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The Euro's Effects on Trade in a Dynamic Setting

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ABSTRACT

This paper provides an update of de Nardis and Vicarelli (2003) estimates of the euro effect on trade integration of EMU economies, taking into account aggregate bilateral exports of 23 OECD countries for the sample period 1988-2003. In this paper 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 lead to an estimate of the intra-Eurozone pro-trade effect, following the adoption of the single currency, as high as around 4%.

This finding, slightly lower than the previous work results, is in line with very recent empirical literature using dynamic specification of gravity equation. It is also consistent with the already tight trade links characterizing the economies that embraced the euro and with the possibility that the trade impact involved the introduction of new goods rather than the expansion, due to lower transaction costs, of the incumbent products

Keywords: International Trade, Currency Unions, Gravity models, Dynamic Panel Data.

JEL Classification: F14, F15, F4, F33, C33.

NON-TECHNICAL SUMMARY

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 the literature that studied the links between currency unions and trade. Euro should promote more trade integration through a reduction of transaction costs, via the elimination of national currencies. Indeed, the effect would go over and above the simple zeroing of the exchange-rate variability, achievable also by means of a fixed-exchange-rate mechanism.

Despite these expectations, the analysis on the first few years of existence of the euro has generally pointed out a modest, although statistically significant, trade effect that took place quite quickly (already in 1999, if not before, thanks to, it is alleged, behaviors that anticipated the introduction of the single currency). An evidence that would not conciliate with the assumption of important reductions of transaction costs, following the replacement of many currencies with one single money, and that could 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 that had had its main drivers in several, former economic policy decisions (e.g. the common market, the EMS, the single market).

In this paper we update a previous work (de Nardis and Vicarelli, 2003), estimating the euro effect on trade integration of EMU economies, taking into account aggregate bilateral exports of of 23 OECD countries and extending our sample period to 2003.

The starting point is that bilateral trade flows should be considered in a dynamic setting. 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 all 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.

As regard as methodological strategy, in this paper we utilize a different dynamic panel data estimator (System GMM estimator, proposed by Blundell and Bond), that shows several advantages and seems more suitable for our scope.

The results of our estimate lead to a coefficient of the intra-Eurozone pro-trade effect, following the adoption of the single currency, as high as around 4%. This finding, slightly lower than our previous work results, is in line with very

recent empirical literature using dynamic specification of gravity equation. It is also consistent with the already tight trade links characterizing the economies that embraced the euro and with the possibility that the trade impact involved the introduction of new goods rather than the expansion, due to lower transaction costs, of the incumbent products .

UN'ANALISI DEGLI EFFETTI DELL'EURO SUL COMMERCIO IN UN CONTESTO DINAMICO

SINTESI

Questo lavoro intende stimare gli effetti dell'introduzione dell'euro sul commercio aggregato dei paesi dell'UE, aggiornando, grazie a una maggiore disponibilità di osservazioni, precedenti risultati (de Nardis Vicarelli 2003). Le stime sono effettuate su un gruppo di 23 paesi OCSE composti da 13 Stati membri UE più 10 paesi industrializzati non-UE. Il periodo sotto osservazione è 1988-2003.

La verifica empirica è stata condotta utilizzando una versione dinamica dell'equazione gravitazionale. In particolare, si è fatto uso di un modello panel dinamico con lo stimatore proposto da Blundell e Bond (1998).

I risultati della stima si dimostrano in linea con quelli della letteratura più recente. Si conferma che le esportazioni dei 13 paesi UE vengono guidate da "forze" analoghe alle leggi gravitazionali della fisica, cioè sono correlate positivamente con la "massa" e negativamente con la distanza geografica. Viene, inoltre, avvalorata l'ipotesi che il commercio sia un fenomeno persistente, in quanto dall'analisi emerge una correlazione positiva e significativa tra le esportazioni e le esportazioni del periodo precedente. La stima conferma anche la teoria che la riduzione della volatilità del cambio favorisca il commercio bilaterale.

Il principale risultato della verifica empirica è il seguente: l'adozione di una valuta comune ha avuto un impatto positivo ma non grande sul commercio dei paesi dell'area dell'euro e la principale giustificazione sembra risiedere nel fatto che la creazione della valuta unica non è che l'ultima fase di un processo di integrazione commerciale progressivo in atto da circa cinquant'anni.

Parole chiave: commercio internazionale, unioni valutarie, modelli gravitazionali, panel data dinamici

Classificazione JEL: F14, F15, F4, F33, C33.

CONTENTS

1 INTRODUCTION

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

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 the literature that studied 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 go over and above the simple zeroing of the exchange-rate variability, achievable also by means of a 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 an exchange-rate mechanism) to be 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 could be expected to the extent the euro increases the exchange of goods at the extensive margin, favoring the introduction, in the euro market, of new products that were formerly sold only within national borders.

Despite these expectations, the analysis on the first few years of existence of the euro has generally pointed out a modest, although statistically significant, trade effect that took place quite quickly (already in 1999, if not before, thanks to, it is alleged, behaviors that anticipated the introduction of the single currency). An evidence that would not conciliate with the assumption of important reductions of transaction costs, following the replacement of many currencies with one single money, and that could 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 that had had its main drivers in several,

former economic policy decisions (e.g. the common market, the EMS, the single market)[1].

However, as time passes since the date of inception of the euro, researchers may deal with more and more information and take stock of the important refinements and progresses realized in the meanwhile in the empirical methodologies. Both these conditions make it worth going back to the issue to verify solidity of former findings to the scrutiny of extra data and more suited methodology. This is what is done in this work which updates, at a four-years distance, the analysis conducted in a former paper dedicated to this kind of investigation (see, de Nardis and Vicarelli, (2003)).

This paper is organized as follows. The first and the second paragraphs provide a critical survey of the most recent empirical literature and a description of the empirical strategy. The third and the fourth paragraphs present the data description and the estimates results. Conclusions finally follow.

2 RECENT EMPIRICAL LITERATURE ON EURO'S TRADE EFFECTS BY GRAVITY MODELS

This paragraph provides a synthetic review of the recent developments in the empirical literature on euro's trade effects[2]. This survey, is not going to be exhaustive[3]. It intends to point out critically the main common elements of the "*post-Rose*"[4] empirical literature for the euro area in the past five years.

In table 1 and 2, a selection of the most recent papers is schematized. We pointed out three main issues emerged in this very recent empirical literature:

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1 Though the finding of a modest, but rapid impact of the euro on goods exchanges would be consistent with that peculiar pro-trade effect coming from the introduction of new goods exported/imported in the euro-market, rather than from the expansion of exchanges of the "incumbent" ones (see Baldwin and Di Nino, 2006).

2 Rose and van Wincoop (2001) are the first to consider the Euro issue, but only as its potential effects. Their paper provides out of sample predictions based on transaction costs between European countries relative to other trading partners suggesting that intra-Euro Area trade should increase by 60% after the adoption of the Euro.

3 For an exhaustive survey on this issue see Baldwin (2006)

4 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).

Tab. 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. 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. 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. 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. Dep. Variable: real bilateral trade 22 OECD countries.	Sample period 1948-2003. Intra area Euro effect not significant once controlled for time trend. Sample period 1992-2003 Intra area Euro effect 5%
Euro's effect on trade, sectoral data	Flam and Nostrom (2003)	Fixed effect panel data estimator , 1 digit ISICS rev.3 sectors. Dep variable: bilateral export, Exchange rate as regressor in the gravity equation. 14 EU countries (excluding Greece).	Sample period 1995-2002. Intra area Euro effect aggregate 15%, increase of trade with non member of 7%.effect not widespread across sectors ranging between 7-50%.
	Baldwin et al. (2005)	Fixed effect panel data. 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. Dep variable: bilateral export. 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 to semi-finished and finished products, to industries with highly processed products

* This paper provides also a dynamic specification see Tab. 2.

The gravity model in the framework of panel data analysis. The first common element in the literature on "euro's effect" is the use of panel data analysis technique. It is worth to notice that all the empirical papers, starting from Glick and Rose (2001), use panel data methodology instead of pooled cross sectional data, to emphasize the time dimension of trade of standard or augmented gravity equations[5] in the estimation of trade flows determinants[6].

All the papers with few exceptions use a standard gravity equation (the product of size variables -the mass-and the geographical distance) "augmented" with the dummies of interest (EMU, EU; FTA[7]); some papers introduce the real exchange rate in the estimate 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 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 in the model specification a set of country-pair specific time trend. They underline that this approach is more flexible in the cross-sectional dimension (ij) with respect to Baltagi, Egger and Pfaffermayr formulation: It allows the trade development over time to be driven by other factors than the national ones (i.e. transportation costs).

All the estimates are performed on a sample of developed countries; however in most of the cases estimates are conducted also on restricted samples of EMU/EU members. As for the time span it is pretty heterogeneous in the various papers. In some case the estimates are tested also on restricted time spans (usually 1992-2002) to compare the results with the seminal paper of Micco et al. (2003). Changing the length of the time dimension is not neutral since the magnitude and significance of the euro dummy coefficients may modify substantially according to the considered period. In particular, using a sample from 1948 to 2003, Berger and Nitsch (2005) find strong evidence of a

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5 The gravity model has been used extensively in 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).

6 In the aggregate model following the practise established by Glick and Rose (2001) the dependent variable is the log of total trade (export plus import) between pair of countries deflated by US CPI.

7 Economic and Monetary Union, European Union and Free Trade agreements.

gradual increase in trade intensity between European countries. Once they control for this trend in trade integration, the euro's impact on trade disappears.

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)[8]) 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 number 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 all 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.

Tab. 2 **Dynamic models**

	Authors	Empirical Strategy	Main findings
Euro's effect on aggregate trade	de Nardis Vicarelli (2003)	Arellano Bond difference GMM estimate. Dep variable: aggregate export. 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. 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. Dep variable: unilateral trade data, 22 developed countries.	Sample period 1992-2002. Trade between EMU member and other countries increases 9%.
Euro's effect on trade sectoral data	Fernandes (2006)	A dynamic panel data System GMM estimator, for 25 two digit ISICS rev. 3 sectors. Dep variable: bilateral export. 23 OECD countries.	Sample period 1988-2003. Intra area Euro effect aggregate 2.8%, effect not widespread across sectors ranging between 7-23%.

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

The "micro foundation" of gravity equation. The third new element is the introduction of the multilateral "trade resistance index" through which Anderson and van Wincoop (2003) [9], obtain a specification of a gravity equation that can be interpreted as a reduced form of a model of trade with micro foundations (see paragraph 3).

3 EMPIRICAL STRATEGY AND EQUATION

Empirical strategy. In this paper, according to the most recent findings in the empirical literature, we introduce dynamics in a panel data model. Nevertheless, this raises econometric problems. If trade is a static process, the fixed-effect estimator is consistent for a finite time dimension T and a infinite number of country-pairs N. But if 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 to transform the model into first differences and run it using the Hansen two-step GMM estimator[10]. Arellano and Bover (1995), describe 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).

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

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[9] Anderson and van Wincoop (2003) pointed 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 a 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.

[10] 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).

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[11]. Since bilateral exports between industrialized countries are expected to change sluggishly, due to sunk costs, one may expect this to affect the estimates[12]

Due to the relatively short time span data availability and the relevance of "persistence" effect in bilateral trade relationships, "System GMM" estimator seems the right choice. The application of this methodology in a gravity context is quite new;[13] as far as we know , only one work apply it to investigate the euro effect on trade.[14]

Equation. We introduce in the dynamic gravity equation three sets of variables: 1) standard gravity variables, 2) controls for heterogeneity, 3) controls for other factors affecting bilateral trade.

1 **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".

2 **Controls for heterogeneity and bias**. Following Baltagi, Egger and Pfaffermayr (2003), we introduce fixed effects for importing and exporting countries and time. Differently from these authors, we don't 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 variables would include the impact of euro effect that we want to control by 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.

3 **Controls for other factors affecting bilateral trade in EMU**. In the specific case of EMU, there are political, institutional and monetary factors that could have been affected bilateral trade flows. After 1992, thanks to

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

[12] For an exhaustive survey about GMM estimators, see Roodman(2006).

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

[14] See Fernandes (2006).

the European Monetary System and the convergence process leading to the adoption of the single currency, volatility among European countries diminished. We control for this by introducing a measure of volatility in our equation. It seems important to distinguish this aspect from a "Currency Union" effect that should capture a structural change in the markets 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 the "EU membership"[15] to "isolate" this effect on exports introducing a specific dummy .

The equation is the following:

$$Ln\ Exp_{ijt} = b1\ ln(Exp_{ijt-n}) + b2\ ln(SumVA_{ijt}) + b3\ lnDist_{ij} + b4\ vol_{ijt} + b5\ dueuro_{ijt} + b6\ duEU_{ijt} + b7\ \alpha_j + b8Bi + b9\ \tau$$

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_{ij} = 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;

$Dueuro_{ijt}$ = Dummy euro: assumes value 1 for bilateral trade among Eurozone countries from 1999, 0 otherwise;

$duEU_{ijt}$ = 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.

$vol_{ijt::}$ = is the nominal exchange rate volatility;

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

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

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

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15 From the late 1950s to the mid-1990s, the European trade integration process were mainly related to the abolition of internal tariffs towards the completion and widening of the Single European Market.

We expect that bilateral export flows are positively influenced by:

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.

The "mass". In gravity models trade flows are positively influenced by the "mass" proxied by the sum of GDP or value added.

The introduction of euro. This dummy proxy the "pure trade effects" and is expected to have had a positive impact on Eurozone trade flows, in line with recent literature.

The "EU membership" effect. Countries joining EU should have benefited from European trade integration process.

We expect that bilateral export flows are negatively influenced by:

Distance. According to the standard gravity model, bilateral distance is a proxy for transport costs and cultural proximity between two countries.

Exchange rate volatility. Reducing exchange rate volatility should promote bilateral trade reducing risks and uncertainty.

4 DATA DESCRIPTION

The pool of the economies we consider in the estimates is composed by 23 developed countries: 13 EU members (Ireland and Luxembourg are not included in the pool due to the lack of homogeneous data), and 10 OECD countries: Korea, Czech Republic, Australia, Canada, Japan, New Zealand, Norway, Mexico, Switzerland and United States. The sample period is 1988-2004 according to data availability.

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

Bilateral exports data in dollars terms, current prices, are from OECD STAN-BTD, and value added is from STAN- Industry data base; both variables are deflated by value added implicit deflators.

Tab. 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	P. Brenton and F. Di Mauro http://www.ceps.be	1988-2004
Free Trade Agreement	European Commission and WTO	1988-2004

The bilateral real exchange rate ($RERij$ variable) is calculated using monthly period average nominal exchange rates and Producer Price Indices (or CPI from OECD-MEI for France) from IMF-IFS. We tested five different measures of Exchange rate volatility ($Xvolij$) but the variable we used is measured by the standard deviation of the first difference of monthly natural logarithms of the bilateral nominal exchange rate at the current year t. the data are taken by monthly average exchange rates from IMF-IFS.

5 ESTIMATES RESULTS

Table 4 reports estimates results and related tests[16]. AR(1) and AR(2) test show the consistency of the GMM estimator and the inconsistency of the OLS. Hence, by introducing dynamics, the proper estimation method is the former one. Hansen test of over-identifying restrictions shows that the hypothesis that all moment restrictions are satisfied for the dynamic specification is not rejected.

In details:

1 As for the “Gravity standard” variables, the results are in line with empirical literature: there is a positive correlation with the mass and a negative one with distance.

16 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.

2 The lagged dependent variable (1-period lag) is statistically significant; the magnitude of the "persistence effect" is in line with the literature.

3 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%[17].

4 "EU membership" effect had a positive impact on trade flows among EU15 countries. Accession of Finland, Austria and Sweden in 1995 increased bilateral trade of these countries with the EU-area by around 6%[18].

5 The adoption of a common currency increased bilateral trade of Eurozone by around 4%. The sign and the magnitude of euro effect on trade are in line with literature empirical findings.

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

	Sample period 1988-2004	Sample period 1993-2004
Number of observation	3771	2854
	I	II
$\ln(Exp_{ij(t-1)})$	0.75*** (19.41)	0.72*** (18.6)
$\ln(Mass_{ij})$	0.44*** (4.96)	0.50 *** (4.15)
$\mathrm{Ln}(DIST_{ij})$	-0.26*** (6.32)	-0.31 *** (7.04)
Xvolij	-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)
α_i	Yes	Yes
β_j	Yes	Yes
τ_{ij}	Yes	Yes
Hansen test	$\chi^2(239)$ =270.12 p> χ^2= 0.08	$\chi^2(238)$ =269.49 p> χ^2= 0.079
Are. Bond test AR (1)	z=-4.63 P>z=0.000	z=-4.97 P>z=0.000
Are. 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.*

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

[18] Since the parameter of duEU dummy is 0.06, the variation of trade induced by being part of EU (with respect to the case of not being part) is given by ((exp0.06*1/exp0.06*0)-1)*100.

Baldwin (2006)[19] points out that limiting the data to post-1992 period it is appropriate since the change, in the 1993, in the way the EU collects trade statistics, could introduce disturbances. To check the robustness of estimates to changes in time span, we reply the exercise for the period 1993-2004. 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.

6 CONCLUSIONS

This paper intends to update de Nardis and Vicarelli (2003) estimates of euro's trade effects in EMU countries, using a longer time span and adopting some very recent methodological findings of the empirical literature that seem more suited to analyze, dynamically, matters related to trade integration in a panel dimesnion.

The abundant gravity-model literature, originated by Rose (2000), provided estimates of the rise of trade -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 quite a delicate issue to deal with. Particularly, dynamic specification of gravity equations and panel data techniques have to be enriched by some important methodological innovations to avoid problems of inconsistency and biases in the estimates (i.e. the System GMM, the introduction of controls for heterogeneity).

Along these indications, in this paper we utilize the "System GMM" dynamic panel data estimator and introduce controls for heterogeneity. The results of our dynamic specification of the gravity equation lead to an estimate of the intra-Eurozone pro-trade effect, arising from the adoption of the single currency, as high as around 4-5% (it was between 9% and 10% in de Nardis and Vicarelli 2003).

Thus, it is confirmed that the adoption of a common currency had a positive but not large impact on bilateral trade of European countries. This

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

probably, as already noted by Berger and Nitsch (2005), De Souza (2002) and de Nardis and Vicarelli (2003), because of already tight trade links characterizing the group of economies that embraced the common currency. Trade relationships within Europe, historically intense for cultural and political factors, were reinforced during the past 20 years by several policy decisions such as the creation of the European Monetary System at the end of the seventies and the institution of the Single Market at the beginning of the nineties. This finding (a modest and, at the same time, quick euro effect) is also consistent with the possibility that trade integration promoted by the euro had to deal more with the introduction of new goods (extensive margin) rather than with the expansion, due to lower transaction costs, of trade volumes of incumbent products (intensive margin).

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