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This paper tests whether trade in new goods were partially responsible for the pro-trade effects of the euro and provides a measure of the size of the effect. It works with a very large data (about 16 million observations) set covering twenty countries at the most disaggregated level of trade data that is publicly available. Using predictions from a heterogeneous-firms trade model in a multi-country environment to structure our empirical model, we find that the euro had a positive impact on trade overall. Our findings provide supportive but not conclusive evidence for the new-goods hypothesis. We also determined the pro-trade effect of euro-usage on non-Euroland nations trading with euro-users. We confirmed the absence of trade diversion for non-Eurozone EU members with sizeable overall increase comparable to that of members.

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Abstract

This paper tests whether trade in new goods is partially responsible for the pro-trade effects of the euro and provides a measure of the size of the effect. It works with a very large data set (about 16 million observations) covering twenty countries at the most disaggregated level of trade data that is publicly available. Using predictions from a heterogeneous-firms trade model in a multi-country environment to structure our empirical model, we find that the euro had a positive impact on trade overall. Our findings provide supportive but not conclusive evidence for the new-goods hypothesis. We also determined the pro-trade effect of euro-usage on non-Euroland nations trading with euro-users. We confirmed the absence of trade diversion for non-Eurozone EU members with sizeable overall increase comparable to that of members.

JEL codes: F4, F21, F12, F33.
Keywords: heterogeneous firms, Eurozone trade effects, Melitz model, extensive margin.

2. INTRODUCTION

Rose (2000) launched the recent wave of research on the trade effect of currency union trade by finding that the nations in a currency union trade 235% more than expected. Starting with Nitsch (2002), an extensive literature has criticized many aspects of Rose's methodology; the current 'received wisdom' seem to be that the trade effect on the worldwide dataset is small and possibly insignificant (see Baldwin 2005 for a survey). A recurrent critique of Rose's original work was the unusual nature of the currency-union countries in Rose's worldwide dataset; most were very small and very poor. The small-and-poor issues do not arise when it comes to the Eurozone. Recent work – including Micco, Stein and Ordonez (2003), Gomes et al (2004), Flam and Nordstrom (2003), Berger and Nitsch (2005), Barr, Breedon and Miles (2003), Bun and Klaassen (2002), De Souza (2002), Piscitelli (2003), Baldwin and Taglioni (2004), Baldwin, Skudelny and Taglioni (2004), and De Nardis and Vicarelli (2003) have investigated the euro's impact on bilateral trade flows. Most of these studies find a positive but small trade effect, typically in the 5% to 20% range, although some papers such as Berger and Nitsch (2005) suggest that the effect is statistically insignificant.

These papers have investigated many aspects of the trade effects of the euro including the effect's timing, its variation across countries and across sectors. A less extensive literature has investigated the impact of the euro's introduction on trade pricing and here the evidence seems to suggest that the euro involved no structural break. Baldwin (2005) argues that it is difficult to find pro-trade channels that could account for all the stylised facts from the empirical literature. Particularly puzzling is the fact that the euro does not seem to have caused trade diversion (i.e. the euro's pro-trade effect does not seem to be limited to nations that have adopted the euro) and the fact that there seems to have been no major impact on trade prices even though trade volumes seem to have jumped up.

Baldwin (2005) and Baldwin and Taglioni (2004) show that one can account for all the empirical findings if one presumes that the euro is operating via the so-called extensive margin of trade. That is, the euro is stimulating the export of new products rather than simply increasing the volume of already-traded varieties. This can be understood using Melitz (2003) model as a reference point. To the extent that the euro makes Eurozone nations look like a single nation from the exporters view, the euro could induce firms to export varieties that they had previously only sold domestically.

Since the products already existed, the switch could happen quickly. Since selling a wider range of products can boost trade volumes without changing prices, the lack of a break in the pricing equations would also be accounted for. Lastly, since the common usage of the euro might make all Eurozone nations more attractive to non-Eurozone exporters, the euro's adoption could stimulate trade with non-euro country and this would explain the lack of trade diversion.

This paper presents the first test of the hypothesis that the euro boosted trade via the extensive margin as well as the intensive margin. It uses highly disaggregated trade data (6-digit export data extracted from the UN's Comtrade) database. The empirical evidence can be considered as supported of the hypothesis but not conclusive. Note that after we started working on this project (following up on the new goods hypothesis first presented in Baldwin 2005) we shared some of our preliminary findings with a number of scholars. In return, we have received two incomplete drafts of papers that also undertake exercises aimed at testing the new-goods hypothesis. These drafts were not complete when we first submitted our paper to a journal (e.g. they were not posted on the author's web sites or included in formal discussion paper series).[1]

The paper is organized as follows. Section two gives an overview of theoretical basis of our estimating equation and econometric strategies. Section three presents and interprets our results estimations. Section four contains our concluding remarks.

3. THEORY AND EMPIRICAL STRATEGY

3.1. *Theory*

The theory behind the Melitz model is well-known so here we merely review the features that shape our empirical strategy. The Melitz (2003) model is basically a Helpman and Krugman (1985) model with two key innovations: fixed cost of entering a new market and differences in firm's marginal production costs. Due to the market-entry costs, only firms with sufficiently low marginal cost find it profitable to export.

The bilateral export from nation-o to nation-d (o and d are mnemonics for origin and destination) is determined by two conditions: 1) nation-o's cut-off condition for exports to nation-d and 2) nation-o's total mass of produced varieties. [2] The condition that defines the threshold-marginal-cost for firms exporting from nation-o to nation-d is the pair-specific export cut-off condition:

(1)
$$\left(\frac{\bar{a}_{od}\tau_{od}}{1-1/\sigma}\right)^{1-\sigma}\frac{\mathbf{B}_d}{\sigma}=F_d^X$$

Here 'a' is firm-specific marginal cost, and $\bar{a}_{od}$ and τ_{od} are the pair-specific threshold-marginal-cost and the bilateral trade costs, respectively. B_d is the demand shifter in nation-d, namely $E_d/P_d^{1-\sigma}$ where E_d is total expenditure in nation-d on all varieties, P_d is the usual CES price index. F_d^X is the fixed cost of entering the market in nation-d; $\sigma>1$ is the constant elasticity of substitution.

The equilibrium in nation-o is characterised by one cut-off condition for every market in the world, including nation-o's own market. The cut-off condition for its own market is called the domestic cut-off condition; it defines the highest marginal cost for active nation-o firms. Firms with marginal costs above this threshold will not produce even for the local market. Formally, the domestic cut-off condition is:

(2)
$$\left(\frac{\bar{a}_{oo}}{1-1/\sigma}\right)^{1-\sigma}\frac{\mathbf{B}_0}{\sigma}=F_o^D$$

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[1] Flam and Nordstrom, October 2006, "Euro effects on the intensive and extensive margins of trade." Word file. Voker Nitsch (2006), "Scalpel, Please! Dissecting the Euro's Effect on Trade," PDF file.
[2] For a complete presentation of a multi-country version of the Melitz model, see Helpman, Melitz and Yeaple (2004).

where $\bar{a}_{oo}$ is the threshold marginal cost of local sales in nation-o, and the other variables are defined by analogy with (1) except F_o^D here reflects the cost of entering the domestic market in nation-o; as usual, we assume zero trade costs for local sales.

Turning to the value of sales from nation-o to nation-d we have from the usual CES demand function that the value of per-firm bilateral exports measured in terms of the numeraire is:

$$v_{od}[a] = \begin{cases} \left(\dfrac{a\tau_{od}}{1-1/\sigma}\right)^{1-\sigma} \mathbf{B}_d \ , & a \le \bar{a}_{od} \\ 0 \ , & a > \bar{a}_{od} \end{cases}$$

so the total bilateral exports (using upper case V for total bilateral exports) are:

$$V_{od}[a] = \int_0^{\bar{a}_{od}} n_o \left(\frac{a\tau_{od}}{1-1/\sigma}\right)^{1-\sigma} \mathbf{B}_d \, dG\left[a \middle| \bar{a}_{oo}\right], \quad a \le \bar{a}_{od}\,, \qquad V_{od}[a] = 0\,, \quad a > \bar{a}_{od}$$

where $G[a|\bar{a}_{oo}]$ is the conditional density function that describes the distribution of marginal costs in nation-o; it is conditioned on the domestic threshold marginal cost $\bar{a}_{oo}$ since only firms that produce can export and no firms with a's above $\bar{a}_{oo}$ produce in nation-o.

Re-grouping the variables that are specific to nations o and d, and those that are specific to the bilateral relationship, we have:

(3)

$$V_{od} = \begin{cases} \tau_{od}^{1-\sigma} \mathbf{B}_d \left\{ n_o \int_0^{\bar{a}_{od}} a^{1-\sigma} dG[a|\bar{a}_{oo}] \right\} \left(1 - \dfrac{1}{\sigma}\right)^{\sigma-1} \ , & a \le \bar{a}_{od} \\ 0 \ , \quad a > \bar{a}_{od} \end{cases}$$

As far as our estimation strategy is concerned, the salient points of (3) are that a drop in the bilateral trade cost, τ, or the fixed market entry costs, F_X, will stimulate bilateral exports. Crucially, these trade cost reductions can induce firms to start exporting across a bilateral relation when previously there was no trade. Our empirical strategy is to focus on exactly the bilateral trade flows that switch from zero to a positive number, although we also look at the change in existing trade flows.

3.2. *Estimation strategy*

The bilateral trade volume equation (3) suggests a gravity-like estimating equation. The peculiarity of our set-up with respect to the standard gravity model is the presence of censored export/import values. Any time trading is not profitable to a firm we have a censored datum. Censored data (zero export values) are a non negligible part of our datasets. One part of our paper's value added is to employ estimation techniques that account for the censored nature of the data generation process.

To stay as close as possible to the theory we define an uncensored profit/loss variable $\Pi^*{}_{od}[a]$:

$$\Pi^*{}_{od}[a] = \left(\frac{a\tau_{od}}{1-1/\sigma}\right)^{1-\sigma} \mathbf{B}_d - F_d{}^x \ , \quad a \le \bar{a}_{oo}$$

and

$$\Pi_{od}[a] = \max\left(0, \Pi^*{}_{od}[a]\right) \rightarrow \begin{cases} \Pi_{od}[a] \geq 0, & \Pi^*{}_{od}[a] \geq 0 \qquad a \leq \bar{a}_{od} \\ \Pi_{od}[a] = 0, & \Pi^*{}_{od}[a] \leq 0 \qquad \bar{a}_{od} \leq a \leq \bar{a}_{oo} \end{cases}$$

In the model, loss-making firms exit and do not export, so there is a one to one relationship between the variable $\Pi_{od}[a]$ and the dependent variable used in our estimations V_{od}, namely:

$$\begin{aligned} \Pi_{od}[a] \geq 0 \leftrightarrow V_{od}[a] \geq 0 \qquad & a \leq \bar{a}_{od} \\ \Pi_{od}[a] = 0 \leftrightarrow V_{od}[a] = 0 \qquad & \bar{a}_{od} < a < \bar{a}_{oo} \end{aligned}$$

In Tobit terminology, $\Pi^*{}_{od}[a]$ the invisible latent variable, and $\Pi_{od}[a]$ is the observable variable; although we do not have data for this variable, we use the one-to-one relationship between Π and V to adopt $V_{od}[a]$ as our observed dependent variable.

Equation (3) suggests that a non-linear equation; we linear-ise this by taking logs.

As the log of a zero trade flow is undefined, we shift the whole distribution of trade values by the small amount of one unit. We believe this transformation of the dependent variable is innocuous for our estimations since it corresponds to censoring the distribution to one but compensating the uncensored value for the shift of the censoring point. Moreover, it does not modify the variance of our dependent variable.

Taking theory to empirics, we notice that B_d equals $E_d/P_d^{1-\sigma}$, where E is expenditure. We proxy for E_d with GDP of the importing (destination) nation. Since n_o is related to the endowment of the exporting (origin) nation, we proxy for it with GDP of the exporting nation.[3] The remaining terms, including bilateral trade costs, the $P_d^{1-\sigma}$ terms and the additional nation-o specific factors affecting n_o are controlled for with time-invariant pair dummies.

Since euro usage is time-varying, we identify its pro-trade effect with three direction-specific dummies: EZ11, EZ01 and EZ10, where the first '1' indicates euro usage by the origin nation, and '0' for non-usage; the second digit indicates that same for the destination nation. Thus EZ11 indicates that both nations use the euro, EZ01 that only in importing (destination) uses it, etc. The control group is EZ00, i.e. nations that do not use the euro. Finally we include dummies to control for single market membership (eu_t).

The inclusion of pair dummies means that all the identification of EZ and GDP parameters will come from time-series variation. Thus, we can think of our regressions as difference-in-differences, where the first difference is change in bilateral exports over time and the second difference is between the behaviour of 'euro-treated' bilateral flows and 'untreated' flows.

We estimate the model using three estimators: Tobit, OLS and Logit.

3.2.1 Tobit regressions

Our first set of regressions, which employ Tobit estimation, quantify the overall impact that of euro-usage on trade, through the following equation.[4]:

[3] See Helpman, Melitz and Yeaple (2004) on the relationship between n_o and nation-o's endowment.

[4] Tobit estimation assumes normal distribution of the error term and is carried through maximum likelihood; we report it below in log form.

$$\Lambda = \sum_{V_{odt}=0} \log\left[\Phi\left(-\left(gdp_{dt} + d_t + d_{od} + eu_t + ez11 + ez01 + ez10\right)\right)\right]$$
$$+ \sum_{V_{odt}>0} \log\left[\phi\left(v_{odt} - \left(\beta gdp_d + d_t + d_{od} + eu_t + ez11 + ez01 + ez10\right)\right)\right]$$

$$v_{od} = \beta gdp_{dt} + d_t + d_{od} + eu_t + ez11 + ez01 + ez10 + \varepsilon_{odt} \quad \text{if}$$
$$\varepsilon_{odt} \geq -(\beta gdp_d + d_t + d_{od} + eu_t + ez11 + ez01 + ez10)$$

and

$$v_{od} = 0 \qquad \text{if} \qquad \varepsilon_{odt} < -(\beta gdp_d + d_t + d_{od} + eu_t + ez11 + ez01 + ez10)$$

In this model the marginal effect of each variable on the expected value of the dependent variable is given by the marginal effect on the latent variable multiplied by the probability that the latent variable is above the censoring point. For instance, the marginal effect of the gross domestic product will be given by:

(4) $$\frac{\partial E\left[v_{od} \left| (gdp, d_t, d_{od}, eu_t, ez11, ez01, ez10)\right.\right]}{\partial gdp} = \beta \cdot P(\Pi^*_{od} > 0)$$

We report and discuss the overall effect indicated in equation (4) in section 3.2.1. We call it overall effect since it sums both the effect on positive and on censored values.

McDonalds and Moffit (1980) showed how to use Tobit estimates to decompose the overall effect into the change of the dependent variable for uncensored values (above the limit) and the change in the probability of being above the limit weighted by the expected value of the dependent variable. This is:

$$\frac{\partial E\left[v_{od} \left| (gdp, d_t, d_{od}, eu_t, ez11, ez01, ez10)\right.\right]}{\partial gdp}$$
$$= P(v_{od} > 0) \frac{\partial E\left[v_{od} \left| (gdp, d_t, d_{od}, eu_t, ez11, ez01, ez10) v_{od} > 0\right.\right]}{\partial gdp} +$$
$$+ E\left[v_{od} \left| (gdp, d_t, d_{od}, eu_t, ez11, ez01, ez10) v_{od} > 0\right.\right] \frac{\partial P(v_{od} > 0)}{\partial gdp}$$

The first part refers to the effect on the positive uncensored values; this is what we report side-by-side with OLS estimation in section 3.2.3. It corresponds to the results of a truncated regression on positive values. The exercise is done with a double purpose. We aim to show the bias introduced by ordinary least squares when the dependent variable is in fact censored. It also shows the euro's effect on strictly positive trade value.

3.2.2 Logit

The new issue we address in this paper is the effect the euro had on trade in products that were not previously traded. To illustrate this we also undertake a binary estimation, namely where the left-hand side consists of zeros and ones (zeros if there is no bilateral trade in the particular product category in a particular year and one otherwise). We estimate this with the logit model. In section 3.2.2 we don't report the marginal effect but the estimation coefficients which are tied to the marginal effect. The reason of our choice is that marginal effects are commonly evaluated at the mean of the regressors, many of our regressors are binary and computing the mean of them is not appropriate although replacing the GDP with a mean value is not appropriate either. Therefore we find the direction and the significance of the effect, which are unaffected by marginal effect

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where Φ, ϕ represent respectively the cumulative density function and the density function of a standard normal. Intuitively what Tobit model does is to weight differently (from the standard normal) censored and uncensored observations. The result is a mixture of a probit likelihood for censored values versus the likelihood of a normal distribution. Maximising it over the unknown parameters $(\beta, d_t, d_{od}, eu_t, ez)$ we obtain the marginal effect on the latent variable.

computation, and provide below the way to compute them. In logit models they are generally obtained as follows:

$$\frac{\partial P\left(b_{od}=1|x\right)}{\partial x_i}=\frac{1}{1+e^{x\beta}}\frac{e^{x\beta}}{1+e^{x\beta}}\beta$$

which in the case of binary regressors simplifies to:

$$\frac{\partial P\left(b_{od}=1|x\right)}{\partial d}=\left[\frac{e^{x\beta+\alpha+d}}{1+e^{x\beta+\alpha+d}}|(dummy=1)\right]-\left[\frac{e^{x\beta+\alpha}}{1+e^{x\beta+\alpha}}|(dummy=0)\right].$$

When dummy coefficient is small, the effect on the binary regressors can be approximated by:

$$\frac{\partial P\left(b_{od}=1|x\right)}{\partial d_i}=\frac{e^{x\beta+\alpha}}{1+e^{x\beta+\alpha}}\left(e^{d}-1\right)\approx\frac{e^{x\beta+\alpha}}{1+e^{x\beta+\alpha}}d$$

The last equation proves that the marginal effects can be computed multiplying estimation coefficient by the cumulative density function of a logistic distribution evaluated at a given point.

3.2.3 Data issues

The ideal dataset for this kind of study should contain product-level, firm-level bilateral trade data. This would allow us to pick up bilateral switches in export behaviour at the individual product and firm level. Since these data are not available to us, we use the most detailed direction-of-trade data that is available for a wide range of nations, namely trade data at the Harmonised System's (HS) six digits level (available from the UN's Comtrade database). We focus on the 1994 to 2003 period since 2003 is the last available year and the data before 1994 is contaminated with issues concerning VAT fraud (see Baldwin 2006 for a discussion). The countries in our sample are the EU15 nations (Germany, Greece, Spain, France, Ireland, Italy, the Netherlands, Austria, Portugal, Belgium and Finland; data for Luxembourg and Belgium are fused), three other West European nations (Switzerland, Norway, Iceland) and three non-European nations (USA, Canada and Japan). There are more than 5000 product lines at the 6-digit level so the total data set for our 20 nations and 10 years is large. Comtrade does not report zero flows but rather omits the product-line altogether; we deduce the existence of the zeros by squaring the database nation by nation. This means that we have no zeros for product-lines that were never traded by the nation concerned.[5] After this procedure, we have about 16 million observations. Data on GDPs were gathered from the World Development Indicators of World Bank.

Each of our product categories encompasses a range of individual goods, so we cannot hope to pick up the full extensive margin. For example, we cannot identify cases where euro usage induces more varieties to be bilaterally traded in an HS 6-digit category that has always had positive trade flows. We can, however, detect the extensive margin in cases where a bilateral trade flow switches from zero to positive since we know that the number of trade varieties was zero before and positive afterwards. In other words, when we observe a positive bilateral trade flow between a pair of nations in a particular product category, we suspect that it includes many different varieties but we do not know how many. Thus we cannot ascertain the full link between euro-usage and the number of varieties.

The appendix presents a more informal analysis of the main data features.

[5] For example, for the database that has Germany as an exporter, there are no zeros for product lines that Germany never exported to any of the 19 partners in any of the years. This is not a problem given our inclusion of pair dummies for each product line since this means that the coefficients are identified off of time-series variation, i.e. that time-dummy fixed effects would have absorbed the always-zero sections in any case.

4. ESTIMATION AND RESULTS

The main empirical contribution of our paper – estimating the pro-trade effect of the euro on highly disaggregated trade data – involves several novel issues due to the extreme size of the data sets. It is useful therefore to start from a more familiar point of departure, namely the standard gravity regression on panel data, where the product-dimension of the data has been collapsed.

4.1. *Aggregate Estimations*

To provide a comparison with other empirical studies of the euro's trade impact, we aggregate our export data across products to form a traditional panel of bilateral export flows. Since this leaves us with only a few thousand observations, it is simple to run the standard panel gravity regressions.

We estimate the effect of Eurozone membership on bilateral exports controlling for 'economic mass' with the GDPs of the origin and destination countries, controlling for all time-invariant pair-specific factors with pair dummies, and controlling for unobserved period-specific factors with time dummies. EU membership is also accounted for with period specific EU dummies. Austria, Finland and Sweden were members from 1 January 1995, so their pair dummies do not fully absorb the EU effect, so we put in a dummy for their EU membership (this equals unity for all bilateral flows between the three newcomers and the incumbent EU members for the 1995-2003 period).

As far as the euro's impact is concerned, we follow Flam and Nordstrom (2003) by allowing for three direction-specific Eurozone (EZ) dummies, EZ11, EZ01, and EZ10. Here EZ11 picks up the euro's impact on intra-EZ flows, EZ01 picks up the euro's extra-EZ import promoting effect and EZ10 picks up its extra-EZ export promoting effects.

Table 1: Euro's trade effect on aggregated data

	EZ effect beginning in 1999			EZ effect beginning in 1998			EZ effect beginning in 2001		
	Coef	se	p	Coef	se	p	Coef	se	p
lgdp_d	0.61	0.04	0.000	0.61	0.04	0.000	0.64	0.04	0.000
lgdp_o	0.37	0.04	0.000	0.37	0.04	0.000	0.39	0.04	0.000
EZ11	**0.11**	0.02	0.000	**0.12**	0.02	0.000	**0.11**	0.03	0.000
EZ10	**0.06**	0.02	0.001	**0.06**	0.02	0.003	**0.07**	0.02	0.001
EZ01	**0.07**	0.02	0.001	**0.06**	0.02	0.001	**0.06**	0.02	0.003
_cons	-12.25	1.52	0.000	-12.31	1.52	0.000	-13.57	1.49	0.000

Note: se = standard error, p = p-value. All regressions are OLS with time and pair dummies (not reported). Sample is 1994-2003, all 20 nations are included. The product dimension is eliminated by simple additive aggregation.. lgdp_o and _d are the log GDPs of origin and destination nations.R square are all above 98%.

The Table 1 results are very similar to those found in the literature (Micco, Stein and Ordonez 2003 and Flam and Nordstrom 2003). The overall Rose effect (i.e. the pro-trade impact of a common currency) is between 10 and 15 percent and there is no sign of trade diversion, rather it seems that euro usage promotes both the Eurozone's exports and its imports to non-EZ markets. Following standard practice in the aggregate gravity model estimation of the Rose effect, we experiment with three different starting dates for the euro effect, 1998, 1999 and 2001 (these correspond to the decision year to launch the euro, 1998, the year the euro was introduced as an electronic currency, 1999, and the year it was introduced as a paper currency, 2001). As the results in Table 1 show, the exact data has little impact on the point estimates.

The coefficients on GDP are positive, but fairly low (the standard prior is that they should be unity). Recall that lgdp_d is a proxy for expenditure on trade goods by the importing nation and lgdp_o is a proxy for the range of goods produced by the exporting nation. Since our time period is relatively short and is marked by sluggish real growth in most of the nations in our sample, there was relatively little time variation in the economic mass variables. Because we are estimating all the coefficients off of time-series variation, the lack of variation may make it difficult for the regression to distinguish between the impact of GDP and the pair dummies. Moreover, the usefulness of the

GDPs as proxies can vary over the business cycle since expenditure and the trade-versus-non traded composition of GDP varies in booms and busts. The implication is that the measurement error may be especially severe in our sample and thus the GDP coefficients may be more downward-biased than they usually are in gravity regressions.

An additional check of results robustness was done dropping various nations from the sample (Table 2). The findings show that the results are somewhat sensitive to the inclusion of individual nations. The exclusion of the UK from the sample rendered all three EZ variables insignificant at the 5% confidence level, although EZ11 is still significant at the 6% level of confidence. Moreover the size of EZ11 dropped (compared to the 0.11 estimate in Table 1) for every exclusion except that of Greece, whose exclusion raised the estimate to 0.15. The coefficient on EZ10 (promotion of Eurozone external exports) is the least robust to sample alterations; it loses significance in more than half of the exclusions namely when Belgium-Luxembourg, Switzerland, Spain, Sweden, Great Britain, Iceland, Ireland, or Netherlands are excluded. The EZ01 coefficient became insignificant at the 5% level in 8 of the 20 altered sample regressions. The adjusted R-squared for all regressions is between 55% and 60%.

Table 2: Sensitivity to nations in sample

Excluded Nation:	Variable	Coef.	se	P	Excluded Nation:	Variable	Coef.	se	p
Austria	EZ01	0.05	0.02	0.000	Greece	EZ01	0.06	0.02	0.000
Canada	EZ01	0.07	0.02	0.000	Ireland	EZ01	0.06	0.02	0.000
Finland	EZ01	0.05	0.02	0.010	US	EZ01	0.07	0.02	0.000
Germany	EZ01	0.05	0.02	0.020	Italy	EZ01	0.04	0.02	0.020
France	EZ01	0.04	0.02	0.020	Sweden	EZ01	0.05	0.02	0.020
Benelux	EZ01	0.04	0.02	0.030	Portugal	EZ01	0.04	0.02	0.030
Denmark	EZ01	0.03	0.02	0.100	Netherlands	EZ01	0.03	0.02	0.140
UK	EZ01	0.03	0.02	0.130	Japan	EZ01	0.03	0.02	0.160
Spain	EZ01	0.03	0.02	0.150	Norway	EZ01	0.02	0.02	0.330
Switzerland	EZ01	0.01	0.02	0.570	Iceland	EZ01	0.01	0.02	0.520
Denmark	EZ10	0.05	0.02	0.000	Greece	EZ10	0.06	0.02	0.000
Finland	EZ10	0.04	0.02	0.020	Portugal	EZ10	0.06	0.02	0.000
Canada	EZ10	0.04	0.02	0.030	US	EZ10	0.06	0.02	0.000
France	EZ10	0.04	0.02	0.040	Norway	EZ10	0.05	0.02	0.010
Austria	EZ10	0.03	0.02	0.050	Italy	EZ10	0.04	0.02	0.020
Germany	EZ10	0.03	0.02	0.060	Ireland	EZ10	0.03	0.02	0.110
Benelux	EZ10	0.03	0.02	0.110	Netherlands	EZ10	0.03	0.02	0.130
Spain	EZ10	0.02	0.02	0.150	Sweden	EZ10	0.03	0.02	0.130
UK	EZ10	0.01	0.02	0.480	Japan	EZ10	0.01	0.02	0.430
Switzerland	EZ10	0.00	0.02	0.960	Iceland	EZ10	0.00	0.02	0.780
Austria	EZ11	0.09	0.02	0.000	Greece	EZ11	0.15	0.02	0.000
Benelux	EZ11	0.07	0.02	0.000	Ireland	EZ11	0.09	0.02	0.000
Canada	EZ11	0.10	0.02	0.000	Iceland	EZ11	0.06	0.02	0.000
Switzerland	EZ11	0.06	0.02	0.000	Italy	EZ11	0.08	0.02	0.000
Germany	EZ11	0.09	0.02	0.000	Japan	EZ11	0.07	0.02	0.000
Denmark	EZ11	0.10	0.02	0.000	Netherlands	EZ11	0.10	0.02	0.000
Spain	EZ11	0.06	0.02	0.000	Norway	EZ11	0.08	0.02	0.000
Finland	EZ11	0.09	0.02	0.000	Portugal	EZ11	0.09	0.02	0.000
France	EZ11	0.09	0.02	0.000	Sweden	EZ11	0.09	0.02	0.000
UK	EZ11	0.04	0.02	0.060	US	EZ11	0.11	0.02	0.000

Note: Regression identical to Table 1 except one nation at a time is dropped from the sample; only EZ parameters reported and these are grouped by EZ11, EZ10 and EZ01 with the excluded nation listed for each. EZ dummies start in 1999.

There is nothing really novel in the Table 1 and Table 2 results. We show them to demonstrate that our data – when aggregated up to the level typically employed in existing empirical work – yield results that are in line with standard results in the empirical literature findings. We turn now to working with our disaggregated data, i.e. bilateral trade at the HS 6-digit level.

4.2. *Country estimations with highly disaggregated data*

Our disaggregated data set consists of uni-directional product-pairs among all of the 20 nations in our sample. The standard panel gravity regression takes the bilateral trade as the sections (the ‘columns’) and the yearly observations as the time-series (the ‘rows’). Since we have 20×19 uni-directional country pairs for each product category, and there are about 5000 categories, we have about 1.9 million sections. This exceeds our computational capacities, so we were forced to estimate the model with a single nation as the reporter and the other 19 nations as partners. The use of a single reporter with multiple partners rules out some of the standard gravity model procedures. For example, there is no difference between pair dummies and partner dummies.

One drawback of this approach is that it makes it impossible to simultaneously estimate EZ10 and EZ01, i.e. the euro’s impact on external trade distinguished between external exports and external imports. To get around this limitation, we arrange the data set in two ways and run regressions on both. The first views each of the 20 nations as exporters with the other nations as importers, e.g. Germany as the exporter and 19 other nations as importers. For Germany, this implies about 100,000 panels (19 nations each of which imports on average 5000 Germany product categories). For minor and less diverse nations such as Iceland, the number of panels is much smaller. The second set of databases involves a given nation as the importer and the other 19 nations as exporters, e.g. Germany as the importer and 19 other nations as exporters.

On these two sets of databases, we undertake mainly two types of estimations – Tobit which views the trade flows as censored data and Logit which seeks to identify the determinants of the zeros. For comparison, we also run OLS which automatically drops any pair-product section that has a zero in it for any year.

4.2.1 Measuring the overall effect: Tobit estimations

We start by estimating the gravity model viewing the trade flows as generated by the gravity model but censored at 0. We employ the Tobit model, so the estimated coefficient can be viewed as capturing the effect of the right-hand-side variable, i.e. uncensored and censored trade flows. For this reason we associated to this estimation the definition of overall trade effect of the euro. Apart from this, the regression specification is as in the aggregated regressions reported in Table 1. Specifically, we include the log GDP of the partners, time and partner dummies, period specific EU membership dummies, a dummy to pick up time-variation in EU membership due to the accession of Austria, Finland and Sweden, and the ‘variables of interest’ namely the Eurozone dummies. In the exporter databases, the EZ dummies are EZ11 when the exporting nation is a Eurozone members and EZ01 when they are not. In the importer databases, the EZ dummies are EZ11 when the import is a euro-user and EZ01 when the importer is not part of the Eurozone. Note that the GDP of the exporting nation in the export database is absorbed into the time dummies, as is the GDP of the importing nation in the import databases.

One issue that has proved nettlesome in the literature is the time-varying aspects of Single Market liberalisation in Europe. The basic problem is that the degree of economic integration in Europe is gradually rising due to ongoing product market liberalisation. Since the various EU members have implemented the liberalising measures at different paces, a simple time trend or time-varying EU dummy does not fully capture the effect. One way to partly control for this is to perform the estimations excluding the non-European nations, US, Japan and Canada since all the European nations, even the non-EU European nations, have participated in Single Market liberalisation (Norway and Iceland via the European Economic Area agreement and Switzerland via the Bilateral Agreements).

This reasoning leads us to run four regressions for each nation – on the exporter database with all 20 partners, and with only the 17 European partners, and on the importer database again for the 20 and 17 country samples. This gives us a total of 80 regression results to summarize. To keep the tables manageable, we separate the results for nations that use the euro from those that do not.

Table 3:Tobit estimations for EZ members.

Database:	On Exporter Databases						On Importer Databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
						EZ11 estimates						
Austria	0.06	0.01	*	0.06	0.01	*	0.05	0.01	*	0.05	0.01	*
Bel-Lux	0.00	0.02		0.00	0.02		0.02	0.01		0.02	0.01	*
Germany	0.01	0.02		0.02	0.02		0.02	0.02		0.02	0.02	
Spain	0.11	0.01	*	0.12	0.01	*	0.04	0.01	*	0.04	0.01	*
Finland	0.04	0.01	*	0.05	0.01	*	0.04	0.01	*	0.03	0.01	*
France	0.02	0.02		0.02	0.02		0.05	0.02	*	0.05	0.02	*
Greece	0.03	0.00	*	0.03	0.01	*	0.04	0.01	*	0.04	0.01	*
Ireland	0.00	0.01		0.04	0.05		0.08	0.01	*	0.07	0.01	*
Italy	0.01	0.02		0.01	0.02		0.02	0.01		0.02	0.01	
Netherlands	0.00	0.02		0.01	0.02		0.06	0.01	*	0.06	0.01	*
Portugal	0.06	0.01	*	0.06	0.04	*	0.08	0.01	*	0.09	0.01	*
						GDP estimates						
Austria	0.39	0.03	*	0.44	0.03	*	-0.02	0.03		-0.14	0.03	*
Bel-Lux	0.44	0.04	*	0.43	0.05	*	0.20	0.02	*	0.20	0.03	*
Germany	0.45	0.03	*	0.42	0.03	*	0.10	0.04	*	0.03	0.05	
Spain	1.02	0.02	*	1.04	0.02	*	0.03	0.03		-0.03	0.04	
Finland	0.11	0.02	*	0.08	0.02	*	-0.13	0.02	*	-0.28	0.03	*
France	0.62	0.04	*	0.69	0.04	*	0.12	0.04	*	0.05	0.04	
Greece	0.23	0.01	*	0.25	0.01	*	-0.09	0.02	*	-0.14	0.03	*
Ireland	018	0.01	*	0.15	0.02	*	0.05	0.02	*	-0.07	0.02	*
Italy	0.68	0.01	*	0.75	0.05	*	0.10	0.03	*	0.07	0.04	
Netherlands	0.60	0.02	*	0.63	0.03	*	0.11	0.03	*	0.17	0.04	*
Portugal	0.22	0.01	*	0.21	0.02	*	-0.02	0.02		-0.13	0.03	*

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with Tobit estimation with time and partner dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a time dummies and a dummy for the time-varying aspects of EU membership but do not report the coefficients. EZ11 indicates that both partners use the euro.

Results for Eurozone members

Table 3 shows the estimated marginal effects. The top panel of the table shows the four estimates of the EZ11 coefficient for each nation; the bottom panel shows the corresponding estimate for the partner's GDP.

We start with the estimates for EZ11, i.e. common euro usage, on the exporter databases (the first three columns of Table 3). The EZ11 estimates are all positive and although there is a good deal of variation across the 11 databases (one for each Eurozone nation as an exporter), the simple average suggests a Rose effect of between 3 and 4 percent. The highest estimate is 0.11 for Spain and the lowest is 0.004 for Belgium-Luxembourg. Only 5 of the 11 point estimates are statistically significant. In particular the point estimates tend to fall into two groups, those that are very small, between 0 and 0.03, and those that are relatively large, above 0.04; it is the large ones that are significant. The GDP marginal effects are small compared to the value theoretically predicted. Detailed data have never been used before in gravity estimation, if at aggregate level we would expect that an increase in the GDP of the destination country would entail a proportionally equal increase in trade with that country, we do not really know what is the relationship between each product exported by a country and the GDP of the destination country.

The second set of three columns shows the estimates on the Europe-only sample. This change has very little impact on the size or significance of the estimates for the variable of interesting, namely EZ11, exception made for Ireland as exporter.

The third set of columns show that the results doesn't change substantially when we re-organise the data to put the listed nation as the importer and the other nations as the exporting partners. On the full 20-nation sample, the estimates of the EZ11 effect are comparable with those of the exporter databases (average of 0.04 versus 0.03).

Note that this is exactly the same data as in the first two sets of columns, just rearranged to get around our computational limitation in a different way. The main difference concerns the interpretation of the GDP variables. In the exporter datasets, the exporter's GDP is absorbed in the time dummies while the GDP of the importers are estimated. In the importer databases, it is the importing nation's GDP that is absorbed into the time dummy while the exporter nation's GDP coefficient is estimated. Note that the coefficients on GDPs in the importer databases are all much lower. Since the coefficients on GDP were larger in the exporter databases, it seems that GDP is a much better proxy for total expenditure, E_d, than it is for the total number of produced varieties, n_o; see (3).

The fourth set of columns shows the results on the importer databases with only European nations. Here the estimated trade impact of the euro is much more in line with the first set of results (exporter databases with only European nations). The point estimates for the GDP effects, by contrast, are much lower and often negative. Since most European nations experienced fairly stagnant GDP growth during our sample period, we conjecture that the poor estimates for GDP are a result of the regression's failure to distinguish between the partner dummies, which are perfectly time-invariant, and the GDPs which are roughly time-invariant.

Results for non-Eurozone members

Table 4 shows the corresponding four sets of results for non-Eurozone members. Note that here the EZ variables do not estimate the impact of common-euro-usage, what is called the Rose effect or currency-union effect. Instead the EZ dummies pick up the trade impact of one-side euro-usage. In the datasets organised by exporter, the EZ dummies picks up the trade impact of the destination nation using the euro, i.e. the extra imports by EZ nations from non-EZ nations (first two sets of results). In the dataset organised by importers, EZ reflects the impact of trade with origin-nation euro usage, i.e. the extra exports from the Eurozone to non-EZ nations (last two sets of results).

On average point estimates for outsiders are the same as for members, four of them are statistically equal to zero in the estimation based on exporters database and UK, whose EMU creation marginal effect on exports to eurozone is 11% , is the exception.

Among the six EZ-outsiders, only Great Britain and Norway saw significant increases in exports due to the Eurozone's adoption of a common currency. This conclusion does not change when we estimate the parameters using only European nations (second set of results). The GDP estimates are well-behaved for the first two sets of results as in Table 3.). Intriguingly, it seems euro-usage had the biggest impact on non-European exporters to the Eurozone (EZ01), especially Canada

When using the full dataset, i.e. 17 European nations plus the US, Japan and Canada, we find that the euro-usage by the importing nation seems to substantially boost the exports of outsiders to the Eurozone.

On the importer-organised databases, we are estimating the impact on Eurozone exports to non-EZ nations (EZ10). Here we see that for six of the nine nations, the euro seems to promote imports from the Eurozone. The only exception is UK with a negative and significant coefficient. These findings are basically confirmed on the Europe-only databases. The GDP estimates suffer the same problems as in Table 3.

Table 4: Tobit estimation for non-EZ countries.

Database:	On Exporters databases						On Importers databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
	EZ01 estimates						EZ10 estimates					
Denmark	0.01	0.01		0.04	0.03		0.06	0.01	*	0.06	0.05	*
UK	0.11	0.02	*	0.12	0.02	*	-0.08	0.02	*	-0.08	0.02	*
Sweden	-0.01	0.01		-0.02	0.03		0.02	0.01		0.01	0.01	
Switzerland	-0.02	0.01		-0.03	0.02		0.04	0.01	*	0.04	0.01	*
Iceland	000	0.00		-0.02	0.10		0.04	0.01	*	0.04	0.01	*
Norway	0.03	0.01	*	0.04	0.01	*	0.02	0.01		0.02	0.01	
Canada	0.04	0.01	*				0.12	0.01	*			
Japan	0.03	0.01	*				0.06	0.01	*			
US	0.04	0.01	*				0.04	0.01	*			
	GDP estimates											
Denmark	0.49	0.02	*	0.51	0.02	*	0.08	0.03	*	-0.01	0.03	
UK	0.21	0.03	*	0.15	0.03	*	0.33	0.01	*	0.32	0.04	*
Sweden	0.30	0.02	*	0.30	0.02	*	-0.15	0.03	*	-0.30	0.04	*
Switzerland	0.17	0.02	*	0.15	0.02	*	0.08	0.03	*	-0.03	0.04	
Iceland	0.15	0.01	*	0.14	0.01	*	0.03	0.01	*	-0.02	0.02	
Norway	0.20	0.01	*	0.18	0.02	*	-0.04	0.03	*	-0.19	0.03	*
Canada	0.27	0.01	*				-0.01	0.03				
Japan	-0.16	0.02	*				-0.09	0.03				
US	0.29	0.03	*				-0.03	0.04	*			

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with Tobit estimation with time and partner dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a dummy for the time-varying aspects of EU membership but do not report the coefficients.

4.2.2 Probability of exporting: Logit estimations

The Tobit regressions pick up the total impact of the euro on trade, both expansion of trade in existing categories and the change in the number of categories traded. This section and the next, attempt to separate these two margins of adjustment. We begin with the determinants of zero trade in a given category – what we called the quasi-extensive margin above.

The specific empirical question is how much euro usage affects the probability that a particular product category is traded among nations when one or both trade partners use the euro. We use the familiar logit model which assumes that the cumulative probability function to be $F(\eta) = e^{\eta}/(1+e^{\eta})$. This is used to estimate, via maximum likelihood, the marginal impact of euro-usage on an observed (positive) trade flow controlling for economic mass. Table 5 presents our results on the four sets of databases.

Table 5 provides empirical support for the 'new goods hypothesis', i.e. the notion that the euro has boosted trade via the opening up of trade in previous un-traded categories. On the European-only sample (the second and fourth sets of results), most the point estimates are positive and the negative point estimates are statistically insignificantly different from zero in all cases except one, namely Germany on the exporter-organised dataset (its coefficient is negative but not on the importer-organised database). The average size of the impact is fairly modest, only about 2% on average in exporter databases and 6% on the importer databases.[6] Note that given our estimation procedure, a

[6] To transform this impact into the marginal effect of euro usage on the probability of trading a new good, the impact must be weighted by the cumulative density function at the evaluation point. Since the cumulative function is equal to 1only at infinity, the impact must somehow be scaled down to obtain the marginal effect. The reason why we decided to report the estimated coefficients instead of the marginal effect resides in the fact that in non linear estimation marginal effect are evaluated at the mean and in this specific case the mean is meaningless.

positive coefficient on the EZ dummy can be interpreted as a positive effect of euro-usage on the likelihood of trade and we refer back to section 2.2 to give an exact size to these coefficients.

Table 5: Logit estimates: euro's impact on observing a positive trade flow.

Database:	On Exporter databases						On Importer databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
				EZ11 estimates								
Austria	0.05	0.01	*	0.06	0.01	*	0.04	0.01	*	0.05	0.01	*
Bel-Lux	-0.01	0.01		-0.01	0.01		0.02	0.01	*	0.03	0.01	*
Germany	-0.04	0.01	*	-0.04	0.01	*	-0.02	0.01		-0.02	0.01	
Spain	0.07	0.01	*	0.07	0.01	*	0.07	0.01	*	0.02	0.01	
Finland	0.04	0.01	*	0.04	0.01	*	0.09	0.01	*	0.06	0.01	*
France	-0.01	0.01		-0.01	0.01		0.00	0.01		0.00	0.01	
Greece	0.11	0.01	*	0.11	0.01	*	0.13	0.01	*	0.05	0.01	*
Ireland	-0.01	0.01		-0.01	0.01		0.16	0.01	*	0.10	0.01	*
Italy	-0.02	0.01		-0.02	0.01		0.03	0.01	*	-0.01	0.01	
Netherlands	-0.03	0.01	*	0.08	0.01	*	0.04	0.01	*	0.04	0.01	*
Portugal	0.08	0.01	*	-0.03	0.01	*	0.11	0.01	*	0.07	0.01	*
				GDP estimates								
Austria	1.04	0.07	*	1.13	0.08	*	-0.22	0.06	*	-0.39	0.09	*
Bel-Lux	0.74	0.07	*	0.68	0.08	*	0.46	0.05	*	0.52	0.08	*
Germany	0.54	0.03	*	0.49	0.03	*	0.14	0.05	*	0.04	0.08	
Spain	2.06	0.04	*	2.04	0.05	*	0.87	0.05	*	-0.07	0.08	
Finland	0.43	0.06	*	0.30	0.07	*	0.12	0.06	*	-0.83	0.09	*
France	0.83	0.05	*	0.88	0.06	*	0.33	0.05	*	0.09	0.08	
Greece	1.97	0.08	*	2.01	0.09	*	0.36	0.06	*	-0.47	0.09	*
Ireland	1.20	0.09	*	1.09	0.10	*	1.06	0.07	*	-0.28	0.12	*
Italy	0.94	0.05	*	0.97	0.04	*	0.73	0.05	*	0.15	0.08	
Netherlands	0.98	0.04	*	1.02	0.06	*	0.30	0.05	*	0.35	0.08	*
Portugal	1.08	0.07	*	1.00	0.08	*	0.15	0.06	*	-0.37	0.09	*

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with logit maximum likelihood estimation with time and partner dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a dummy for the time-varying aspects of EU membership but do not report the coefficients. The dependent variable is 0 if there is no trade for a particular pair-product-year combination and 1 if there is. The pseudo R-squared in this set of estimation range always between 5% and 15%.

The Europe-only datasets are more cautious in that they include only nations that have experienced Single Market integration (to varying degrees). In principle, this helps us separate the impact of the Single Market from the impact of the euro since all the nations have been 'treated' with Single Market integration, but only the EZ members have been treated with the single currency as well. It is useful, however, to check whether the results are robust to the inclusion of non-European nations. It is thus reassuring that on the full data samples (first and third sets of results) we find qualitatively and quantitatively similar results. The only two exceptions are represented by Portugal, whose positive effect seems to capture more the effect of Single Market Integration and Netherlands where the estimate on the restricted sample proves that euro-usage had a significantly positive impact on the probability of exporting new goods.

Results for non-Eurozone members

The impact of the euro on the probability of observing a positive trade flow between Eurozone nations and non-Eurozone nations is quite different from the impact on intra-Eurozone flows, as Table 6 shows. The first two sets of results show the marginal impact of the importing nation's use of the euro on the probability that it imports a particular product category from the listed nation. The point estimates are small and two of the six coefficients that are significant are negative. A negative coefficient here indicates trade diversion, i.e. the use of the euro by the importing nation but not the exporting nation makes it less likely to observe a positive trade flow in the typical product category. It is interesting that the estimates for the non-European exporters are larger on average; as before this may be picking up the fact that the common use of the euro had a bigger impact on outside firms who were not selling originally to any Eurozone markets. The results for the Europeans-only datasets (second set of results) generally confirm the mixed pattern of negative and positive effects for exports from outsiders to the Eurozone nations. The GDP coefficients are quite low (average of 0.27), suggesting that marginal changes in market size have only a modest impact on the probability of exporting a given product.

The third and fourth sets of results in Table 5 (i.e. columns 7 to 12) show the impact on outsiders' imports from Eurozone nations. Here the results are far more homogeneous, suggesting that the euro tended to promote exports from the EZ nations to non-EZ nations. Indeed the simple average of the coefficients is 0.06 for the third set (Europe+3 databases) and 0.03 for the fourth set (Europe-only databases). The stand-out is Britain whose imports from EZ members seem to have been diminished by the introduction of the euro. We should note, however, that the problems with the GDP estimates are quite severe for the importer databases, especially the Europe-only ones. Many of the GDP estimates are negative with several of them significant[7].

Table 6: Logit estimation for non-EZ countries.

Database:	On Exporters databases						On Importers databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
	EZ01 estimates						EZ10 estimates					
Sweden	-0.04	0.01	*	-0.04	0.01	*	0.01	0.01		0.01	0.01	
Denmark	0.01	0.01		0.01	0.01		0.06	0.01	*	0.07	0.01	*
UK	0.06	0.01	*	0.07	0.01	*	-0.03	0.01	*	-0.06	0.01	*
Switzerland	-0.02	0.01	*	-0.02	0.01	*	0.17	0.01	*	0.04	0.01	*
Iceland	0.03	0.03		0.03	0.03		0.13	0.01	*	0.11	0.01	*
Norway	0.05	0.01	*	0.06	0.01	*	0.04	0.01	*	0.02	0.01	
Japan	0.02	0.01					0.11	0.01	*			
US	0.03	0.01	*				0.05	0.01	*			
Canada	0.09	0.01	*				0.03	0.01	*			
	GDP estimates											
Sweden	-0.03	0.02		-0.07	0.02	*	0.26	0.02	*	0.25	0.03	*
Denmark	0.08	0.02	*	0.06	0.02	*	0.04	0.03		-0.08	0.04	*
UK	0.12	0.02	*	0.11	0.02	*	-0.19	0.02	*	-0.31	0.04	*
Switzerland	0.25	0.02	*	0.23	0.02	*	0.01	0.02		-0.22	0.04	*
Iceland	0.42	0.02	*	0.42	0.02	*	0.03	0.02		0.00	0.04	
Norway	1.12	0.06	*	1.08	0.07	*	0.18	0.03	*	-0.03	0.05	
Japan	-0.17	0.02	*				-0.06	0.03	*			
US	0.16	0.02	*				0.12	0.02	*			
Canada	0.52	0.02	*				-0.03	0.02				

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with Tobit estimation with time and partner dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a dummy for the time-varying aspects of EU membership but do not report the coefficients. The pseudo R-squared in this set of estimation range always between 5% and 15%.
The EZ variables estimated on the 'exporter databases' estimate the impact of euro-usage by the destination nation on the listed nation's exports, hence EZ01. The EZ estimated on 'importer databases' captures the impact on the imports of the listed nation from euro-using nations, hence EZ10.

[7] The fact that gdp's coefficients take on low or negative values is not of particular worry since theory only predicts the effect of gdp on overall imports or exports but there are no theoretical predictions about the effect aggregate gdp can have on trade of specific products.

Summary

To summarise the 80 logit regressions reviewed in this subsection, we find moderately supportive evidence that common adoption of the euro raises the range of goods trade between two nations. This evidence supports the new goods hypothesis. However, since the quasi-extensive marginal accounts for only a moderate share of the total trade creation, the evidence suggests that the new goods hypothesis is not sufficient to explain the overall increase in trade. Of course, we cannot make the complete calculation of the extensive margin since we can only observe trade in new goods when a category switches from zero to unity.

4.2.3 Ordinary least square versus censored regressions

Finally we turn to estimating the impact of the euro on the quasi-intensive margin, i.e. the trade flows that were positive before and after the euro's introduction. To this end, we perform the estimations with two different techniques: the standard panel-data gravity model estimation where we drop all pair-product combinations that have a zero in their time series, and the Tobit estimation where we focus on the result for the uncensored dependent variable (only positive values of trade). The first method, which is widely used in this literature, is incorrect, but we include it for comparison. The second methodology corrects the bias that exists in the first methodology.

To connect these results with those of the previous two sub-sections, recall that Tobit can be thought of as a two step procedure. In the first step, the econometrician estimates the probability of observing a trade flow above the censoring threshold and these are used to form Mills ratios. In the second step, the Mills ratios are included among the regressors in a regression on the positive trade flows. If the other regressors used in the first and in the second stage are identical then the results coincide with the Tobit estimates. In this light, what we do here is to run the second stage regressions with and without the Mills ratios. Our aim is to provide a rough estimate of the intensive margin, noting as always that the HS 6-digit is too aggregated to capture individual varieties, so our regressions confuse some adjustment in the number of varieties with the growth in already-traded varieties. The results are displayed in Table 7 for EZ members.

When we use the export-organised databases and the OLS technique, the impact of the common usage of the euro on pre-existing trade flows is estimated to be positive for all EZ members apart from Greece. In 8 of the 9 cases of positive estimates we find statistical significance. When we use the export-organised databases and the Tobit model, estimations are smaller. The French, German, Bel-Lux and Irish estimates become insignificant while Greek coefficient gains in significance. The results for the importer organised databases is even better, especially for the full sample of countries. The average euro-effect is 0.06 in the first two sets of results, 0.15 in the third and 0.08 in the fourth when OLS is used, while it is only 3-4% in Tobit estimations.

Table 7: The euro and the quasi-intensive margin (OLS technique): EZ members

Database:	On Exporter databases						On Importer databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
					EZ11 estimates							
Austria	0.03	0.02		0.03	0.02		0.14	0.02	*	0.09	0.02	*
Bel-Lux	0.06	0.02	*	0.05	0.02	*	0.02	0.02		0.00	0.02	
Germany	0.09	0.01	*	0.10	0.01	*	0.06	0.02	*	0.05	0.02	*
Spain	0.20	0.01	*	0.21	0.01	*	0.28	0.02	*	0.09	0.02	*
Finland	0.13	0.02	*	0.13	0.02	*	0.08	0.02	*	-0.02	0.02	
France	0.04	0.02	*	0.04	0.02	*	0.18	0.02	*	0.11	0.02	*
Greece	-0.21	0.03	*	-0.20	0.03	*	0.19	0.02	*	0.11	0.02	*
Ireland	0.05	0.03	*	0.06	0.03	*	0.16	0.02	*	0.04	0.02	
Italy	0.04	0.02	*	0.04	0.02	*	0.18	0.02	*	0.09	0.02	*
Netherlands	0.08	0.01	*	0.13	0.02	*	0.09	0.02	*	0.05	0.02	*

Portugal	0.13	0.02	*	0.08	0.01	*	0.24	0.02	*	0.23	0.02	*
					GDP estimates							
Austria	0.30	0.05	*	0.24	0.06	*	0.17	0.04	*	-0.06	0.07	
Bel-Lux	0.23	0.05	*	0.17	0.05	*	0.25	0.04	*	0.09	0.06	
Germany	0.53	0.02	*	0.48	0.03	*	0.15	0.03	*	-0.08	0.06	
Spain	0.83	0.03	*	0.81	0.03	*	0.29	0.04	*	-0.43	0.06	*
Finland	0.35	0.04	*	0.30	0.05	*	0.38	0.04	*	-0.18	0.06	*
France	0.45	0.04	*	0.44	0.04	*	0.16	0.03	*	-0.15	0.06	*
Greece	0.09	0.06		0.05	0.06		0.29	0.04	*	0.09	0.07	
Ireland	0.49	0.05	*	0.46	0.06	*	0.54	0.04	*	0.09	0.08	
Italy	0.45	0.04	*	0.36	0.04	*	0.31	0.04	*	-0.04	0.06	
Netherlands	0.62	0.03	*	0.24	0.05	*	0.12	0.03	*	-0.11	0.06	*
Portugal	0.27	0.04	*	0.61	0.03	*	0.26	0.04	*	0.24	0.07	*

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with OLS estimation with time and pair-product dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a dummy for the time-varying aspects of EU membership but do not report the coefficients..

Table 8:The euro usage and the quasi intensive marginal (Tobit estimation on uncensored values): EZ members

Database:	On Exporter databases						On Importer databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
					EZ11 estimates							
Austria	0.04	0.01		0.05	0.01		0.04	0.01	*	0.04	0.01	*
Bel-Lux	0.00	0.01		0.00	0.01		0.01	0.02		0.01	0.02	
Germany	0.01	0.01		0.02	0.01		0.01	0.01		0.01	0.01	
Spain	0.09	0.01	*	0.08	0.01	*	0.03	0.01	*	0.03	0.02	*
Finland	0.04	0.01	*	0.04	0.01	*	0.03	0.01	*	0.03	0.01	
France	0.01	0.01		0.01	0.01		0.04	0.01	*	0.04	0.01	*
Greece	0.04	0.01	*	0.04	0.01	*	0.03	0.01	*	0.03	0.01	*
Ireland	0.00	0.01		0.01	0.01		0.07	0.01	*	0.06	0.02	
Italy	0.01	0.01	*	0.01	0.01	*	0.01	0.01	*	0.01	0.01	*
Netherlands	0.00	0.01		0.00	0.01		0.04	0.01	*	0.04	0.01	*
Portugal	0.06	0.01	*	0.07	0.01	*	0.07	0.01	*	0.07	0.01	*
					GDP estimates							
Austria	0.31	0.02	*	0.35	0.03	*	-0.01	0.02	*	-0.11	0.03	*
Bel-Lux	0.31	0.03	*	0.30	0.03	*	0.15	0.02	*	0.15	0.02	*
Germany	0.34	0.02	*	0.32	0.02	*	0.07	0.03	*	0.02	0.03	
Spain	0.74	0.02	*	0.75	0.02	*	0.02	0.02		-0.02	0.03	
Finland	0.11	0.02	*	0.07	0.02	*	-0.11	0.02	*	-0.23	0.03	*
France	0.45	0.03	*	0.50	0.03	*	0.09	0.03	*	0.04	0.03	
Greece	0.35	0.01		0.36	0.02		-0.08	0.02	*	-012	0.02	*
Ireland	0.23	0.02	*	0.20	0.02	*	0.04	0.02	*	-0.07	0.03	*
Italy	0.48	0.03	*	0.53	0.03	*	0.07	0.02	*	0.05	0.03	
Netherlands	0.43	0.02	*	0.44	0.03	*	0.08	0.02	*	0.12	0.03	*
Portugal	0.24	0.02	*	0.22	0.02	*	-0.01	0.02		-0.11	0.02	*

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with OLS estimation with time and partner dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a dummy for the time-varying aspects of EU membership but do not report the coefficients. The EZ variables estimated on the 'exporter databases' estimate the impact of euro-usage by the destination nation on the listed nation's exports, hence EZ01. The EZ estimated on 'importer databases' captures the impact on the imports of the listed nation from euro-using nations, hence EZ10.

Taken together these are very much in line with the Tobit estimates, but naturally smaller since the creation of trade on the quasi-extensive margin is excluded by construction.

Results for the non-EZ countries

Turning to the final 36 regression results, Table 9 shows the OLS estimates on positive trade flows for the non-EZ nations in our sample. As the first and second sets of regressions reveal, it seems that the euro has had a small and ambiguous impact on the exporters of outsiders to the Eurozone as far as the quasi-intensive margin is concerned. Most of the point estimate for EZ01 are positive but most are insignificant and Canada's is negative and significant. The results for the Europe-only exporter-organised databases confirm the basic point.

For the importer-organised databases, the results seem more robust. These indicate that Eurozone exports to outsiders seem to have been stimulated by the euro's introduction. However, the large difference between the Europe+3 and Europe-only databases suggests that the pro-export aspects of the unobserved impact of the Single Market may be contaminating the euro coefficient. The GDP figures suffer the same problems as those discussed in Table 7 and Table 8.

Table 9:OLS results for non-EZ countries.

Database:	On Exporters databases						On Importers databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
	EZ01 estimates						EZ10 estimates					
Denmark	0.00	0.02		0.00	0.02		0.05	0.02	*	-0.01	0.02	
UK	0.04	0.01	*	0.05	0.01	*	0.13	0.02	*	0.08	0.02	*
Sweden	0.15	0.02	*	0.14	0.02	*	0.12	0.02	*	0.04	0.02	
Switzerland	0.01	0.02		0.01	0.02		0.12	0.02	*	0.07	0.02	*
Iceland	-0.03	0.07		-0.03	0.07		0.10	0.02	*	0.01	0.02	
Norway	0.02	0.02		0.02	0.02		0.05	0.01	*	0.00	0.02	
Canada	-0.05	0.02	*				0.07	0.01	*			
Japan	0.03	0.02					0.05	0.02	*			
US	0.02	0.01					0.15	0.02	*			
	GDP estimates											
Denmark	0.39	0.03	*	0.40	0.03	*	0.16	0.04	*	-0.14	0.06	*
UK	0.37	0.02	*	0.33	0.03	*	0.24	0.04	*	-0.08	0.05	
Sweden	0.69	0.03	*	0.71	0.03	*	0.30	0.04	*	-0.01	0.06	
Switzerland	0.33	0.03	*	0.32	0.03	*	0.32	0.04	*	0.19	0.06	*
Iceland	-0.55	0.14	*	-0.58	0.15	*	0.31	0.04	*	-0.14	0.06	*
Norway	0.32	0.04	*	0.32	0.04	*	0.25	0.04	*	-0.10	0.06	
Canada	0.19	0.04	*				0.19	0.03	*			
Japan	0.05	0.04					0.28	0.04	*			
US	0.25	0.03	*				0.34	0.04	*			

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with OLS estimation with time and partner dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a dummy for the time-varying aspects of EU membership but do not report the coefficients. The EZ variables estimated on the 'exporter databases' estimate the impact of euro-usage by the destination nation on the listed nation's exports, hence EZ01. The EZ estimated on 'importer databases' captures the impact on the imports of the listed nation from euro-using nations, hence EZ10.

Similar conclusions of Table 7 and 8 can be reached comparing tobit and ols results for non member countries (Tables 9 and 10). Differences in estimates are remarkable; taking Canada as example the estimate sign is overturned and the same happens to Sweden, this suggest caution in selecting the econometric model to employ.

Table 10: (Tobit uncensored values) results for non EZ-countries

Database:	On Exporters databases						On Importers databases					
Sample:	Europe+3			Europe			Europe+3			Europe		
	Coef.	s.e.		Coef.	s.e.		Coef.	s.e.		Coef.	s.e.	
	EZ01 estimates						EZ10 estimates					
Denmark	0.01	0.01		0.01	0.01		0.04	0.01	*	0.04	0.01	
UK	0.08	0.01	*	0.09	0.01	*	-0.06	0.01	*	-0.05	0.01	*
Sweden	-0.01	0.01		-0.01	0.01		0.01	0.01		0.01	0.02	
Switzerland	-0.01	0.01		-0.01	0.01		0.03	0.01	*	0.03	0.01	*
Iceland	-0.01	0.01		0.00	0.01		0.04	0.01	*	0.04	0.01	*
Norway	0.03	0.01	*	0.04	0.01	*	0.02	0.01	*	0.01	0.01	
Canada	0.05	0.01	*				0.11	0.01	*			
Japan	0.02	0.01	*				0.05	0.01	*			
US	0.03	0.01					0.03	0.01	*			
	GDP estimates											
Denmark	0.39	0.02	*	0.40	0.02	*	0.11	0.03	*	-0.01	0.03	
UK	0.15	0.02	*	0.15	0.03	*	0.33	0.04	*	0.23	0.03	*
Sweden	0.23	0.01	*	0.23	0.01	*	-0.12	0.02	*	-0.23	0.03	*
Switzerland	0.13	0.02	*	0.11	0.02	*	0.06	0.02	*	-0.03	0.03	
Iceland	0.46	0.03	*	0.42	0.03	*	0.04	0.02	*	-0.03	0.02	
Norway	0.19	0.01	*	0.17	0.02	*	-0.04	0.02		-0.15	0.03	*
Canada	0.34	0.02	*				-0.01	0.02	*			
Japan	-0.14	0.02	*				-0.08	0.03	*			
US	0.21	0.02	*				-0.01	0.02				

Notes: an "*" indicates the variable is significantly different than zero at the 5% level or better. All regressions are done with OLS estimation with time and partner dummies included (i.e. the classic fixed effects with a time-invariant dummy for each section). We also included a dummy for the time-varying aspects of EU membership but do not report the coefficients. The EZ variables estimated on the 'exporter databases' estimate the impact of euro-usage by the destination nation on the listed nation's exports, hence EZ01. The EZ estimated on 'importer databases' captures the impact on the imports of the listed nation from euro-using nations, hence EZ10.

5. CONCLUDING REMARKS

This paper presents the first estimates of the euro's trade effects using highly disaggregated trade data. The highly disaggregated data is used in order to pick up the euro's impact on the so-called extensive margin of trade, i.e. the range of products that one nation exports to another. The goal is to test the 'new goods hypothesis', i.e. the notation that that common usage of the euro lowers variable and fixed trade costs bilaterally and thus expands the range of products traded between Eurozone partners.

Our data consists of HS 6-digit level bilateral trade flows among 20 nations (EU15 plus Switzerland, Norway, Iceland, US, Canada and Japan). At this level of disaggregation there are many 'zeros' in the trade matrix in the sense that nations export only a sub-set of goods to each partner. Using the Melitz (2003) model of trade with heterogeneous firms, the existence of a zero in the trade matrix can be related to the variable and fixed trade costs, with the likelihood of observing a zero increasing with the level of the trade costs. The new-goods hypothesis suggests that common euro-usage lowers trade costs and thus stimulates trade via the extensive margin (more products are traded) and the intensive margin (the trade in products that are already traded rises).

Our empirical findings provide supportive but not conclusive evidence for the new-goods hypothesis. In particular, our Logit estimates – which gauge the impact of common euro-usage on the probability of observing a positive trade flow at the highly disaggregated level – indicate a positive finding for seven of the eleven Eurozone nations on our exporter databases and nine of the eleven on our importer databases.

While our Logit regressions focus precisely on the role of the euro in determining the zeros in the trade matrix, we present another set of Tobit regressions that allow the euro to affect the trade of both new and existing product categories. The Tobit results are broadly supportive of the Logit findings. In a final set of regressions, we use the traditional OLS estimator. Since this automatically drops all country-product combinations that were ever zero, the estimates focus on the euro's impact on existing trade flows. Here we find the usual results that the euro boosted intra-Eurozone trade modestly and did not lead to trade diversion. Indeed, we find that even one-sided euro-usage had a pro-trade effect.

In addition to our original focus on the extensive margin, our empirical work may be viewed as a contribution to the broader literature on the euro's trade impact. In particular, previous studies have ignored the zero's in the bilateral trade matrix and the euro's impact on them. Thus, our Tobit estimates and the use of extremely disaggregated bilateral trade data can be viewed as a methodological advance – totally apart from the focus on the extensive margin.

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APPENDIX

5.1. *Data features*

Figure 1 presents the number of zeros in German exports to the 19 partners in our data set. For example, the top line in the diagram shows the time-series of the number of zeros in German exports to Iceland. The number moves between about 2600 and 2800, which means there are more than 2500 six-digit product lines which Germany exports to some nation, but not to Iceland. A number of features are worth pointing out.

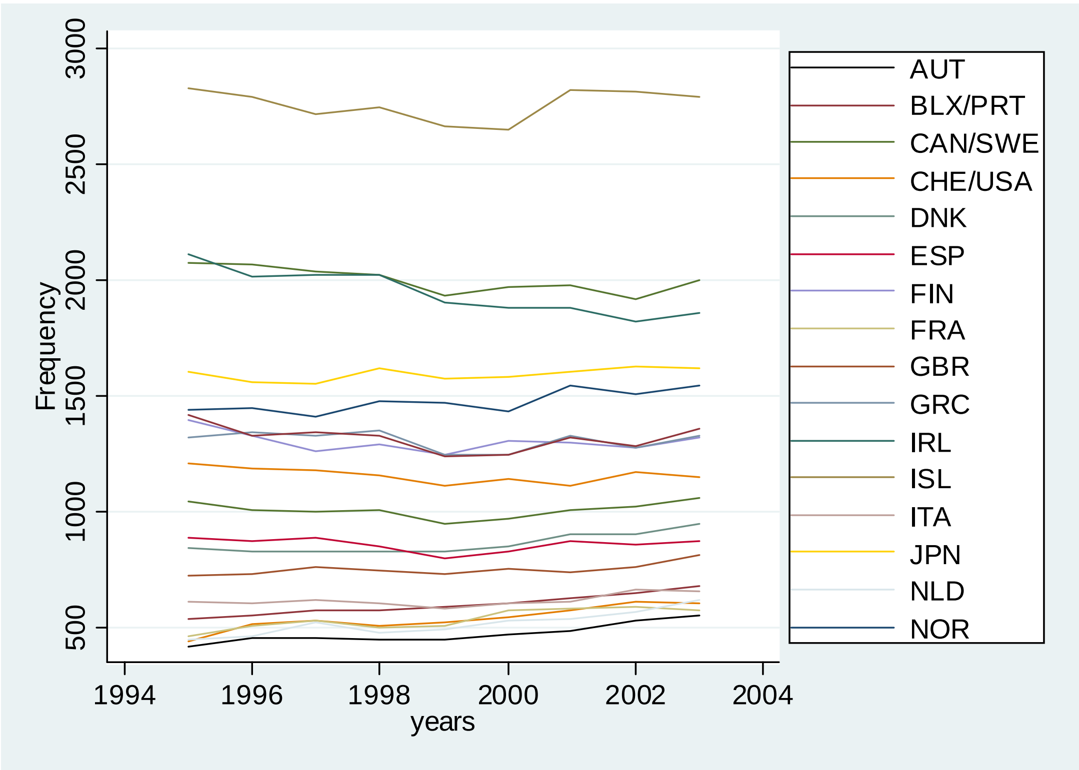

Figure 1: The pattern of non exported product lines, Germany.

- As suggested by the theory, Germany exports fewer goods to distant and small markets (Iceland) than it does to large and nearby nations (France).
- The lowest number of zeros is with Austria, so language may also play a role as it does in traditional gravity model estimations. Such effects will be picked up by our pair dummies.
- The number of zeros has risen moderately over the period despite ongoing economic integration. At least part of this may be due to proliferation of product categories in the 6-digit HS system. Such effects will be picked up by our time dummies.

Figure 2 displays the zeros in Germany imports by partner. The main features of the previous diagram are found in this diagram as well, with some correlation between zeros and the size and distance of Germany's partners. One thing to note is that upper bound on zeros is much higher for German imports. Iceland exports to Germany contain almost 5000 zeros and this number varies little. This is in line with the theory since the number of goods a nation exports is related to the size of its economy whereas the number of varieties a nation's imports is much less directly connected to its size.

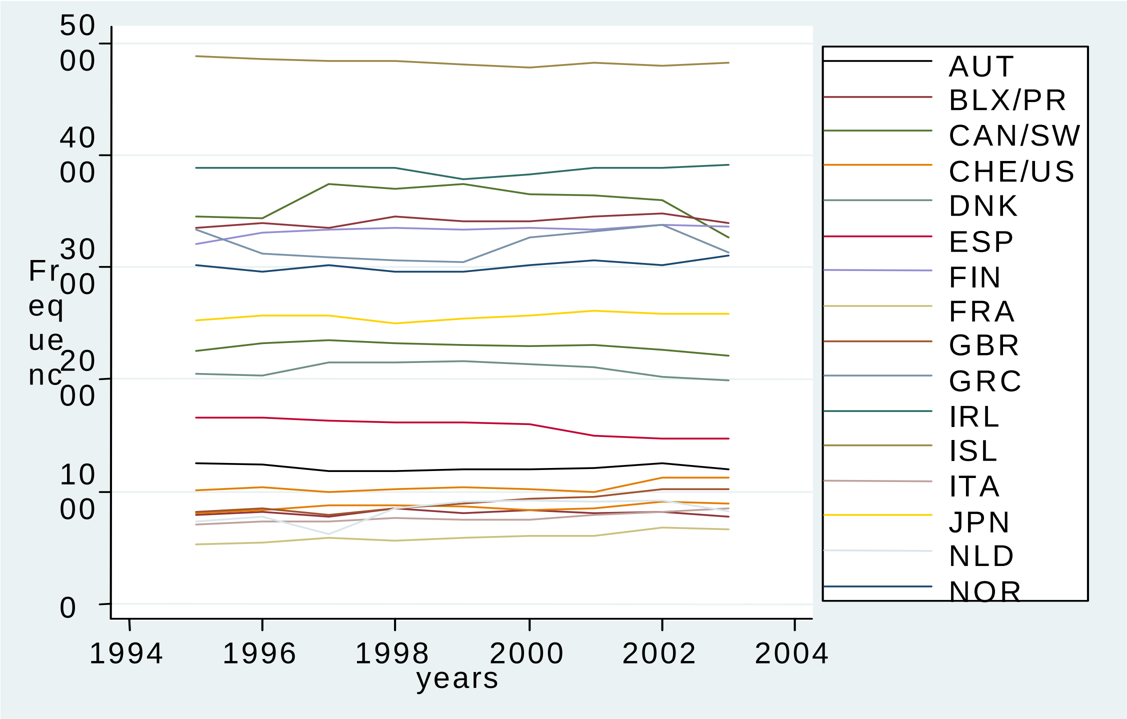

Figure 2: The pattern of non exported item by Germany (evolution by partner and year)

5.2. *Growth in trade from the quasi-intensive and quasi-extensive margins*

From the figures we can see how the number of zeros varies. Now we turn to showing how much trade is due to these new goods. Table 11 shows the overall growth in exports by the listed nations during the 1999-2003 sample period. It also shows the growth in exports that are in categories that were not exported in 1999 (second column). We call this the quasi-extensive margin since it only picks up new-goods trade in those categories where there was no trade to begin with. The first column shows the quasi-intensive trade, i.e. the growth of trade in categories that were trade in 1999.

The nations in the table are arranged in three groups, the euro-users, EU15 members that do not use the euro and other nations. The quasi-extensive margin generally accounts for between 10 and 20 percent of the overall growth although the number varies widely across nations. The average is not particularly high for Eurozone nations. In general there's a negative correlation between nation size and the increase in quasi-extensive trade, confirming that big economies export almost every 6-digits category.

Note that these statistics are merely illustrative since our empirical strategy is basically that of difference-in-differences. Roughly speaking, the first difference is the change in the number of HS 6-digit categories with zeros trade between the pre- and post-euro periods. The second difference is between bilateral trade flows where the euro is used and those where it is not used. We use the three EU15 members who were subject to general EU integration, but were not using the euro to control for time-varying effects on trade costs that are not related to euro usage.

Table 11. Growth in exports in new and old goods

	Quasi-intensive trade (1)	Quasi-extensive trade (2)	Overall change (3)	(2) / (3)
NLD	18.82%	9.53%	28.35%	0.3
FIN	5.28%	9.26%	14.54%	0.6
GRC	2.38%	6.99%	9.37%	0.7
BLX	24.61%	5.65%	30.26%	0.2
PRT	15.50%	3.98%	19.49%	0.2
IRL	16.58%	3.56%	20.14%	0.2
AUT	21.97%	2.53%	24.50%	0.1
ESP	26.58%	2.51%	29.09%	0.1
ITA	12.94%	2.43%	15.37%	0.2
FRA	14.16%	2.02%	16.18%	0.1
DEU	19.20%	1.85%	21.06%	0.1
SWE	17.35%	6.84%	24.19%	0.3
GBR	7.02%	4.28%	11.30%	0.4
DNK	17.45%	3.90%	21.36%	0.2
NOR	30.38%	7.70%	38.08%	0.2
ISL	18.06%	3.85%	21.91%	0.2
CHE	16.45%	1.46%	17.90%	0.1
CAN	7.56%	14.13%	21.70%	0.7
JPN	-6.36%	1.72%	-4.64%	-0.4
USA	-1.63%	1.19%	-0.44%	-2.7

Notes: NLD = Netherlands, FIN= Finland, GRC = Greece, BLX = Belgium-Luxembourg, PRT = Portugal, IRL = Ireland, AUT = Austria, ESP = Spain, ITA = Italy, FRA = France, DEU = Germany, SWE=Sweden, GBR=Great Britain, DNK=Denmark, NOR=Norway, ISL=Iceland, CHE=Switzerland, CAN=Canada, JPN=Japan.
Source: Authors calculations.