How do Multiproduct Exporters React to a Change in Trade Costs?

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Abstract

We use data on individual French exporters to document how a change in trade costs following the introduction of the euro affected firms' export margins in relation to export decisions, the number of products exported and average sales per product. Our results confirm two effects predicted by the theory: firms increase the range of products they export as well as their intensive margin. This effect is most evident in markets with moderate monetary policy co-ordination before 1999. General equilibrium competition effects reduce the initial positive impact on each of these margins. We find no evidence of firms' increased export participation.

JEL classification: F12, F15
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I. Introduction

Countries' exports are concentrated in a few large firms that export large volumes to several countries. These firms produce and export several varieties of differentiated goods (their "product mix"), and are flanked by a large number of very small single-product exporters. To improve our understanding of the effects of changes in trade costs on aggregate exports, it is important, therefore, to better identify the underlying microeconomic adjustments, and in particular the role of products.

In this paper, we investigate empirically how changes in trade costs affect firm-level exports, using the introduction of the euro in 1999 as a natural experiment. Our objective is to shed new light on the contribution of firms and product selection in export markets, to overall adjustments in firm-level exports.

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We use a firm-level database provided by the French Customs, which reports individual exporters' annual export flow values, by product and destination, for the period 1995-2003.[1] These data allow us to identify the effects of trade costs on firms' decisions to export to particular markets, the number of products they export to those markets, and average sales per product. We are thus able to measure the effect of trade costs on firms' total export sales, and to quantify the impact on each margin. We find that the acknowledged limited aggregate impact on trade flows of the introduction of the euro hides a very rich set of microeconomic adjustments. These are the result of the combined gross effects of trade costs and competition.

The choice to use euro' introduction in 1999 as a natural experiment was motivated by this being the largest shock, in terms of economic integration among European countries, covered by available firm-level trade data for France.[2] The introduction of the euro in 1999 was associated with a permanent elimination of nominal exchange rate volatility within the euro area, which reduced the cost of trading with Euro area destinations. All potential French exporters were affected although we would expect the reduction in trade costs to be larger for the group of euro area destinations characterized by moderate monetary policy coordination before 1999 and, consequently, higher short term nominal exchange rate volatility. An important feature of the introduction of the euro is that monetary integration involved many countries. This possibly led to an increase in competition in each euro area destination market, due to the simultaneous reduction in trade costs for third euro area exporters. For instance, trade costs for exporting to Italy were reduced for French firms, but also for their German competitors. Martin and Méjean (2008) provide empirical evidence of increased competition: price dispersion within the euro area decreased after 1999.[3]

The results of our estimates show that the introduction of the euro only weakly affected the average value of French firms' exports to euro area destinations with respect to the other EU15 destinations. The

[1]We would like to thank the French customs administration for making this data set available to researchers at CEPII, where estimations have been carried out.

[2]Our contribution (using firm and product level data) is in the vein of papers testing the euro's effects on trade using aggregate data (Micco et al., 2003; Flam and Nordström, 2003) or product-level data (Flam and Nordström, 2007).

[3]Other papers highlight this channel: Ottaviano et al. (2009) calibrate a model *à la* Melitz and Ottaviano (2008) and also predict that European integration increased the competitive pressure on firms.

euro's introduction provided the greatest benefit to the most productive exporters. We also find that the trade creation effect is heterogeneous across the treated destinations. It is conditioned by the intensity of monetary policy coordination before 1999, which affected short-term nominal exchange rate volatility. In euro area destinations characterized by moderate monetary policy coordination before 1999, the adoption of the euro increased firm-level exports by 12.8% with respect to non-euro area destinations. About 20% of this effect is due to an increase in the number of products exported. However, no effect can be identified regarding the decision to export. For euro area destinations with closer monetary policy coordination before 1999 - and lower nominal exchange rate volatility (the so-called "D-Mark zone") - the euro's adoption had a negative impact on the decision to export, the number of products exported and the average per product value of exports. For each group of treated destinations, the size of the euro effects has been growing over time.

Controlling for competition among euro area exporters on euro area destinations allows us to identify the *gross* effect of the reduction in trade costs: taking all euro area destinations, firms' average exports to euro area destinations have increased by almost 7%. About 18% of this effect is due to the number of products exported, and 25% for euro area destinations with less strict monetary policy coordination before 1999. This is confirmed by the aggregate estimations.

These results are in line with the empirical predictions in a series of theoretical works. Recent trade models introduce the possibility for firms to choose endogenously between the range of products that they sell in the domestic market and/or export. Our results show that changes in trade costs have a significant impact on the range of products exported by firms, especially the most productive ones. However, competition effects dampen the gross impact of trade cost reductions on firms' exports.

This paper contributes to a series of empirical studies that show how changes in firms' macroeconomic environment can affect export behavior. Bernard et al. (2009) for the United States show that changes in aggregate exports are explained mostly by the intensive margin. Ekholm et al. (2011) study the effects of the real appreciation of the Norwegian Krone in the early 2000s, and show that net exporters decreased

employment and increased productivity. Berman et al. (2011), employing similar data to ours, show that, following exchange rate movements, more productive firms tend to do more pricing to market and adjust the quantities exported less.

The paper is organized as follows. Section 2 presents the theoretical background and situates this study within the empirical work on multi-product exporters. Section 3 describes the data and the empirical methodology. Section 4 presents the estimation results. Section 5 concludes.

II. Related literature

There is ample evidence that only a small proportion of domestic firms are exporters, that aggregate exports are concentrated in a small number of major players (Eaton et al., 2004) and that larger exporters are involved in exporting more than one product (Arkolakis and Muendler, 2010; Bernard et al., 2011; Iacovone and Javorcik, 2010; Eckel et al., 2011). Decreased trade costs stemming from the introduction of the euro, may have affected firms' export decisions in relation to the number of products exported and the average value of exports per product. Several papers provide evidence of these mechanisms. Eckel and Neary (2010) develop a model with oligopolistic competition and flexible manufacturing technology, where firms endogenously select the set of goods categories to be produced. Each firm has a "core competence" and, while expanding product lines is possible, it involves diseconomies of scope. Globalization increases competition among the products exported by each firm (supply-side competition). Firm sales increase, but the scope of the goods produced by the firm is reduced due to "cannibalization effects" among varieties of goods.

Our paper is more closely related to new trade theory models with monopolistic competition and firm heterogeneity, since they include predictions specific to the export market. In Melitz (2003), a decrease in fixed export costs allows less productive firms to start exporting. A change in variable trade costs affects firm entry and the intensive margin of incumbents. Also, Bernard et al. (2011) model the possibility that

firms manufacture several products. Their model predicts that the proportion of multi-product firms that export, the number of destinations for each variety, and the range of products they export to each market all increase in response to reduced variable trade costs. However, the effect of trade liberalization on the value of sales by exported product is ambiguous since new products are exported in smaller volumes.[4]

As the introduction of the euro was expected to increase competition in product markets, we need to rationalize how potentially it affected firms' exports margins. Melitz and Ottaviano (2008) use a linear demand system that allows markups to vary across different markets. Market size and trade affect the degree of competition, and feed back into firms' selection in foreign markets. Increasing competition is expected to negatively affect firms' export decisions and export sales, especially for the less productive ones. Baldwin and Gu (2009), and Mayer et al. (2011) extend this framework to the case of multi-product exporters. Both models feature firm heterogeneity, but Mayer et al. (2011) also includes product heterogeneity within the firm: as competition increases in a given market, firms stop selling marginal (less efficient) product lines in that market and concentrate on sales of top products.

The empirical literature provides some evidence of the existence of these mechanisms. Iacovone and Javorcik (2010) use the experience of NAFTA to provide evidence of symmetric trade liberalization between Mexico and the US. The number of products exported by Mexican firms increased most in those sectors where US tariffs declined the most, while Mexican firms reduced product scope in the domestic market in sectors where there was a significant decline in Mexican tariffs. These results are illustrative of the effects of simultaneous changes to trade costs and competition. Bernard et al. (2011) provide evidence that, coincident with the enforcement of the Canada-US Free Trade Agreement (CUSFTA) in 1989, the US firms most exposed to trade liberalization concentrated on production of fewer products. Finally, Mayer et al. (2011) use data for France similar to those utilised for our study, to show that in markets where there is tough competition, firms concentrate foreign sales on their best product.

Our work uses the introduction of the euro in 1999 as a natural experiment affecting both trade costs

[4]Marginal products are subject to lower demand in the market.

and the degree of competition, over time, in European markets. This event was unique, in that it involved many countries, and can be expected to have increased competition in export markets. Nitsch and Pisu (2008) provide evidence of the effects of introduction of the euro on Belgian exporters. We have mainly three contributions to the literature on multi-product firms. First, for French exporters, we identify the effect of trade costs and the effect of competition on firms' export decisions, the number of products exported to each market, and the average value of exports to each market by product. Second, we quantify the relative importance of product adjustments to firm-level exports. Third, we investigate how these adjustments are related to firm productivity.

III. Data and Empirical Methodology

Data

Firm-level export data. We use a database provided by French Customs, which includes data on the export flows of individual French firms in the period 1995-2003, differentiated by product category and destination country.[5] Firms are identified by their SIREN number.

These data provide fairly exhaustive information on the universe of French exporters, although French customs limit the reporting of certain information. Beyond the borders of the European Union (EU), shipments valued at less than 1,000 euros are subject to a simplified declaration procedure and do not appear in our data. Within the borders of the Single European Market, the reporting threshold is based on each firm's cumulated yearly export value. Although this threshold has increased over time, up to 100,000 euros in 2002, we use the same threshold value for the entire period.

The classification of products utilized is the European Combined 8-digit Nomenclature (CN8), which includes 8,482 different groups of manufactured products. At CN8 level, changes to the European product

[5] Eaton et al. (2004) and Eaton et al. (2011) use similar data for 1986. Data are available for the period 1995-2005; we dropped the last two years on the basis that the entry of 10 new member states into the EU in 2004 would constitute a second, and different, shock.

nomenclature are recorded every year. We aggregate products to the 6-digit level of the United Nations Harmonized System, based on the 1992 revision (HS6-92).[6] This allows comparability of products over time.

We use the product categories corresponding to manufacturing industries (ISIC 311 to 390). Since we are merging customs and Business Survey data based on firm identifiers, we select only those firms whose main activity is manufacturing.

Other firm characteristics. The French annual business survey "Enquête Annuelle d'Entreprises" (EAE) is used to identify firm characteristics. The EAE survey includes exporting and non-exporting firms with more than 20 employees, in all manufacturing sectors. These data include a series of variables, such as the wage bill, number of employees, value added, and investment. Based on this information, we compute Total Factor Productivity (TFP) for each exporter using the Olley-Pakes methodology.

Other data sources and controls. The empirical strategy discussed in the next section uses a set of aggregate controls that allow us to disentangle the effects of the introduction of the euro on French firms' exports from other macroeconomic shocks, such as the importing country's Gross Domestic Product (GDP) or the real exchange rate, computed as the ratio of producer price indexes. The vector of aggregate controls also includes the import price index of the destination country, defined by industry, and a measure of competition from third euro area countries, which we detail later. We justify the use of these variables in the empirical methodology section.

Descriptive statistics. We provide descriptive evidence for the number of products exported by destination, average export value by product, total export value by firm for each EU15 destination, and TFP. Table 1 reports the mean, standard deviation and percentile statistics for each variable: 15,088 French exporters with more than 20 employees, exported to the EU15 at least once in the period 1995-2003. Each exporter ships an average of 5.17 products to each destination annually. The distribution of the number of exported products is highly skewed: 50% of exporters export a maximum of two products to each destination,

[6]We retained the first 6 digits of the CN code, which corresponds to HS6 nomenclature, then converted the codes into the 1992 revision using conversion tables provided by UN Comtrade.

while the top 5% of exporters export 19 or more products to each destination. The distribution is similar for average sales per product to each destination: mean sales per product is about 348,000 euros, although it is less than this for the median firm. Export sales by destination are highly concentrated among the top 5% of exporters. Table 2 shows that the different margins of firms' exports and exporter's TFP are positively correlated.

Similar empirical patterns are observed for euro area markets (14,998 exporters) and EU15 destinations outside the euro area (11,804 exporters). For both groups of destinations, the distribution of productivity among firms is comparable since most of the 15,088 firms in our sample export to both regions. However, firms' exports to euro area destinations slightly dominate exports to EU15 non-euro area destinations, with respect to all margins.

– Table 1 about here –

– Table 2 about here –

Empirical methodology

Rationale. Our empirical analysis uses the introduction of the euro by 11 European countries in 1999 as a natural experiment on reductions in trade costs. Traditionally, nominal exchange rate volatility and the transaction costs associated with exchanges of currencies have been considered a major source of trade costs (Anderson and van Wincoop, 2004). On this basis, the adoption of a single currency was expected to generate two effects: reduced trade costs and increased competition within the euro area. Using the euro experiment to identify the effect of changes in trade costs on firms' exports margins (export decision, number of products exported and average sales per product) has several advantages. Firstly, we can identify a clear point in time when trade costs fell. Secondly, all French exporters were subject to the same shock.

We apply a difference-in-difference approach traditional in euro-related empirical studies to compare the evolution of exports to two different types of destination groups. The first group is composed of nine

treated destinations that joined the euro area in January 1999: Austria, Finland, Germany, Italy, Ireland, The Netherlands, Spain, Portugal and Belgium and Luxembourg.[7] The *control group* is composed of three member states of the EU15 that did not join the euro area: the United Kingdom, Sweden and Denmark.

Our baseline estimations, therefore, are based on a sample of 12 destinations (listed in Appendix Table A1), subject to the same degree of economic integration and, with the exception of the introduction of the euro, to the same economic reforms over the period of analysis.

Baseline estimation strategy. The effect of the euro on the probability of exporting is estimated with a linear probability model using Ordinary Least Squares (OLS). Our estimations only include "switchers", i.e. firms whose export status changed at least once during the period analyzed. This allows us to identify whether the introduction of the euro affected the decision to export to euro area destinations compared to the control group destinations. Equation 1 corresponds to the estimated specification:

$$T_{fjt} = \alpha_1 EZ_{99-03} + \beta_1 ln(TFP_{ft-1}) + \gamma_1 \mathbf{Z}_{jt} + \kappa_{fj} + \kappa_t + \epsilon_{jt} \tag{1}$$

where f denotes the firm, j is the destination, and t is the year. T_{fjt} is the dependent variable, which takes the value of 1 if the firm exports and 0 otherwise. $EZ_{1999-2003}$ is a dummy variable equal to 1 during the period 1999-2003 if the destination country was a member of the euro area, and 0 otherwise. TFP_{ft-1} is the TFP of firm f, lagged by one year to avoid reverse causality. $\mathbf{Z}_{jt}$ is a vector of macroeconomic controls, including the real exchange rate (RER_{jt}), real GDP ($RGDP_{jt}$) and the import price index (MP_{jkt}) of the destination, defined for each industry k. These controls isolate the effects of the euro from other macroeconomic shocks such as price-competitiveness, the business cycle and competition from the rest of the world.[8] κ_{kj} is the fixed effect $firm \times destination$, which corresponds to our individuals in the panel. κ_t is the set of year dummy variables.

[7]The last two countries are considered as a single destination, Benelux, in the French data; Greece is not included since it did not join the euro until 2001; and France is the source, making the number of treated destinations 9.

[8]Competition, especially from emerging countries, must be accounted for and may evolve differently in different sectors. This effect is generally captured in a gravity model with a multilateral resistance term. In Equation 1, for the sake of simplicity, we integrate this control with a sectoral dimension in the vector Z.

The euro effect on firm-level exports to each destination is estimated using a *within fixed effect estimator* for positive trade flows only. The value of firms' exports to each destination is decomposed into the number of products exported (N_{fjt}) and average sales per product ($\overline{x}_{fjt}$). The value of firm-level exports to each destination (X_{fjt}) is the product of these two variables: $X_{fjt} = N_{fjt} \times \overline{x}_{fjt}$. The following specification is estimated, where $M_{fjt} = \{N_{fjt}; \overline{x}_{fjt}; X_{fjt}\}$ is one of the margins:

$$\ln(M_{fjt}) = \alpha_2 EZ_{99-03} + \beta_2 ln(TFP_{ft-1}) + \gamma_2 \mathbf{Z}_{jt} + \kappa_{fj} + \kappa_t + \mu_{jt} \tag{2}$$

Only the dependent variable has changed compared to Equation 1. The estimation relies on positive export values by firms ($X_{fjt} > 0$). Based on this empirical strategy, the marginal effect of the introduction of the euro on firm-destination exports can be decomposed into the adjustment due to the number of products, and the value of exports per product:

$$\frac{\partial \ln(X_{fjt})}{\partial EZ} = \frac{\partial \ln(N_{fjt})}{\partial EZ} + \frac{\partial \ln(\overline{x}_{fjt})}{\partial EZ}$$

This decomposition quantifies the contribution of the within-firm product extensive margin to the overall change in the value of firm exports predicted by the theory.

When we are combining micro data with macroeconomic variables it is important to account for possible correlation between disturbances within groups (Moulton, 1990). This would bias the standard errors downwards and increase the economic significance of the regressors. Traditional clustering methods apply only in the presence of large numbers of groups (Wooldridge, 2003; Donald and Lang, 2007). Here, standard errors are clustered by destination *and* year: since we have 12 destinations and 8 years, this gives 96 clusters.[9] Using destination-year groups allows us to account for the fact that the size of groups changes annually based on entries and exits of exporters in each market.[10]

Heterogeneity among firms. Besides the euro effects on the average firm, we want to know whether our

[9]The 8 years correspond to the period 1996-2003 ; 1995 is dropped because we lag firm TFP by 1 year.

[10]A similar clustering method is applied in the firm-level studies of Berman et al. (2011) and Iacovone and Javorcik (2010).

results interact with firm TFP before 1999. For each exporter, we compute average TFP for the period 1996-1998.[11] Four productivity quartiles are identified based on pre-1999 firm TFP. We construct interaction variables between the EZ_{99-03} variable, and TFP quartile dummies Q1, Q2, Q3 and Q4. EZ_{99-03} is then omitted from the estimation, so that the euro effect on firms, for each TFP quartile, is measured directly by the coefficient on $EZ_{99-03} \times Q_1$, $EZ_{99-03} \times Q_2$, $EZ_{99-03} \times Q_3$ and $EZ_{99-03} \times Q_4$ variables.

Heterogeneity among destinations. Given the existence of monetary cooperation among euro area countries before 1999, the absolute decrease in nominal exchange rate volatility at the time of the introduction of the euro is highly heterogeneous among the group of treated destinations. This implies that the reduction in trade costs was heterogeneous across euro area destinations. The empirical strategy exploits this heterogeneity of treatment across euro area countries to improve the identification of the effects of trade costs on French exporters.

Monetary cooperation in Europe started in 1979 with the creation of the European Monetary System (EMS), which included eight members of the European Community. Before the 1992-1993 crisis, the EMS stipulated that nominal exchange rate fluctuations among participants should not exceed +/- 2.25%. However, this period of low volatility is relevant only for a few European countries. The UK joined in 1990 with a large fluctuation band, and left in 1992 during the EMS crisis. The Italian lira entered the EMS with a larger fluctuation band (+/- 6%); the Irish punt was devalued by 10% in 1993 following the crisis in the EMS in 1992-1993. Following the 1992-1993 crisis, the fluctuation bands were widened to allow nominal exchange rate fluctuations of 15% more or less. Countries that did not devalue during the 1992-1993 period (France, Belgium, Luxembourg, Netherlands, Germany and Denmark) and that had been members of the EMS from the beginning, were identified as belonging to a *de facto* D-Mark zone. [12]

Figure 1 depicts average short-term nominal exchange rate volatility of the French franc against the currencies of the EU15 member states, for the years 1995-1996. Volatility is low vis-à-vis Denmark, the

[11] It is possible to calculate TFP using EAE data after 1995, but data for 1995 are scarce.

[12] See (De Grauwe, 1989; McKinnon, 2002) for a complete discussion. The term D-Mark zone was initially coined to refer to the core group of countries that did not leave the "snake in the tunnel".

Netherlands, Belgium, Austria and Germany, and higher vis-à-vis the rest of the EU15. Two sub-groups emerge from the treated destinations: 1) The *D-Mark zone* (the Netherlands, Belgium and Luxembourg, Austria and Germany), which shows low nominal exchange rate volatility vis-à-vis the French franc before 1999; 2) *Euro area destinations outside the D-Mark zone*, consisting of Finland, Spain, Ireland, Portugal and Italy, which show high nominal exchange rate volatility vis-à-vis the French franc, before 1999.

As the decrease in trade costs is expected to be larger for euro destinations with less tight monetary policy cooperation before 1999 and higher short-term nominal exchange rate volatility, we expect a larger trade creation effect outside the D-Mark zone. A second set of estimations differentiates treated destinations belonging to the D-Mark zone from the rest of the euro area. We keep Denmark out of the control group because it had a managed exchange rate with the D-Mark before the introduction of the euro.

– Figure 1 about here –

Competition from third euro area countries. The introduction of the euro reduced trade costs for French firms exporting to treated destinations. However, this reduction in trade costs also benefited competitors from third euro area countries. We need to control for the competition effect due to the euro, which we do by introducing a measure of ease of trade between each destination j and the rest of the euro area excluding France.

To proceed we introduce a measure of trade integration between each destination and third euro area countries. This variable, derived from the theory, is inversely related to the trade costs related to any two destinations.[13] It is constructed to identify, for each destination j and ISIC revision 2 industry k, the ease of trading with euro area destinations. This time varying measure, the "phiness" of trade, is adapted from Head and Mayer (2004):

$$Phiness_{jkt}^{EUR} = \sqrt{\frac{M_{Eur,jkt} M_{j,Eurkt}}{M_{Eur,Eurkt} M_{jjkt}}}$$

[13] This measure is derived from a monopolistic competition model.

where $M_{Eur,j}$ measures the value of imports by country j from the euro area (excluding France) Eur and $M_{j,Eur}$ is the reverse flow. $M_{Eur,Eur}$ and $M_{j,j}$ measure the domestic absorption in the Euro area and each country j, computed as production minus exports.

This indicator is computed for ISIC rev.2 industries using data from the Trade and Production database provided by the CEPII. It is merged with our main database using the same strategy as for the import price index (see Data Appendix). We replicate the baseline estimations augmented with this new control. We expect the coefficient of this variable to have a negative sign. The estimation also includes (ISIC) industry-year dummies to control for possible correlation between the $Phiness_{jkt}^{EUR}$ variable and the trade phiness of France, with respect to the same destination.[14] The large number of fixed effects requires a different estimator for the decision to export. Equation 1 is re-estimated using a linear probability model with OLS. This strategy enables us to identify the gross effect of trade costs that are due to the introduction of the euro.

IV. Results

Baseline estimations

Table 3 presents the estimation results from the baseline specification (Equations 1 and, 2).[15] The dependent variables in columns (1) to (4) are the export decision (T_{fjt}), the number of products exported by each firm (N_{fjt}), the average value exported per product by each firm ($\overline{x}_{fjt}$), and the total export value of each firm to each destination (X_{fjt}) respectively. In columns (5) to (6), the estimations also control for the firm-level lagged TFP (TFP_{ft-1}) to account for changes in firm productivity that can be correlated with the introduction of the euro.

Our results show that the introduction of the euro had only a negligible positive effect on firm level

[14] We are deeply indebted to an anonymous referee for suggesting this approach.

[15] Our main results remain unchanged when we carry out a Heckman two-step estimation to account for selection (see web appendix).

exports. We find no effect on export propensity (column 1) or on the number of exported products by firm to each destination (column 2). We find a weakly significant positive effect of the euro on the average exports per firm (column 3). Overall, the introduction of the euro increased firms' exports by about 5% ($\exp(0.051) - 1$), due mostly to an increase in the average value of exports per product.

This result is independent of price competitiveness. As expected, the real exchange rate variable has a negative coefficient: real appreciation of the French currency tends to decrease firm-level exports, although the coefficient of this variable is not significant. One reason for this is that the euro's adoption in 1999 eliminated annual nominal exchange rate fluctuations with euro area partners. Year fixed effects also control for real exchange rate fluctuations in the French currency vis-à-vis all destinations. Columns (5) to (8) in Table 3 show that, as expected, productivity is positively related to all firms' export margins. GDP, as expected, always has a positive effect. Overall, competition from the rest of the world (which is inversely related to the price index) has a negative impact on the intensive margin only (positive coefficient on the import price index).

– Table 3 about here –

Heterogeneity among exporters

While these results show that the adoption of the euro had only a fairly small positive impact on the average French exporter, this possibly hides some heterogeneity among firms. We can expect larger and more productive firms to be affected differently. On this basis, we introduce interaction variables between the $Euro99_{jt}$ variable and the four dummy variables that identify firms by groups according to productivity before 1999. The TFP quartile dummies are fixed over time and rank firms from the low-productivity group (TFP_{Q1}) to the highest productivity group (TFP_{Q4}).

The estimation results are presented in Table 4. Columns (1), (2), (3) and (5) report the estimation results corresponding to the already used decomposition of firm-level exports. In order to identify possible composition effects, Column (4) reports results for the average intensive margin, where products have been

exported at least once before 1999. The results in column (1) confirm that the introduction of the euro in 1999 had no effect on exporters' selection in Euro area markets, irrespective of their productivity. The results in columns (2), (3) and (5) show that the introduction of the euro promoted exports only for the most productive firms before 1999. Firms in the highest quartile increased their exports to the euro area by 8.4% $(\exp(0.081) - 1)$ compared to the control destinations. The contribution of new products and average exports per product, to the evolution of firm exports can also be quantified: about a quarter of the effect comes from an increase in the scope of products exported to euro area markets; the remaining overall impact is explained by an increase in average sales per product. For less productive exporters, no effect is observed.

Column (4) in Table 4 shows that the results for the intensive margin are more positive and are significant for products that were exported at least once before 1999. The demand for new products is generally lower than the demand for goods previously exported, which has a negative impact on average sales per product (Bernard et al., 2011). These estimations controlling for firm heterogeneity shed light on our baseline estimations. We initially found no effect on the number of products exported by firm: we then obtained a positive effect of the euro, but only for the most productive firms. We initially found a limited positive impact on the intensive margin: we also find this effect to be concentrated in the most productive firms. Overall, these results are evidence that the net reduction in trade costs due to the introduction of the euro has benefited the most productive exporters more.

– Table 4 about here –

Different impacts among euro area destinations

We subsequently test the different impacts of the euro depending on monetary policy prior to 1999. As already discussed, the decrease in trade costs is larger for destinations that, prior to 1999, had moderate monetary policy coordination and, thus, high nominal exchange rate volatility vis-à-vis the French franc. We would expect trade creation to be more pronounced for these destinations after introduction of the

euro.

The estimations reported in Table 5 consider two sub-samples of treated destinations separately. The first four columns report the results of estimations that consider only the euro area destinations outside the D-Mark zone in the treatment group, excluding the D-Mark zone destinations from the estimation. Columns (5) to (8) report the estimation results where the treated destinations are the D-Mark zone destinations only, excluding the remaining euro area destinations from the estimation. Denmark is excluded from the control group because of its narrow fluctuation band vis-à-vis the French franc, before 1999.

The estimation results confirm that the trade creation effect is greater for euro area destinations that had less close monetary cooperation prior to 1999: outside the D-mark zone, firm-level exports increased by 12.8% compared to the control group destinations.[16] More than 75% of the effect is at the intensive margin, the rest of the effect being due to the product range exported by the firm. The decision to export is unaffected. Thus, there is a positive effect of the net trade cost reduction on firm-level exports in terms of product range and the intensive margin.

For destinations within the D-Mark zone, firm-level exports and export propensity are negatively affected by the introduction of the euro.[17] This suggests that competition effects due to the introduction of the euro dominate. Firm-level exports declined by 5.5% relative to control group destinations.[18]

– Table 5 about here –

The timing of euro effects

Before examining the respective role of trade costs and competition, we need to address the timing of the euro effects on the different export margins. As the process of monetary integration had been announced, firms' expectations were modified accordingly. This cushions the trade creation effect of the introduction

[16] $\exp(0.12) - 1$ in column (4).

[17] In unreported estimations we interacted the euro variable with a dummy that identifies countries with high/low nominal short-term exchange rate volatility prior to 1999. These alternative specifications confirm the results presented here: the coefficient of the euro variable is systematically more positive for destinations with the highest volatility.

[18] The control variables have the expected sign, although some, e.g. RER and real GDP, lose significance, which is not surprising given that we consider a limited group of destinations with several similar characteristics. Consequently, the time dummies capture all the macroeconomic dynamics common to all destinations (e.g. real appreciation of the French franc, etc.).

of the euro in our estimations.[19] On the other hand, exporters need time to adjust to a new environment, to absorb the costs of entry into new markets, leading to a progressive response of exports.

We address this issue by relying on euro $\times$ year dummies starting in 1998 (prior to the introduction of the euro). We reproduce the euro effects for each year in Figures 2 to 5, separately for the whole euro area, the DM zone and the rest of euro area. Each curve plots the estimated coefficient and the confidence intervals at 95%. These four graphs confirm our previous findings regarding the difference between the DM zone and the rest of the euro area. Nevertheless, we observe a steady increase in the effects over time: in other words, firms take time to adjust to a trade shock. Euro dummies are mostly significant by 1999.

– Figures 2, 3, 4 and 5 about here –

Competition from third euro area countries

In the previous estimations we identified the net euro effect on French exporters, controlling for competition from the rest of the world. We now control for competition from third euro area members, as discussed in the empirical methodology section, using a time-varying measure of trade "phiness" by destination and industry.

Estimation results are provided in Table 6. All euro area destinations are included in the treatment group; the control group comprises all EU15 non-euro area destinations. Results for the $Euro99_{jt}$ variable, therefore, are comparable to the results presented in Table 3.[20] As discussed in the empirical methodology section, the selection equation in column (1) of Table 6 is estimated using a linear probability model with OLS. We now control for the phiness of trade in columns (1) to (4), and for the interaction between phiness and productivity quartiles in the last two columns. This interaction controls for the fact that competition may have different effects on firms with different productivity.[21]

[19] Friberg (2001) provides a theoretical framework in which firms' decisions to segment markets are dependent on expectations of future exchange rate volatility.

[20] Differences arise in terms of the number of observations because of missing industry-level production data for certain country-industry-year triples used to compute trade phiness. The two samples are still highly comparable.

[21] In a framework *à la* Melitz and Ottaviano (2008), competition would tend to decrease firm exports, especially for low-productivity firms, and to increase firm selection in export markets.

Our results show that the coefficient of $phiness_{jkt}^{EUR}$ is negative, as expected: a 10% increase in competition from other euro area countries reduces firm-level exports per product by 5.8% (column 3). Most importantly, controlling for general equilibrium effects increases the coefficient of the $Euro99_{jt}$ variable, which now captures the gross trade costs effect. Reductions in gross trade costs have strong positive effects on firm-level exports. In the case of the adoption of the euro, they increase average firm exports by about 7% ($\exp(0.067) - 1$), 18% of this effect being due to the number of products exported, with the remaining 82% at the intensive margin. On average, there is no effect on export propensity. These results confirm that taking account of general equilibrium effects, as suggested by the theory, is important in our study.

How heterogenous firms are eventually affected by competition effects is shown in columns (5) and (6) of Table 6. In both the selection and firms' total exports equations, the results show that the coefficients of interaction terms are negative for all productivity quartiles, with the exception of the most productive exporters (Q4). Competition effects are focused on intermediate productivity firms (Q2 and Q3). The least productive exporters in Q1 are also negatively affected by competition from third euro area countries, although the effect is not significant. Overall, our results show that competition effects tend to dampen the initial trade creation effect of the decrease in trade costs in the case of a monetary union involving several countries. This competition effect contributes to explaining the heterogeneity observed among exporters.

– Table 6 about here –

Aggregate patterns

We use aggregate estimations to determine how the results observed at micro level translate into industry-level exports. The raw export data are aggregated within 28 ISIC rev.2 industries, using the concordance with HS 6-digit (rev.92) product codes.[22] Table 7 presents the estimation results. For all estimations, the dependent variable is the value of French exports to destination j in industry k. These exports are

[22]This concordance table was produced by the CEPII and is available upon request.

accounted for by the $Euro99_{jt}$ dummy variable, the real exchange rate, the import price index, real GDP and trade phiness in the alternative specifications. All of the estimations rely on country-industry fixed effects and industry-year dummies to control for industry-level shocks that are independent of adoption of the euro.

Table 7, columns (1) and (2) show the treatment group comprising all euro area members, and the control group that includes the EU15 destinations outside the euro area. The results show that the introduction of the euro increased industry-level exports to euro area destinations relative to non-euro area destinations. Controlling for the phiness of trade between destination j and other euro area members increases the coefficient of the euro variable. The effect of the reduction in trade costs is positive and highly significant, and the magnitude of the coefficient is in line with previous findings based on aggregate data (Micco et al., 2003; Flam and Nordström, 2003; Baldwin et al., 2008). The aggregate pattern is also consistent with the estimation results presented in Table 4 where the introduction of the euro mainly promotes exports from the most productive exporters, which are also the largest firms, and their behavior tends to drive the empirical pattern.[23]

Columns (3) and (4) in Table 7 report the estimation results for the sub-sample of euro area destinations outside the D-Mark zone. These estimations confirm previous results showing that the trade creation effect is greater for destinations where firms benefited from a larger reduction in trade costs. As in the previous estimations, the coefficient of the euro variable is larger if we include the control for competition from other euro area members. Columns (5) and (6) report the estimation results for the members of the D-Mark zone in the treatment group. These estimations confirm our finding that the introduction of the euro had a negative effect on aggregate exports to these destinations. However, this negative effect vanishes if we control for general equilibrium effects in column (6).

The control variables have the expected sign, although real exchange rate and import price variables are

[23]Recent empirical work on firm dynamics shows that given the fat-tailed distribution of firms with respect to employment, production and exports (distributions mainly follow the power law), the behavior of the largest firms has important consequences for the aggregate pattern (Gabaix, 2011). For empirical evidence of a concentration of exports among the largest exporters, see (Mayer and Ottaviano, 2007).

mostly non-significant. In terms of firm-level estimations, industry-year fixed effects capture an important share of the aggregate variation in prices. The trade phiness variable remains non-significant, but has the expected (negative) sign. Most importantly, the inclusion of this variable tends to make the coefficient of the euro variable more positive or less negative. Overall, the aggregate estimations confirm that the introduction of the euro promotes firm-level exports when the reduction in trade costs is sizeable and, simultaneously, increases competition, which is detrimental to low-productivity firms.

– Table 7 about here –

V. Conclusion

This paper provides an empirical investigation of how changes in trade costs affect firm-level exports, using the introduction of the euro in 1999 as a natural experiment. The results shed new light on the contribution of firm and product selection on export markets, using data on French exporters over the period 1995-2003.

Overall, the adoption of the euro increased firms' exports by about 5% and this effect is weakly significant. The contribution of our study is to show how this effect was distributed among heterogeneous firms and, within firms, across export margins. Not all firms were positively affected; the positive effects are concentrated among the largest players. This explains why the aggregate effect of the introduction of the euro is generally found to be in the range of 6% to 7%, a magnitude confirmed here when we aggregate individual data within large sectors. Within firms, between 20% and 25% of the effect comes from the number of products exported to each destination, with the rest at the intensive margin. On average, there is no effect on export propensity.

These results are in line with the theoretical predictions. Multi-product firms adjust to a reduction in trade costs in two ways: the portfolio of exported products expands, and sales per variety of goods exported increase, but the intensive margin dominates. On the other hand, competition increases due to

general equilibrium effects and works in the opposite direction.

However, these mechanisms operated in a specific way in the case of European monetary integration. First, the introduction of the euro was the result of a long and uneven history of monetary policy coordination. Accordingly, the expected drop in trade costs was more limited for the sub-group of destinations with tighter monetary policy cooperation prior to 1999 (the D-Mark zone). Second, monetary integration affected a highly integrated area (the large Single European Market), where general equilibrium competition effects could be expected to be particularly acute. However, if this specificity is properly accounted for in the estimation strategy, the gross effect of trade costs is properly identified and the results reflect what is predicted by the theory.

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Appendix

A1. List of countries

Treatment/control group	Destination type	Country
Treatment group	Euro area excluding D-Mark zone	Spain Finland Ireland Italy Portugal
	Euro area D-Mark zone	Belgium Austria Germany Netherlands
Control group	EU15 excluding euro area	United Kingdom Sweden Denmark*

Denmark is included in the group of D-Mark zone countries due to its low volatility against the French Franc before 1999.

A2. Data Appendix

Nominal Exchange Rate Volatility. For each year in our sample, we follow Tenreyro (2007) and compute the volatility of the exchange rate by taking the standard deviation of the monthly variation of the nominal exchange rate:

$$Vol_{jt} = Std.Dev.\left(\frac{e_{jt,m} - e_{jt,m-1}}{e_{jt,m-1}}\right)$$

With $m = 1...12$. Vol_{jt} is the yearly volatility of the monthly nominal exchange rate of the French Franc against the foreign currency.

Real exchange rate. The bilateral real exchange rate variable is computed using the Producer Price Indexes (PPI) of the exporter - France - and importer countries, in domestic currencies. Data for PPI come from the International Monetary Fund's International Financial Statistics (IFS) and the OECD. Bilateral nominal exchange rates are provided at annual frequency in the IFS and in European Central Bank data.

Other gravity controls. Data for real GDP come from the Penn World Tables 6.2. Real GDP is computed using GDP per capita in constant US dollars (taking 1996 as the reference year) and population data.

Importer's price index. We follow the methodology in Gaulier et al. (2008). The import price index variable is computed for each destination and 27 ISIC industries, as a chained geometric Paasche index of unit import prices P_{mjt}. Subscript m refers to a variety, identified by an exporter and an HS6 product category. Given that the price of the French variety is likely to be correlated with the price offered by firm f, we exclude France from the sample of exporters to avoid reverse causality. Chained indexes allow us to account for changes in the composition of traded baskets of goods imported by country j. The formula used to compute the index is the following:

$$MP_{jkt} = \prod_{m=1,...,M}\left(\frac{P_{mj,t}}{P_{mj,t-1}}\right)^{\omega_{t-1}}$$

The import price index is computed for each ISIC manufacturing industry k, with 27 sectors. ω_{t-1} is the trade share in value of variety m in country j and year $t-1$. All unit prices P_{mjt} are approximated by unit values. We selected the 50 main world exporters from the trade data in CEPII's BACI database.

A concordance table between the HS6 rev.92 product codes and ISIC rev.2 industries is used to compute firms' total exports by industry over the period 1996-2003. Each firm is then identified by its main industry. The import price index data is merged with our main database with respect to destination countries and industry. The import price index for each market and each industry in which the French exporter operates measures price competition from the rest of the world.

Tables and Figures

Table 1: Descriptive statistics (1995-2003)

	All EU15 destinations (15,088 firms)					
	Mean	Std. Dev	1st quartile	Median	3rd quartile	top 5%
Nb. of Products (fjt)	5.17	11.84	1	2	4	19
Exports by product (fjt)	348.55	1990.02	7.76	38.13	172.27	1351.64
Total exports (fjt)	1661.33	23400.00	16.68	101.50	505.50	4969.97
Log TFP (ft)	1.12	0.43	0.86	1.06	1.31	1.84
	EU15 outside euro area (11,804 firms)					
	Mean	Std. Dev	1st quartile	Median	3rd quartile	top 5%
Nb. of Products (fjt)	4.81	11.22	1	2	4	17
Exports by product (fjt)	326.36	1597.85	6.15	32.01	154.57	1316.08
Total exports (fjt)	1446.32	18900.00	12.40	78.01	444.16	4622.41
Log TFP (ft)	1.13	0.44	0.87	1.06	1.31	1.86
	Euro area (14,998 firms)					
	Mean	Std. Dev	1st quartile	Median	3rd quartile	top 5%
Nb. of Products (fjt)	5.27	12.01	1	2	5	20
Exports by product (fjt)	354.73	2086.02	8.29	39.98	177.36	1362.11
Total exports (fjt)	1721.15	24400.00	18.22	108.65	521.95	5074.96
Log TFP (ft)	1.12	0.43	0.86	1.06	1.30	1.84

Note : Export values are expressed in thousands of euros. All statistics are provided for firms with more than 20 employees, over the period 1995-2003. The subscripts f, j and t stand for firms, destinations and years respectively.

Table 2: Correlation between the main variables of interest

	TFP (ft)	Nb. Products (fjt)	Exports by product (fjt)	Total exports (fjt)
TFP (ft)	1			
Nb. of Products (fjt)	0.13	1		
Exports by product (fjt)	0.0116	0.0646	1	
Total exports (fjt)	0.0621	0.4559	0.9176	1

Note: All variables are expressed in logarithm. Statistics are provided for firms with more than 20 employees, over the period 1995-2003.

Table 3: Euro effects on on firm-level exports, baseline estimations

Treatment group	Euro area Members							
Control group	EU15 non-euro area							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	T_{fjt}	N_{fjt}	$\overline{x}_{fjt}$	X_{fjt}	T_{fjt}	N_{fjt}	$\overline{x}_{fjt}$	X_{fjt}
$Euro99_{jt}$	**0.006**	**0.006**	**0.046***	**0.051***	**0.006**	**0.006**	**0.046***	**0.052***
	(0.042)	**(0.006)**	**(0.026)**	**(0.030)**	**(0.042)**	**(0.006)**	**(0.026)**	**(0.030)**
RER_{jt}	-0.049	-0.046	-0.151	-0.197	-0.054	-0.046	-0.150	-0.196
	(0.364)	(0.030)	(0.162)	(0.177)	(0.366)	(0.029)	(0.162)	(0.177)
MP_{jkt}	-0.066	-0.008	0.257***	0.249***	-0.066	-0.008	0.256***	0.248***
	(0.135)	(0.011)	(0.035)	(0.041)	(0.136)	(0.010)	(0.035)	(0.040)
$RGDP_{jt}$	1.336***	0.267***	0.743**	1.011***	1.338***	0.267***	0.743**	1.010***
	(0.316)	(0.058)	(0.296)	(0.345)	(0.315)	(0.057)	(0.296)	(0.345)
TFP_{ft-1}					0.120***	0.052***	0.144***	0.196***
					(0.036)	(0.003)	(0.012)	(0.012)
Observations	208169	445771	445771	445771	208169	445771	445771	445771
Estimator	Cond. FE logit	Within fixed-effect			Cond. FE logit	Within fixed-effect		
Fixed effects	Firm × destination, year							

Note : Significance levels *10%, **5%, ***1%. Dependent variables and right hand side variables (with the exception of the euro dummy) are in logarithm. Robust standard errors in parentheses. Standard errors are clustered by destination country and year.

Table 4: Euro effects interacted with productivity before 1999

Treatment group			Euro area Members		
Control group			EU15 non-euro area		
Dependent variable	(1) T_{fjt}	(2) N_{fjt}	(3) $\overline{x}_{fjt}$ All products	(4) $\overline{x}_{fjt}$ Products exported before 1999	(5) X_{fjt}
Euro99$_{jt}\times$ **TFP**$_{Q1}$	**0.022**	**-0.002**	**0.037**	**0.029**	**0.035**
	(0.049)	**(0.007)**	**(0.029)**	**(0.032)**	**(0.034)**
Euro99$_{jt}\times$ **TFP**$_{Q2}$	**-0.009**	**0.006**	**0.042**	**0.055***	**0.049**
	(0.049)	**(0.006)**	**(0.027)**	**(0.032)**	**(0.031)**
Euro99$_{jt}\times$ **TFP**$_{Q3}$	**-0.005**	**-0.001**	**0.043**	**0.062****	**0.042**
	(0.051)	**(0.006)**	**(0.026)**	**(0.030)**	**(0.030)**
Euro99$_{jt}\times$ **TFP**$_{Q4}$	**0.017**	**0.021*****	**0.060****	**0.091*****	**0.081*****
	(0.051)	**(0.007)**	**(0.024)**	**(0.030)**	**(0.028)**
RER$_{jt}$	-0.024	-0.048	-0.146	-0.169	-0.194
	(0.367)	(0.030)	(0.165)	(0.191)	(0.180)
MP$_{jkt}$	-0.070	-0.009	0.244***	0.273***	0.236***
	(0.137)	(0.010)	(0.035)	(0.042)	(0.040)
RGDP$_{jt}$	1.330***	0.266***	0.738**	0.581*	1.004***
	(0.309)	(0.058)	(0.293)	(0.345)	(0.342)
TFP$_{ft-1}$	0.113***	0.054***	0.151***	0.177***	0.205***
	(0.038)	(0.003)	(0.012)	(0.012)	(0.012)
Observations	202004	422663	422663	382065	422663
Estimator	Cond. FE logit		Within fixed-effect		
Fixed effects			Firm $\times$ destination, year		

Note : Significance levels *10%, **5%, ***1%. Dependent variables and right hand side variables (with the exception of the euro dummy) are in logarithm. Robust standard errors in parentheses. Standard errors are clustered by destination country and year.

Table 5: Heterogeneity among treated destinations before 1999

Treatment group	EZ excluding D-Mark zone				EZ D-Mark zone only			
Control group	EU15 non-euro area less Denmark							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. variable	T_{fjt}	N_{fjt}	$\overline{x}_{fjt}$	X_{fjt}	T_{fjt}	N_{fjt}	$\overline{x}_{fjt}$	X_{fjt}
Euro99$_{jt}$	**0.017**	**0.026*** **	**0.095*** **	**0.121*** **	**-0.165*** **	**-0.015** **	**-0.041***	**-0.055***
	(0.048)	**(0.007)**	**(0.032)**	**(0.037)**	**(0.060)**	**(0.007)**	**(0.024)**	**(0.028)**
RER$_{jt}$	0.082	-0.015	-0.026	-0.040	0.153	-0.045	-0.174	-0.219
	(0.434)	(0.035)	(0.222)	(0.243)	(0.358)	(0.033)	(0.171)	(0.196)
MP$_{jkt}$	-0.077	-0.010	0.171**	0.161**	-0.136	-0.002	0.278***	0.275***
	(0.198)	(0.016)	(0.065)	(0.070)	(0.155)	(0.012)	(0.035)	(0.042)
RGDP$_{jt}$	0.737**	0.100**	0.138	0.238	0.548	0.117	0.598	0.715
	(0.326)	(0.048)	(0.255)	(0.289)	(1.426)	(0.114)	(0.453)	(0.529)
TFP$_{ft-1}$	0.126***	0.052***	0.174***	0.226***	0.108**	0.055***	0.120***	0.175***
	(0.040)	(0.004)	(0.014)	(0.015)	(0.053)	(0.004)	(0.015)	(0.016)
Observations	125770	240890	240890	240890	99162	253879	253879	253879
Estimator	Cond. FE logit	Within fixed-effect			Cond. FE logit	Within fixed-effect		
Fixed effects	Firm $\times$ destination, year							

Note : Significance levels *10%, **5%, ***1%. Dependent variables and right hand side variables (with the exception of the euro dummy) are in logarithm. Robust standard errors in parentheses. Standard errors are clustered by destination country and year.

Table 6: Trade costs versus increase in competition

Dependent variable	(1) T_t^{fj}	(2) N_{pt}^{fj}	(3) $\overline{x}_t^{fj}$	(4) X_t^{fj}	(5) T_t^{fj}	(6) X_t^{fj}
Treatment group	Euro area Members					
Control group	EU15 non-euro area					
Euro99$_{jt}$	**0.007**	**0.012****	**0.055****	**0.067****	**0.007**	**0.067****
	(0.008)	**(0.006)**	**(0.026)**	**(0.030)**	**(0.008)**	**(0.030)**
Phiness$_{jkt}^{EUR}$	-0.005	-0.001	-0.058***	-0.059***		
	(0.012)	(0.005)	(0.020)	(0.020)		
Phiness$_{jkt}^{EUR}\times$ TFP.Q1					-0.007	-0.049
					(0.018)	(0.034)
Phiness$_{jkt}^{EUR}\times$ TFP.Q2					-0.004	-0.087**
					(0.015)	(0.036)
Phiness$_{jkt}^{EUR}\times$ TFP.Q3					-0.060***	-0.107***
					(0.020)	(0.037)
Phiness$_{jkt}^{EUR}\times$ TFP.Q4					0.030**	0.016
					(0.014)	(0.031)
Observations	175010	380138	380138	380138	174869	361988
Fixed effects	Firm $\times$ destination, industry$\times$year					
Estimator	Within fixed-effect					
	(linear probability)				(linear probability)	

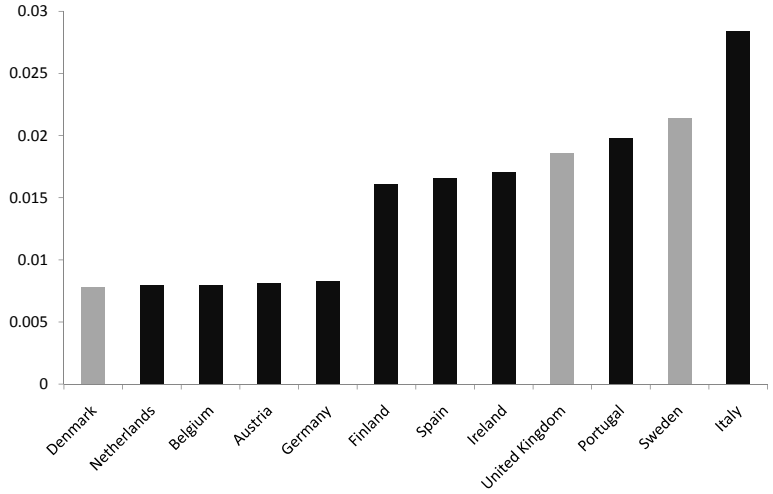
Note : Significance levels *10%, **5%, ***1%. Dependent variables and right hand side variables (with the exception of the euro dummy) are in logarithm. Robust standard errors in parentheses. Standard errors are clustered by destination country and year. Estimations performed using a within fixed effect estimator. All estimations control for RER_{jt}, MP_{jt}, $RGDP_{jt}$ and TFP_{jt-1} (not reported). The $Phiness_{jkt}^{EUR}$ variable is an inverse measure of trade costs by industry between the importer (j) and euro area countries excluding France.

Table 7: Euro effects on industry-level exports

Dependent variable	Industry-level French exports					
Control group	EU15 non-euro area					
Treatment group	Euro area Members		EZ excluding D-Mark zone		EZ D-Mark zone only	
	(1)	(2)	(3)	(4)	(5)	(6)
Euro99$_{jt}$	**0.066****	**0.077****	**0.079****	**0.095****	**-0.053***	**-0.049**
	(0.029)	**(0.032)**	**(0.037)**	**(0.040)**	**(0.028)**	**(0.039)**
RER$_{jt}$	-0.792***	-0.811***	-0.231	-0.201	1.117	1.204*
	(0.239)	(0.236)	(0.314)	(0.291)	(0.672)	(0.689)
MP$_{jkt}$	0.142	0.019	0.019	-0.108	0.020	0.224
	(0.186)	(0.159)	(0.306)	(0.246)	(0.196)	(0.277)
RGDP$_{jt}$	1.291***	1.595***	0.876***	1.142***	1.221***	1.428***
	(0.253)	(0.160)	(0.319)	(0.187)	(0.393)	(0.461)
Phiness$^{EUR}_{jkt}$		-0.052		-0.113		-0.019
		(0.042)		(0.075)		(0.059)
Observations	2375	2074	1515	1376	1076	900
Fixed effects	Destination-industry, industry$\times$ year					
Estimator	Within fixed effects					

Note : Significance levels *10%, **5%, ***1%. Dependent variables and right hand side variables (with the exception of the euro dummy) are in logarithm. Robust standard errors in parentheses. Standard errors are clustered by destination country and year. Estimations performed using a within fixed effect estimator.

Figure 1: Volatility vis-a-vis French Franc, 1995-96 average by country



Note : Authors calculations based on "Ecowin" data. Dark bars correspond to countries entering the euro area in 1999. Light grey bars are EU15 countries outside the euro area.

Figure 2: Euro effects by year: export decision

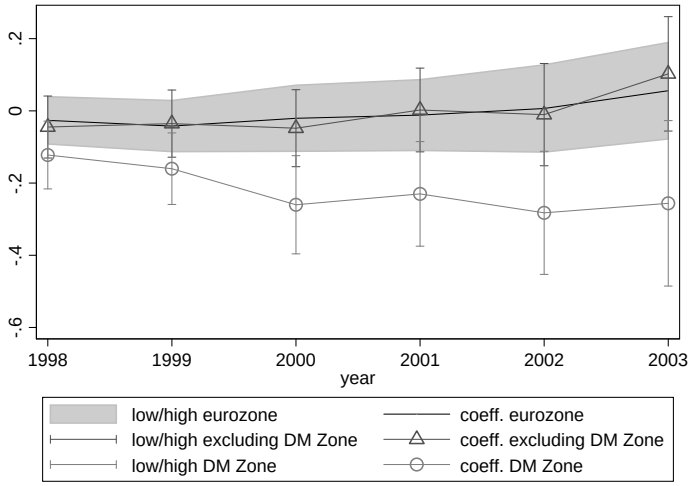


Figure 3: Euro effects by year: Number of products exported

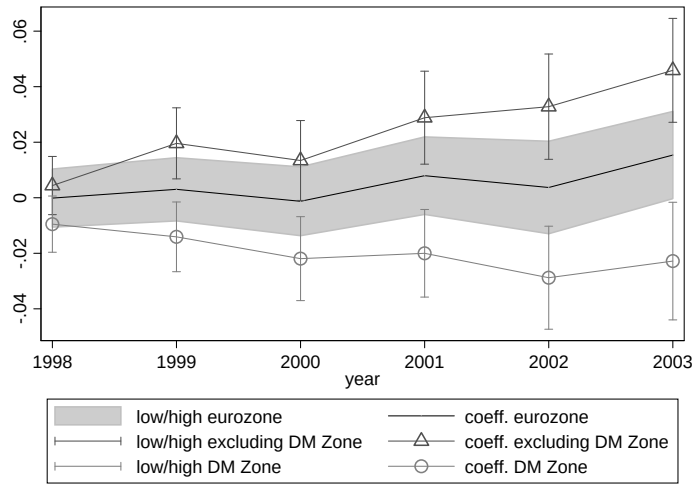


Figure 4: Euro effects by year: firms' exports by product

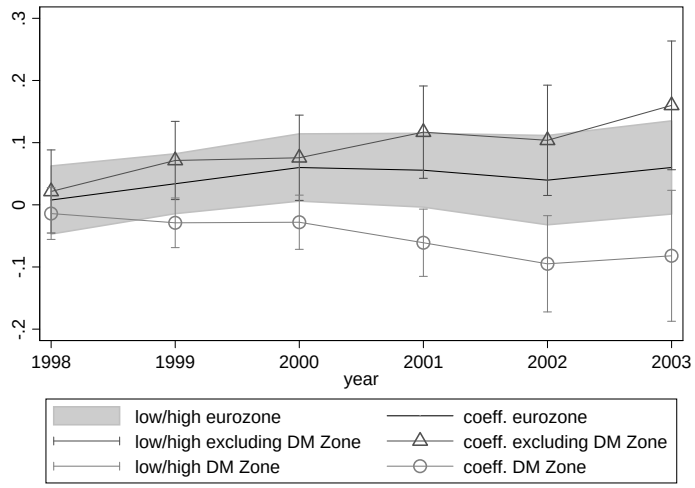


Figure 5: Euro effects by year: firms' total exports