products

**This paper also provides a dynamic specification: see tab 2.*

Almost all the papers use a standard gravity equation (the product of size variables – the mass – and geographical distance) "augmented" with the dummies of interest (EMU, EU; FTA[5]); some papers introduce into the estimate the real exchange

[5] Economic and Monetary Union, European Union and Free Trade agreements.

rate and some measures of exchange rate volatility (de Nardis and Vicarelli (2003), Baldwin (2005), Fernandes (2006), Micco et al.(2003), Flam and Nordstrom (2006).

As regards specification of the gravity equation, Baltagi, Egger and Pfaffermayr (2003) made use of a set of controls for heterogeneity: time dummies plus importing and exporting country dummies, and interaction terms between them. This specification, proposed for a static model, has been recently adopted also in a dynamic framework. Fernades (2006) considers in the estimates as controls, fixed effects for importing and exporting countries; Bun and Klaassen (2006) introduce a set of country-pair specific time trends into the model specification. They emphasise that this approach is more flexible in the cross-sectional dimension (ij) with respect to Baltagi, Egger and Pfaffermayr's formulation: It allows trade development to be driven over time by factors other than national ones (i.e. transportation costs). All the estimates are performed on a sample of developed countries. However, in most cases estimates are also conducted on restricted samples of EMU/EU members. As for the time span, this is rather heterogeneous in the various papers. In some cases the estimates are also tested on restricted time spans (usually 1992-2002) in order to compare the results with the seminal paper of Micco et al. (2003). Changing the length of the time dimension is not neutral, because the magnitude and significance of the euro dummy coefficients may change substantially according to the period considered. In particular, using a sample from 1948 to 2003, Berger and Nitsch (2005) find strong evidence of a gradual increase in trade intensity among European countries. When they control for this trend in trade integration, the euro's impact on trade disappears.

Table 2 Dynamic models:

	Authors	Empirical Strategy	Main findings
Euro's effect on aggregate trade	de Nardis Vicarelli (2003)	Arellano Bond difference GMM estimate. Gravity model.. Dep variable: aggregate exports. 15 EU countries	Sample period: 1980-2000 Intra area EMU effect: between 8.9% and 9.8%,
	Bun and Klaassens (2002a)	Dynamic fixed effect estimator. LSDV. Gravity model . Dep variable: aggregate export. 19 developed countries	Sample period: 1988-2001 Intra area EMU effect: 4%,
	Micco et al (2003)	Arellano Bond difference GMM method. Gravity model Dep variable: unilateral trade data, 22 developed countries	Sample period: 1992-2002 Trade between EMU members and other countries increases by 9%,
Euro's effect on trade sectoral data	Fernandes (2006)	A dynamic panel data System GMM estimator , Gravity model. for 25 two digit ISICS rev.3 sectors Dep variable: bilateral exports. 23 OECD countries.	Sample period: 1988-2003 Intra area Euro effect: aggregate 2.8%; effect not widespread across sectors ranging between 7-23%.

II) The introduction of dynamics into the panel data model. The results of the recent literature show, with few exceptions (Berger and Nitsch (2005) and De Souza (2002)[6]), positive and significant coefficients of the dummy EMU. However, there is high heterogeneity in the magnitude of the dummy coefficients (ranging between zero and 112%). The magnitude of the euro coefficient decreases (ranging between 3% and 9%) if a dynamic specification is adopted (see tab 2). Therefore, theory and a large body of empirical work support the hypothesis that trade is a dynamic process and that estimating static equations may produce upward biased estimates.

The rationale for considering dynamics in trade is the existence of sunk costs borne by exporters to set up distribution and service networks in the partner country. This sticky behavior seems the more important in the EMU case, where trade relationships between countries are affected not only by past investments in export-oriented infrastructure, but also by the accumulation of invisible assets such as political, cultural and geographical factors characterizing the area and influencing the commercial transactions taking place within it.

III) The "micro foundation" of the gravity equation. The third new element is the introduction of the multilateral "trade resistance index", with which Anderson and van Wincoop (2003)[7] obtain a specification of a gravity equation that can be interpreted as a reduced form of a model of trade with micro foundations (see section 3).

2. Empirical strategy and equation

In accordance with the most recent developments in the empirical literature, we introduce dynamics into a panel data model. This reflects the fact that trade is affected by marked persistence effects due to the existence of sunk costs in entering foreign markets. Moreover, one should also consider that the euro has had a relatively short history, so that a more suitable specification to study its effects on trade is provided by a model describing short run dynamics and allowing one to derive, from the estimated short run elasticities, the implicit long run impact.[8]

However, considering dynamics raises econometric problems. If trade were a static process, the fixed-effect estimator would be consistent for a finite time dimension T and an infinite number of country-pairs N. But since trade is a dynamic process, the transformation needed to eliminate the country-pair fixed effects produces a correlation between the lagged dependent variable and the transformed error term that renders the least square estimator biased and not consistent.

To avoid the inconsistency problem, Arellano and Bond (1991) suggested transforming the model into first differences and run it using the Hansen two-step

[6] They argue that it is primarily political and institutional integration among European countries that has increased trade, not the adoption of a common currency.

[7] Anderson and van Wincoop (2003) point out that trade between a pair of countries depends on their bilateral trade barriers with all trading partners: trade will be stronger for those countries with relatively low trade barriers. Rose and van Wincoop (2001) approximate the multilateral trade resistance index using country-pair fixed effects. Ritschl and Wolf (2003) and Estevadeordal et al. (2003) propose using country-group dummies.

[8] See section 4.

GMM estimator.[9] Arellano and Bover (1995) described how, if the original equations in levels were added to the system of first-differenced equations, additional moment conditions could increase efficiency ("System GMM" estimator). This estimator has been refined by Blundell and Bond (1998).

The system GMM estimator has several advantages with respect to Arellano and Bond's estimator. First differencing the equation removes fixed effects but also the time invariant regressors in the specification. If these regressors are of interest, the resulting loss of information may be a serious inconvenience.

Indeed, the first-differenced GMM estimator performs poorly in terms of precision if it is applied to short panels (along the T dimension) including highly persistent time series. Lagged levels of time series with near unit root properties are in fact weak instruments for subsequent first-differences.[10] Since bilateral exports between industrialized countries are expected to change sluggishly, due to sunk costs, one may expect this to affect the estimates.[11]

Owing to the relatively short time span data availability and the relevance of "persistence" effects in bilateral trade relationships, the "System GMM" estimator seems to be the right choice. The application of this methodology in a gravity context is quite new:[12] as far as we know, only one study has applied it to investigate the euro effect on trade.[13]

Equation. We introduce into the dynamic gravity equation three sets of variables: i) gravity variables, ii) controls for heterogeneity, iii) controls for other factors affecting bilateral trade.

i) *Standard gravity variables.* Bilateral distance, as a proxy of transport costs, and the sum of importer and exporter's value added as proxies of the "mass".

ii) *Controls for heterogeneity and bias.* Following Baltagi, Egger and Pfaffermayr (2003) we introduce fixed effects for importing and exporting countries and time. Contrary to these authors, we do not control for country-pair effects (i.e. the interaction effect between exporting and importing country picking up unobserved characteristics of country-pairs) because this kind of variable would include the impact of the euro effect, which we want to control by means of a specific dummy. Controlling for exporter and importer effects, we can proxy the multilateral "trade resistance index" (see Anderson and van Wincoop (2003)), obtaining a specification of a gravity equation that can be interpreted as a reduced form of a model of trade with micro foundations.

iii) *Controls for other factors affecting bilateral trade in EMU.* In the specific case of EMU, there are political, institutional and monetary factors that may have affected bilateral trade flows. After 1992, thanks to the European Monetary System and the convergence process leading to adoption of the single currency, volatility among European countries diminished. We control for this by introducing a measure of

[9] They show how the two key properties of the first differencing transformation – eliminating the time-invariant individual effects while not introducing disturbances for periods earlier than period t-1 into the transformed error term – can be obtained using any alternative transformation (i.e. forward orthogonal deviations).

[10] More in general, an IV approach is a way to solve the endogeneity problem. See Anderson and Van Wincoop (2004).

[11] For an exhaustive survey of GMM estimators, see Roodman(2006).

[12] See De Benedictis and Vicarelli (2005); De Benedictis, De Santis and Vicarelli (2005).

[13] See Fernandes (2006).

volatility into our equation. It is important to distinguish this aspect from a "Currency Union" effect capturing a structural change in market expectations due to the fact that a common currency is an irrevocably fixed commitment on exchange rate regime.

The introduction of the euro has been the last step of this integration process; we control for "EU membership"[14] in order to "isolate" this effect on exports by introducing a specific dummy .

The equation is the following:

$$ln\ Exp_{ijt} = b1\ ln(Exp_{ijt}\ -n) + b2\ ln(SumVA_{ijt}\ ) + b3\ ln\ Dist_{ij} + b4\ vol_{ijt} + b5\ dueuro_{ijt} + b6\ duEU_{ijt} + b7\alpha_j + b8\beta_i + b9\tau \quad [1]$$

where:

ln = the natural logarithm, *i* is the exporting country, *j* is the importing country and *t* is the year, *n* is a lag structure for the dependent variable,

Exp_{ijt} = exports in volume from country *i* to country *j*;

$SumVA_{ijt}$ = the sum of value added at constant term of the exporting and importing countries, a proxy of the "mass" in gravity models.

$Dist_{ij}$ = bilateral distance between capital cities, expressed in kilometers .

Vol_{ijt} = exchange rate volatility index (see section 3 for a description).

$dueuro_{ijt}$ = Dummy euro: assumes value 1 for bilateral trade among Eurozone countries from 1999, 0 otherwise; in the case of Greece the dummy euro assumes value 1 starting from 2001

$duEU_{ijt}$ = Dummy European Union membership: assumes value 1 for bilateral trade among European Union countries, taking into account the enlargement process of EU (Austria, Finland and Sweden entered in 1995), 0 otherwise.[15]

α_i = exporting country dummy: assumes value 1 if export flows are from exporter country *i* to each one of the importing countries *j*, 0 otherwise;

β_j = importing country dummy: assumes value 1 if export flows are from each one of the exporter countries *i* to the importing country *j*, 0 otherwise;

τ = annual dummies: assumes value 1 for time *t*, 0 otherwise.

We expect bilateral export flows to be positively influenced by:

[14] From the late 1950s to the mid-1990s, the European trade integration process was mainly centred on the abolition of internal tariffs with a view to the completion and widening of the Single European Market.

[15] We consider EU membership instead of other "institutional" variables (i.e. Single Market 1993) because EU membership implies the obligation of a Member State to transpose into national law directives (for example to implement the Single Market) issued by the EU Commission.

i) The lagged endogenous variable. Countries trading heavily with each other are expected to continue to trade, thus reflecting the effects of entrance and exit barriers due to sunk costs.
ii) The "mass". In gravity models trade flows are positively influenced by the "mass" proxied by the sum of GDP or value added.
iii) The introduction of the euro. This dummy proxies the "pure trade effects" and is expected to have had a positive impact on Eurozone trade flows, in line with the recent literature.
iv) The "EU membership" effect. Countries joining EU should have benefited from the European trade integration process.

We expect bilateral export flows to be negatively influenced by:

i) Distance. According to the standard gravity model, bilateral distance is a proxy for transport costs and cultural proximity between two countries;
ii) Exchange rate volatility. Reducing exchange rate volatility should promote bilateral trade by reducing risks and uncertainty.

3. Data description

The pool of the economies that we considered in the estimates was composed of 23 developed countries: 13 EU members (Ireland and Luxembourg were not included in the pool owing to the lack of homogeneous data[16]), and 10 OECD countries: Korea, Czech Republic, Australia, Canada, Japan, New Zealand, Norway, Mexico, Switzerland and United States. The sample period was 1988-2004 according to data availability.

We considered 13 exporting European countries and 23 importing industrialized countries (13 EU + 10 OECD).

Bilateral exports data in dollars terms, current prices, were from OECD STAN-BTD, and value added was from the STAN Industry database; both variables were deflated by value added implicit deflators.

Table 3 Data source

Variable	Source	sample
Bilateral exports in current terms	OECD STAN-BTD	1988-2004
Value Added	STAN industry	1988-2004
Bilateral nominal exchange rate	IMF-IFS	1988-2004
CPI, PPI	IMF-IFS, OECD- MEI	1988-2004
Distance	http://www.cepii.fr/anglaisgraph/bdd/distances.htm	1988-2004
Free Trade Agreement	European Commission and WTO	1988-2004

We tested five different measures of Exchange rate volatility (vol_{ijt}) but the variable we used was measured by the standard deviation of the first difference of

[16] In this paper we deflate nominal bilateral export by value added implicit deflators taken from OECD STAN BTD, a more accurate measure than US CPI commonly used in empirical literature. However, this data bank does not provide value added implicit deflators for Ireland. Data for Belgium and Luxembourg are aggregated.

monthly natural logarithms of the bilateral nominal exchange rate at the current year t. The data were taken by monthly average exchange rates from IMF-IFS.

4. Estimates results

Table 4 reports the estimates results and the related tests.[17] AR(1) and AR(2) tests showed the consistency of the GMM estimator and the inconsistency of the OLS. Hence, by introducing dynamics, the proper estimation method is the former one. The Hansen test of over-identifying restrictions showed that the hypothesis that all moment restrictions are satisfied for the dynamic specification was not rejected.

In detail:

i) As for the "Gravity standard" variables, the results are in line with those in the empirical literature: there is a positive correlation with the mass and a negative one with distance.
ii) The lagged dependent variable (1-period lag) is statistically significant; the magnitude of the "persistence effect" is in line with the results in the literature.
iii) A decrease in exchange rate volatility promotes bilateral trade. In particular, following Rose (2000), we find that a reduction in exchange rate volatility between EU15 countries and their partners by one standard deviation around its mean would increase total bilateral trade of EU15 by around 2.2%.[18]
iv) The "EU membership" effect has had a positive impact on trade flows among EU15 countries. The accession of Finland, Austria and Sweden in 1995 increased the bilateral trade of these countries with the EU-area by around 6%.[19]
v) The adoption of a common currency has increased bilateral trade of the Eurozone by around 4%.
vi) The sign and the magnitude of the euro effect on trade are in line with empirical findings in the literature.[20]

Baldwin (2006)[21] points out that limiting the data to the post-1992 period is appropriate because the change made in 1993 to the way in which the EU collects trade statistics may have introduced disturbances. To check the robustness of estimates to

[17] Arellano and Bond (1991) propose a test of the hypothesis of no second-order serial correlation in the disturbances of the first differenced equation. This is a necessary condition for the valid instrumentation. A test for the hypothesis of no first order–order serial correlation is also reported: the rejection of the null hypothesis (i.e. the presence of first-order serial correlation) indicates the inconsistency of the OLS estimator.

[18] The simulation proposed by Rose(2000) consisted of reducing volatility by an amount equal to its standard deviation. Since the standard deviation of vol_{ijt} is 0.08348 and the estimate of its parameter is -0.26, the increase in trade following the fall of vol_{ijt} by its standard deviation is given, *ceteris paribus*, by: $((e^{-0.26*0.008})-1)*100 = 2.19\%$.

[19] Since the parameter of duEU dummy is 0.06, the variation of trade induced by membership of the EU (with respect to the case of non-membership) is given by ((exp0.06*1/exp0.06*0)-1)*100.

[20] The finding of a modest, but rapid impact of the euro on goods exchanges would also be consistent with the peculiar pro-trade effect generatedby the introduction of new goods exported/imported in the euro-market, rather than by the expansion of exchanges of the "incumbent" ones. Estimates based on sectoral effects, showing substantially differentiated impacts according to industries (significantly stronger in activities dominated by increasing returns to scale and much weaker or even absent in traditional and commodity-related sectors) would be in line with this view; on this issue see the findings of Baldwin and Di Nino (2006) and the sectoral evidence provided by de Nardis, De Santis, Vicarelli (2008).

[21] See Balwin (2006), pag 33.

changes in time span, we repeated the exercise for the period 1993-2004. The results are reported in column 2 of Table 4. All the previous results are confirmed; in particular, the estimate of the euro effect is affected only marginally by the modification of the panel time dimension.

Table 4. Estimate of bilateral exports EU 15 (1988-2004)

	sample period 1988-2004	sample period 1993-2004
Number of observation	3771	2854
	I	**II**
ln(Expij(t-1))	0.75*** (19.41)	0.72*** (18.6)
ln(Massit)	0.44*** (4.96)	0.50 *** (4.15)
Ln(DISTij)	-0.26*** (6.32)	-0.31 *** (7.04)
Ervol	-0.26 ** (2.87)	-0.24** (2.75)
Euro	0.04* (3.13)	0.05** (3.05)
EU	0.06** (3.13)	0.09*** (3.64)
αi	Yes	Yes
βj	Yes	Yes
τi	Yes	Yes
Hansen test	$\chi 2(239)$ =270.12 p> $\chi 2$= 0.08	$\chi 2(238)$ =269.49 p> $\chi 2$= 0.079
Arellano Bond test AR (1)	z=-463 P>z=0.000	z=-4.97 P>z=0.000
Arellano Bond test AR (2)	z=-0.86 P>z=0.389	z=–0.45 P>z=0.650

t values in parenthesis
**p<0.05; **p<0.01, *** p<0.001*

To be stressed is that our empirical analysis captures the short-run effect exerted on intra-EMU trade by adoption of the euro. The short run effect of 4% is indeed small. One may reasonably assume that, in general, it takes several years for a currency union to have a significant trade enhancing effect. Yet, there is no clear indication in the existing literature about the lapse of time necessary for a single currency to exert its steady state effects. According to some authors (Bun and Klassen, 2002), in seven years only half of the whole long run effect is apparent (incidentally, in our sample the euro has been in existence for six years). But the period necessary to detect the "regime" effect may be even longer: according to some estimates (Glick and Rose, 2002), it can take more than thirty years to discern the full long run impact on trade of a reversed process, that is, the dissolution of a monetary union between a pair of countries. Leaving aside the issue of the length of time required to approach the long run, we can nonetheless use the parameter of the lagged dependent variable to compute the change in intra-EMU trade implied by the short run impact of the euro obtained in our results, letting time grow larger and larger. The estimate is still small by the standards proposed in the literature on currency unions: the long run positive effect of the euro on trade between EMU countries is as high as 17%.[22]

[22] We obtained estimates of long-run effects simply by applying the following transformation: long run $\overline{B2}$ = B2/(1-B1), where B2 is the parameter of the EURO dummy and B1 is the vector of coefficients of the lagged dependent variable. We tested H0 : $\overline{B2}$=0 and we rejected it (F(1,286)=6.14,

The finding of a limited impact of the euro on intra-area trade confirmed by our results (on an even lower scale than in the current literature) has major implications for the endogeneity argument of the Optimum Currency Area criteria. The argument (originally put forward by Frankel and Rose 1998) runs as follows: if EMU entry produce an important stimulus to trade, this may cause an increase in the correlation of business cycles and make a country more likely to satisfy the criteria for entry into the monetary union ex post rather than ex ante. On the basis of our results, the least we can say is that the modest trade expansion produced (even in the long run) by the euro adoption substantially undermines the ex-post endogeneity argument running through the trade channel.

Conclusions

This paper has updated de Nardis and Vicarelli's (2003) estimates of the euro's trade effects in EMU countries by adopting some recent methodological advances in the empirical literature that seem better suited to dynamic analysis of matters related to trade integration in a panel dimension.

The abundant gravity-model literature originating from Rose (2000) provides estimates of trade having increased – due to the euro – by a factor varying between 0 and 112%. However, the range of the "euro dummy coefficient" tends to substantially decrease (ranging between 3 and 10%) when a dynamic specification is adopted. Moreover, the recent econometric literature on the euro's trade effect has also shown that the empirical treatment of dynamics is a rather difficult issue to deal with. Specifically, dynamic specification of gravity equations and panel data techniques should be enriched with some important methodological innovations in order to avoid problems of inconsistency and biases in the estimates.

In light of these indications, in this paper we have utilized the "System GMM" dynamic panel data estimator and introduced controls for heterogeneity. The results of our dynamic specification of the gravity equation lead to an estimate of the intra-Eurozone pro-trade effect due to the adoption of the single currency as high as around 4-5% (it was between 9% and 10% in de Nardis and Vicarelli 2003). Implicit in these results is a long run influence of the euro on trade as high as 17%.

It is thus confirmed that the adoption of a common currency has had a positive impact on the bilateral trade of European countries, but not a large one, not even in the steady state implied by the estimates. This result substantially weakens the argument of possible ex-post endogeneity of currency union membership. This finding of a small impact probably relates, as already noted by Berger and Nitsch (2005), De Souza (2002) and de Nardis and Vicarelli (2003), to the already tight trade links characterizing the group of economies that adopted the common currency. Trade relationships within Europe, historically intense because of cultural and political factors, have been reinforced during the past 20 years by several policy decisions, such as the creation of the European Monetary System at the end of the 1970s and the institution of the Single Market at the beginning of the 1990s.

Prob>F=0.0138 for the $\overline{B2}$. We then obtained the long run impact from the same kind of computation indicated in footnote 18.

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