

Heterogeneity in the Euro Effect on Markups: Evidence from French Manufacturing Firms

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Abstract

This paper investigates the effects of the introduction of the euro on the markups of French manufacturing firms. For this purpose, we rely on the recent methodology from De Loecker & Warzynski (2012) that allowed us to compute markups per year and per firm. We confirm that the introduction of the euro led to a decrease in the markups mean but this decrease had a differentiated effect conditional on the location of firm's customers. While being an exporter irrespective of the destination is associated with larger markups, it is as expected the largest when exporters have at least one non eurozone customers. Second, interactions variables between year dummies and export status show a clear distinct behavior whether firms are exporting only in the eurozone or outside the eurozone. The decrease in markups following the introduction of the euro was lower for firm exporting in the eurozone while exporters beyond the eurozone experienced a higher decrease. Our intuition is that eurozone exporters didn't pass through the decrease in cost they encountered thanks to the introduction of the euro. Unlike eurozone exporters, reduction in fixed export costs for global exporters was not a significant change in total cost and starting from a higher markup level, they experienced a larger drop in markups in response to the introduction of the euro. For them, the pro-competitive effect of the introduction of the euro wasn't mitigate by the decrease in fixed cost. Additionnal results are brought by the quantile regression in order to explore heterogeneity in the euro effect on markups. Among other results, we find that the introduction of the euro has been far more dramatic for firms with an initially high market power, decreasing their markups by almost 23 percentage points for the 90th percentile of the distribution, whereas firms with a lower market power have decreased theirs by less than 10 percentage points. Therefore by boosting competition, the introduction of the euro has reduced heterogeneity in market power across firms.

Key Words: Price-Cost Margins, euro, Competition, Export Destinations.

JEL codes: D40, E30, F4, F14, L16, L60 .

1 Introduction

Ten years after the starting of the Euro, the eurozone crisis has played down all positive arguments put forward in favor of the introduction of the euro. Instead, most crisis-related debates returned to the old demons associated to the establishment of a single currency and highlighted the drawbacks and inconsistencies of the Eurozone. This paper intends to return to one of the main positive argument: the pro-competitive effect expected to decrease markups, prices and then to foster production.

This return is motivated by the use of a recent methodology to estimate markups per firm. This allows to account for heterogeneity in markups and avoid most biased agregation effect. Because of technical restriction, markup estimates used to be the average of markups by year and/or industry. De Loecker & Warzynski (2012)'s methodology allows to compute markups per year and per firm. As a consequence, we can estimate not only the mean of markups and the distribution of markups conditional on specific characteristics. More generally, it allows to examine the impact of exogenous shock or policy upon the heterogeneity of markups. When it comes to judge the impact of a political or economical measure, the heterogeneity of markups is in a way a measure of the inequalities between firms and of their idiosyncratic ability to face identical shock. In this paper, we will use it to analyze the effect of the introduction of the euro in 1999 on French manufacturing firms.

The establishment of a unique currency was expected to increase competition because of the disappearance of barriers due to several currencies: if all prices are expressed in a same currency, arbitrage by consumers is made easier. Firms that may be sheltered behind their currency market will be directly in competition with their product firm counterpart when prices can be directly compared. Moreover, the transaction cost linked to the currency exchange will disappear and make purchases by consumers in the single currency zone really easier. Increase in competition should lead to a decrease in firm markup in order to stay competitive and keep market shares.

On the firm side, the decline in cost linked to segmented currency markets may lead to different attitude regarding their pricing behavior. While export cost declined, some firms may not pass through the decline in cost into their price and raise their markup. Our hypothesis is that the firm pricing behavior following the establishment of the euro depends on the firms export status in terms of destination and export intensity. In consequence the euro may have increased the heterogeneity in markups and profitability.

While markups level were expected to decrease following the establishment of the euro, its variance was also expected to slow down. This expectation comes from the adjustment in markups due to firm ajustement to changes in exchange rate. A large literature, starting with the seminal paper of Krugman (1987), has evidenced pricing-

to-market behaviour consisting of adjusting mark-ups to exchange rate effect on export price. A partial pass-through of exchange rate was mostly evidenced in many countries in many sectors producing differentiated products. A partial pass-through has an automatic counterpart: a variation in mark-up per destination to account for the destination change in exchange rate. So the introduction of the euro should have reduce the variance in markup per firm. This can be tested only if markups are evaluated at the firm level.

Another advantage of this methodology is thus to provide a set of estimates to test some hypothesis regarding markup. In this paper, once we obtain the estimates of the markup per firm, we use them to test the effects of the introduction of the euro on the distributional properties of markups. Moreover we test to what extent the firm's export status affect the firm reaction to the euro in terms of margin's behavior.

Section 2 describes the data used in this research, provides detailed information of the method by which firm-level markups and productivity are simultaneously estimated, and finally lays out the maximum likelihood method by which the determinants of the first and second moments of markups distribution are being identified. Section 3 reports the results. Section 4 concludes.

1.1 Simultaneous Estimations of Markups and Productivity

Similar to Hall (1986) and Roeger (1995), the method developed by De Loecker & Warzynski (2012) is based on the production function framework. But unlike previous contribution, it neither imposes constant return to scale nor requires the computation of the user cost of capital, a task hard to perform accurately. Last but not least, it provides time-varying and firm-specific estimates of markups and productivity, which allows us to unravel the heterogeneity in firm markups.

The method by De Loecker & Warzynski (2012) is based on the value-added production function framework: $Q_{it} = Q_{it}(X_{it}, K_{it})$, where subscripts i and t stand for firm i at time t , Q is value added, K is capital and X is a set of variable inputs. We suppose that $Q(\cdot)$ is twice differentiable and continuous and we will restrict non capital inputs to labor input only. Capital is assumed to be fixed and the only variable input in function $Q_{it}(\cdot)$ is labor L . The producer's objective function is to minimize costs, and the associated Lagrangian function reads:

$$\mathcal{L}_{it} = P_{it}^X X_{it} + r_{it} K_{it} + \lambda_{it} (Q_{it} - Q_{it}(X_{it}, K_{it})) \quad (1)$$

where P_{it}^X and r_{it} are firm input prices for labor and capital, respectively.

The first order conditions ensures that:

$$\frac{\partial \mathcal{L}_{it}}{\partial X_{it}} = P_{it}^X - \lambda_{it} \frac{\partial Q_{it}(X_{it}, K_{it})}{\partial X_{it}} = 0 \quad (2)$$

and

$$\frac{\partial \mathcal{L}_{it}}{\partial Q_{it}} = \lambda_{it} \quad (3)$$

which implies that λ_{it} is the marginal cost of production.

Rearranging (2) and multiplying both sides by $\frac{X_{it}}{Q_{it}}$, we have:

$$\frac{\partial Q_{it}(X_{it}, K_{it})}{\partial X_{it}} \frac{X_{it}}{Q_{it}} = \frac{P_{it}^X X_{it}}{\lambda_{it} Q_{it}} \quad (4)$$

The term of the left hand side of Equation 4 is the output elasticity of variable input X_{it} , whereas the right hand side term is its associated cost share. Now define firm markup μ as the price to marginal cost fraction $\mu_{it} \equiv \frac{P_{it}}{\lambda_{it}}$, it follows that $\lambda_{it} \equiv \frac{P_{it}}{\mu_{it}}$. Inserting the former into Equation 4 and simplifying yields:

$$\mu_{it}^X = \frac{\theta_{it}^X}{\alpha_{it}^X} \quad (5)$$

where the numerator $\theta_{it}^X = \frac{\partial Q_{it}(X_{it}, K_{it})}{\partial X_{it}} \frac{X_{it}}{Q_{it}}$ represents the output elasticity of input X_{it} and the denominator $\alpha_{it}^X = \frac{P_{it}^X X_{it}}{P_{it} Q_{it}}$ is the share of expenditures on input X_{it} in total sales. In order to compute the markups μ_{it} per firm per period, we need to compute θ_{it}^X and α_{it}^X per firm per period.

To obtain consistent estimates of output elasticities θ_{it}^X , we restrict our attention to production functions with a scalar Hicks-neutral productivity term and with technology parameters which are common across firms. Thus we have the following expression for the production function:

$$Q_{it} = F(X_{it}, K_{it}; \mathbf{B}) \quad (6)$$

where \mathbf{B} is a set of technology parameters to be estimated. In this work, we prefer to use the translog production function over the Cobb-Douglas framework because it generates markups, which distribution is not fully determined by heterogeneity in cost shares, as will be clear below. Let y_{it} be the translog production function:

$$y_{it} = \beta_l l_{it} + \beta_k k_{it} + \beta_{lk} l_{it} k_{it} + \beta_{kk} k_{it}^2 + \beta_{ll} l_{it}^2 + \omega_{it} + \varepsilon_{it} \quad (7)$$

where ω is a measure of the true productivity and ϵ is true noise ¹. To solve the problem of endogeneity of variable inputs, i.e. the correlation between variable input decisions and ω , we use a control function approach, as in Olley & Pakes (1996) or Levinsohn & Petrin (2003), using demand for material to proxy for productivity:

¹Note that we recover the Cobb Douglas (CD) production function when omitting higher order terms ($\beta_{kk} k^2, \beta_{ll} l^2$) and the interaction term $\beta_{lk} l_{it} k_{it}$.

$$m_{it} = m_t(k_{it}, \omega_{it}, ED) \quad (8)$$

where ED is an indicator variable set to unity if the firm enjoys positive exports, 0 otherwise. Hence we control for exporting behavior in the first stage of the estimation algorithm. As in Olley & Pakes (1996), one can then invert the function and write productivity ω as in the following:

$$\omega_{it} = h_t(k_{it}, m_{it}, ED) \quad (9)$$

Step 1 starts with the following estimation:

$$y_{it} = \phi(l_{it}, k_{it}, ED_{it}) + \varepsilon_{it} \quad (10)$$

where the function form of ϕ is set to the third order polynomials and a full vector of interactions. This first step is used to generate an estimate of expected output $\hat{\phi}_{it}$ and ε_{it} . Define productivity ω as:

$$\omega_{it}(\beta) = \hat{\phi}_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it} - \hat{\beta}_{lk} l_{it} k_{it} - \hat{\beta}_{ll} l_{it}^2 - \hat{\beta}_{kk} k_{it}^2 \quad (11)$$

Defining the law of motion for productivity as a first order Markov process allows us to recover true innovation ξ_{it} in the productivity equation:

$$\omega_{it} = g_t(\omega_{it-1}) + ED_{it} + \xi_{it} \quad (12)$$

As suggested by Akerberg et al. (2006), we use the following moments to obtain our estimates of the production function:

$$E \left(\xi_{it}(\beta) \begin{pmatrix} l_{it-1} \\ k_{it} \\ l_{it-1}^2 \\ k_{it}^2 \\ l_{it-1} k_{it} \end{pmatrix} \right) = 0 \quad (13)$$

This provides an estimation of \mathbf{B} used to compute the estimated output elasticity of input θ_{it}^X :

$$\theta_{it}^X = \hat{\beta}_l + 2\hat{\beta}_{ll} l_{it} + \hat{\beta}_{lk} k_{it} \quad (14)$$

From this we compute the expenditure share as follows:

$$\alpha_{it}^X = \frac{P_{it}^X X_{it}}{P_{it} \frac{\hat{Q}_{it}}{\exp(\varepsilon_{it})}} \quad (15)$$

At last, having information on α_{it} and $\hat{\theta}_{it}^X$, one can compute the markups for each firm i at time t :

$$\hat{\mu}_{it} = \frac{\hat{\theta}_{it}^X}{\alpha_{it}^X} \quad (16)$$

2 Data and Descriptives Statistics

2.1 Data

We use a panel database of French firms covering the period 1994-2007. Data come from the annual survey of company (EAE) led by the statistical department of the French Ministry of Industry on all the manufacturing sectors. The survey covers all the French firms of 19 or more employees which exercise in main title their activity in one of the manufacturing sectors. For each of these companies, the EAE data supply information, among which we hold for this study the production, defined as sales corrected for stock variations, labour, in terms of number of hours worked, capital, in terms of capital stock, and materials. The EAE data provides also the amount of export per firm. The export status requires then to know the export destination. We got this information from the French Customs data. We end up with a dataset of 215,049 observations.

2.2 Descriptive Statistics of Explicative Variables

The Introduction of the euro: The euro has been introduced in 1999 for firm accountability and reach the consumer side in 2002. We will consider the two stages separately. While the first stage may have triggered a change in the firm pricing behavior due to a change in their currency exchange cost, the second stage is probably the one starting the competition coming from consumers arbitrage. We then define two dummies per period. The period 1999-2007 dummy and the period 2002-2007 dummy are set equal to one when the year of observation is included in the period. The dummies overlap in order to get additive coefficients when they are put together in the regression. Are those time dummies able to capture the introduction of the euro only? Of course not, but for sure it is the main common event that changed a firm's environnement during that period. During the same time, another main change was the rise of the emergent economies competition mostly coming from East Asia. We will capture this increase in competition by adding the import coming from countries with low wages by industry.² Moreover over the period the increase in openness may have also increased competition and impact markups. We then include an indicator of openness per industry. Last we will add year dummies to account for the growth cycle.

²ADD a footnote for PBS.

The export Status Export status is first given by the EAE dataset. Over the period on average there are 73% of French Manufacturing firms that are exporters (see Table 2). By using the knowledge of export destination from the French Custom Data, we were able to differentiate whether they were, over the period of analysis, non exporters, eurozone exporters, and global exporters. Eurozone exporters are those firms that export only in the eurozone while global exporters have at least a destination outside the eurozone. Non eurozone exporters have no customers in the eurozone. Global exporters (Global), eurozone exporters (EZ Only), and Non eurozone exporters (NEZ Only) represent respectively 53%, 5% and 15% of French Manufacturing firms.

The list of variables used in the econometric part is given by Table 1.

Table 1: Variable Definition

Name	Definition	Source
μ_{it}	Firm Markups	EAE, Authors' Calculations
ω_{it}	Firm Productivity	EAE, Authors' Calculations
$Size_{it}$	Firm Revenue (log)	EAE
LW Import Share $_{jt}$	Low Wage Countries Import as a share of Total French Import per industry	BACI-CEPII
Openness $_{jt}$	Trade over Value Added per industry	OECD STAN database
Exporters $_{it}$	Dummy Equal to 1 when the French Firm is exporter in year t	EAE
EZ Only $_{it}$	Dummy Equal to 1 when the French Firm is exporter only to the Eurozone in year t	French Custom Data
NEZ Only $_{it}$	Dummy Equal to 1 when the French Firm is exporter only outside the Eurozone in year t	French Custom Data
Global $_{it}$	Dummy Equal to 1 when the French Firm is exporter both outside and inside the Eurozone in year t	French Custom Data
Post99	Dummy equal to one when the year of observation is included in the period 1999-2007 .	
Post02	Dummy equal to one when the year of observation is included in the period 2002-2007.	

3 Results

3.1 Markups Estimates

We start by computing firm-year specific markups between 1995 and 2007. Figure 1 shows that markups remained stable until 2000, then dropped between 2000 and 2003, stood stable between 2003 and 2005, and to then rise again between 2005 and 2007. By and large, this seems coherent with the pro-competitive effect of the introduction of the euro.

Table 2: Descriptive Statistics

Variable	Mean	Median	Standard_deviation	Minimum	Maximum
Size (ln)	8.923	8.724	1.210	3.877	16.90
LW Import Share	0.086	0.052	0.090	0.002	0.387
Openness ^a	2.728	2.253	2.228	0.570	43.23
Exporters	0.729	1	0.445	0	1
EZ Only	0.0496	0	0.217	0	1
NEZ Only	0.151	0	0.358	0	1
Global	0.528	1	0.499	0	1

^a Sector-year specific $(X + M)/Y$.

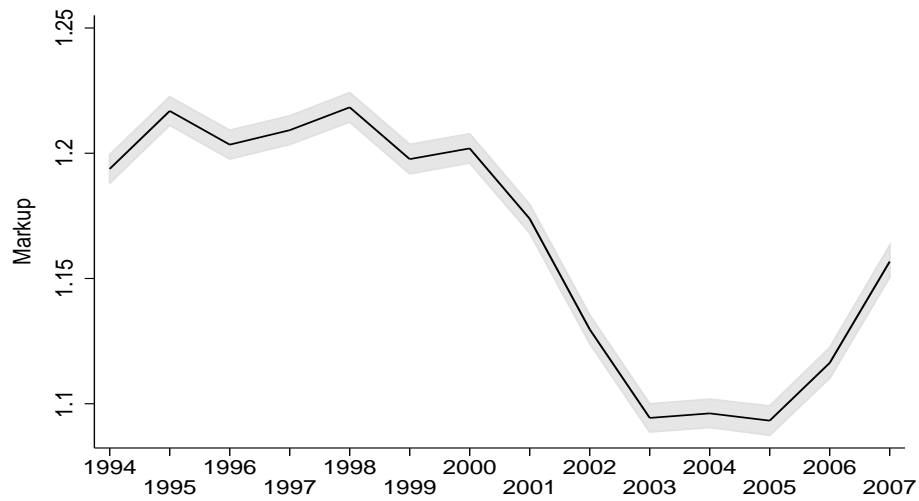


Figure 1: Evolution of Markups between 1995 and 2007

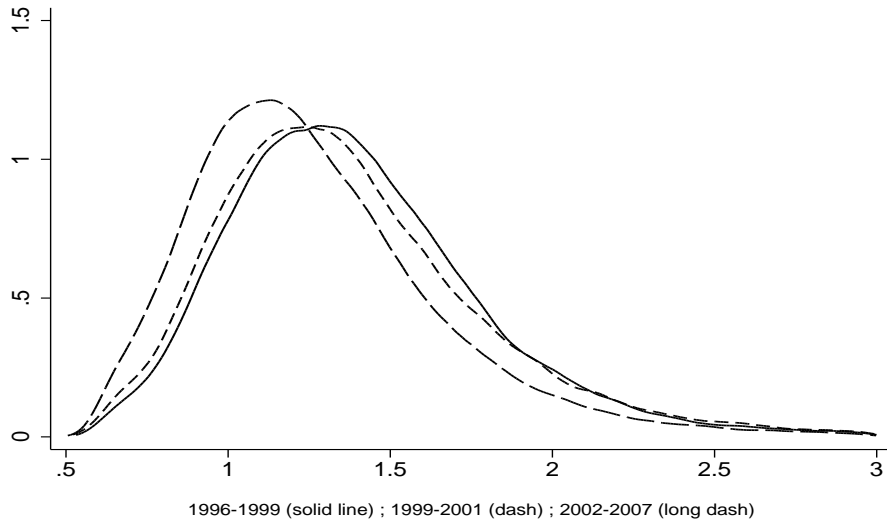


Figure 2: Distribution of Markups by period

Figure ?? shows kernel distributions for markups per time period. Overtime, we observe a move leftwards, unveiling a decrease in markup without a change in variance among firms. The distribution 2002-2007 is also but more clearly at the left of the 1996-1999 distribution and of the 1999-2001 distribution and displays also a smaller variance. All firms have experienced a decline in markups since 1999 that seems to accelerate in 2002. Figure 3 shows kernel distributions for markups per export status.

Table 3: Computed Markups and Productivity Indices, by Time Period and Export Status

Export Status	Time Period	$\bar{\mu}$	$\bar{\omega}$	σ_{μ}	σ_{ω}
All firms	1995-2007	1.339	1.478	0.388	0.270
All firms	1995-1998	1.398	1.421	0.379	0.254
All firms	1999-2007	1.311	1.504	0.390	0.273
Non exporter	1995-1998	1.310	1.409	0.325	0.207
Non exporter	1999-2007	1.223	1.485	0.339	0.226
EZ Only	1995-1998	1.396	1.423	0.368	0.218
EZ Only	1999-2007	1.335	1.531	0.393	0.264
NEZ Only	1995-1998	1.348	1.439	0.353	0.217
NEZ Only	1999-2007	1.257	1.515	0.364	0.235
Global	1995-1998	1.463	1.423	0.403	0.288
Global	1999-2007	1.368	1.507	0.408	0.303

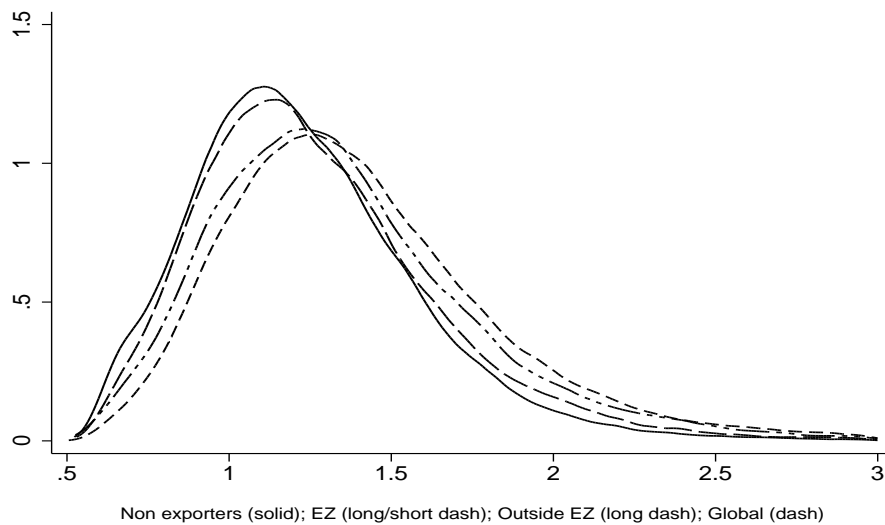


Figure 3: Distribution of Markups by destination of customers – 1995 and 2007

3.2 Markups and the Introduction of the Euro

We first compute an OLS regression that regresses markup per firm on control variables to provide a rough set of correlations between markups and Export status. We follow up by estimating a fixed effect regression to account for firm idiosyncratic characteristics trying then to unveil more confident causal relationships. Last, we replicate the fixed effect regression on a restrictive sample of firms to exclude new entrants during the period to prevent a change in overall markup coming from markups average level of new entrants.

Table 4 provides the simple OLS regression. The constant gives the markup basis for all firms. Column (1) indicates a markup of 1.119 in addition to which exporters displays a 0.118 premium. This is coherent with the empirical literature on exporters showing their better performance relative to their non exporter counterparts. A higher productivity is also correlated to a higher markup.³ Regarding the introduction of the euro, the two “euro dummies” are negatively significant. Each dummy coefficient turns around -0.5 . It suggests that the introduction of the euro led to a decrease in the mean value of markups. Column(2) shows estimates when the export status is split up conditional on destination. All exporters have higher markups but the highest is for global exporters (both eurozone and elsewhere). By the way, eurozone exporters have higher markups than exporters heading their goods towards non eurozone destination. This is probably due to a correlation between type of goods (less differentiated) and non eurozone customers. To explore the

³A firm becoming an exporter and having an average level of productivity should have a markup equal to : $\mu = 1.119 + \bar{\omega} * 0.139 + 0.118$ – without accounting for the decreasing effect of the introduction of the euro.

interaction between export status and the euro introduction effect, column(3) and (4) show results of a specification where the three export status dummy are interacted with the times dummies. First, we introduce only the dummy period 1999-2007 (column(3)). It happens to have a significant negative effect on global exporter only and a weak and positive effect on eurozone exporters. During this period, global exporters experience a bigger decrease in margins than other exporters. Outside-eurozone exporters as well do not display a specific reaction during that period. Adding the second dummy starting in 2002, global exporters are the only type of exporters showing a different reaction. Eurozone exporters have experienced a lower decrease in the first period than in the second period. It is interesting to remark that it is since 2002 that global exporters have experienced a larger decrease while actually, from 1999 to 2002, they experienced an increase in markup relative to other firms. Does this mean that the pro-competitive effect of the euro introduction influenced more the margins of global exporters? Could we conclude that this pro-competitive effect impacted more the large and with large market power firms that use to benefit from a sort of monopoly rent before the increase in competition?

To be more confident in our results and confirm our intuition, we implemented a set of new regressions by, first, including firm fixed effects and industry fixed effects ; second, by adding variables controlling for other major events during the period regarding change in competition and in demand that may impact markups – Low wage import share and level of openness by industry – and last by adding the firm size as a control of monopoly power. Table 5 presents results of six specifications coming from the subsequent addition of control variables. The first one shows that controlling for fixed effect increases the markup basic level while it decreases the export premium found in Table 4. Productivity is playing the same significant positive role on markup up to the specifications including firm’s size. Column (2) brings no new results different from Table 4. On the contrary column (3) including interactions variables between year dummies and export status show a clear distinct behavior whether firms are exporting only in the eurozone or outside the eurozone. The decrease in markups following the introduction of the euro was lower for firm exporting in the eurozone while global exporters experienced a higher decrease. Previous results are also found in the fixed effects specification regarding global exporters. Concerning eurozone exporters the interaction with the 1999 dummy shows a clearly positive significant coefficient: eurozone exporters have experienced a lower decrease in markups than global exporters when the euro was introduced.

The addition of control variables corroborates our results and brings additional information. We first add firm size and observe that larger firms enjoy higher markups. As such, firm size is similar to controlling for a host of firm-level unobserved characteristics, notably monopsony power in the input factors markets which may in turn affect firm product market power. The inclusion of firm size, however, does not affect our previous

Table 4: Least Square Regression – Markups as Dependent Variable – 1995-2007

	(1)	(2)	(3)	(4)
Constant	1.119*** (0.007)	1.117*** (0.007)	1.114*** (0.007)	1.114*** (0.007)
Exporters	0.118*** (0.002)			
Post99	-0.051*** (0.004)	-0.053*** (0.004)	-0.048*** (0.005)	-0.057*** (0.005)
Post02	-0.050*** (0.004)	-0.050*** (0.004)	-0.050*** (0.004)	-0.035*** (0.005)
Productivity ω	0.139*** (0.005)	0.141*** (0.005)	0.141*** (0.005)	0.141*** (0.005)
EZ Only		0.098*** (0.004)	0.084*** (0.009)	0.084*** (0.009)
NEZ Only		0.032*** (0.002)	0.034*** (0.004)	0.034*** (0.004)
Global		0.144*** (0.002)	0.151*** (0.003)	0.151*** (0.003)
EZ \times Post99			0.016* (0.010)	0.007 (0.011)
NEZ \times Post99			-0.003 (0.005)	0.000 (0.007)
Global \times Post99			-0.010** (0.004)	0.008* (0.005)
EZ \times Post02				0.016* (0.009)
NEZ \times Post02				-0.005 (0.006)
Global \times Post02				-0.028*** (0.005)
Observations	215,049	215,049	215,049	215,049
R-squared	0.054	0.064	0.064	0.064

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

conclusion on the Euro effect qualitatively. Controlling for LWC competition and openness, the coefficient stayed identical though the LWC competition and openness have both negative impact on markups. The inclusion of these two “competition” variables only slightly reduce the euro-dummies coefficients. The euro-dummies coefficients keep their informative level.

To exclude any composition effects coming from the markups of firms that entered the market during the period, we perform additional regressions on a more restricted sample. To prevent industry churning and entry into and exit from export markets to affect the results, we focus exclusively on firms which did not change their export status between years 1998 and 2003. This discards 10,351 companies, and reduces sample size by over 100,000 observations. By concentrating on stable firms in terms of export behaviour, we control for any effects which may have changed the price-to-marginal cost markup as a result of more competitors in the markets (since the introduction of the Euro shifted the productivity threshold downwards, allowing for more firms to enter the market).

Table 6 presents same regression as Table 5 but on the restricted sample. Significance and signs are mostly unchanged while magnitude of effects are different. Exception regards the effect of openness on markups that lost its significance. The average markup estimates is below the one in the unrestricted sample indicating that entries of new firms during the period were due to higher markup firms.

3.3 Heterogeneity in Markups response to the Euro Introduction

This Section investigates the homogeneity of the Euro effect on markup levels using quantiles regressions. Quantile regression techniques is an alternative to OLS which provides an estimation of the heterogeneous impact of any explanatory variable on the dependent variable. Our motivation comes from the fact that the introduction of the euro may be heterogenous, depending on initial firm market power. In essence, the spirit of quantile regression is to produce quantile-specific marginal effects $\hat{\beta}_\tau$, where τ is the desired quantile. For simplicity, the euro effect is assumed to take effect in 1999 only, ruling the possibility for firms to further adapt their markups in 2002.

Table 7 presents the results for the least squares solution (Column 1) and various quantiles (Columns 2-6). The OLS estimate associated with the introduction of the euro is negative and significant by -0.174 , implying that firms have decreased their markups by 17 percentage points. The quantile estimates indicate that the introduction of the euro has been far more dramatic for firms with an initially high market power, decreasing their markups by almost 23 percentage points for the 90th percentile of the distribution, whereas firms with a lower market power have decreased theirs by less than 10 percentage points.

A more thorough examination of the heterogeneity of the overall euro effect is found in Figure 4. In the upper left quadrant, the actual effect is displayed for each of the 5th

Table 5: Fixed Effects Regression – Markups as Dependent Variable – 1995-2007

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.204*** (0.024)	1.197*** (0.024)	1.192*** (0.024)	1.190*** (0.024)	-0.103*** (0.040)	-0.058 (0.041)
Exporters	0.007*** (0.002)					
Post99	-0.057*** (0.003)	-0.057*** (0.003)	-0.051*** (0.003)	-0.059*** (0.003)	-0.092*** (0.003)	-0.084*** (0.004)
Post02	-0.067*** (0.002)	-0.067*** (0.002)	-0.067*** (0.002)	-0.053*** (0.003)	-0.052*** (0.003)	-0.050*** (0.003)
Productivity ω	0.140*** (0.016)	0.140*** (0.016)	0.140*** (0.016)	0.141*** (0.016)	0.045*** (0.015)	0.049*** (0.015)
EZ Only		0.006 (0.004)	-0.014** (0.007)	-0.014* (0.007)	-0.027*** (0.007)	-0.026*** (0.007)
NEZ only		0.004 (0.002)	0.002 (0.004)	0.002 (0.004)	-0.010*** (0.004)	-0.010*** (0.004)
Global		0.023*** (0.003)	0.031*** (0.004)	0.033*** (0.004)	0.003 (0.004)	0.004 (0.004)
EZ \times Post99			0.022*** (0.008)	0.023*** (0.008)	0.021*** (0.008)	0.021*** (0.008)
NEZ \times Post99			0.003 (0.004)	0.002 (0.005)	0.004 (0.004)	0.003 (0.004)
Global \times Post99			-0.013*** (0.004)	0.002 (0.004)	0.002 (0.004)	0.002 (0.004)
EZ \times Post02				-0.001 (0.006)	0.002 (0.006)	0.002 (0.006)
NEZ \times Post02				0.000 (0.004)	0.003 (0.004)	0.003 (0.004)
Global \times Post02				-0.026*** (0.004)	-0.023*** (0.003)	-0.023*** (0.003)
Size					0.166*** (0.004)	0.164*** (0.004)
LW Import						-0.397*** (0.054)
Openness ^a						-0.015** (0.007)
Observations	215,049	215,049	215,049	215,049	215,049	215,049
R-squared	0.107	0.108	0.108	0.109	0.160	0.161
Number of Firm-year	29,178	29,178	29,178	29,178	29,178	29,178

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

^a Openness is in logarithm.

Table 6: Fixed Effects Regression – Markups as Dependent Variable – Restrictive Sample 1995-2007

	(1)	(2)	(3)	(4)	(5)	(6)
Exporters	0.162*** (0.003)					
Constant	1.186*** (0.010)	1.183*** (0.010)	1.172*** (0.011)	1.172*** (0.011)	-0.223*** (0.017)	-0.222*** (0.017)
Post99	-0.060*** (0.006)	-0.064*** (0.006)	-0.050*** (0.007)	-0.061*** (0.008)	-0.088*** (0.007)	-0.084*** (0.007)
Post02	-0.055*** (0.006)	-0.052*** (0.006)	-0.052*** (0.006)	-0.033*** (0.008)	-0.090*** (0.007)	-0.085*** (0.007)
Productivity ω	0.088*** (0.007)	0.092*** (0.006)	0.092*** (0.006)	0.092*** (0.006)	0.197*** (0.007)	0.201*** (0.007)
EZ Only		0.117*** (0.010)	0.077*** (0.017)	0.077*** (0.017)	0.015 (0.017)	0.014 (0.017)
NEZ Only		0.043*** (0.004)	0.050*** (0.008)	0.050*** (0.008)	-0.018** (0.007)	-0.018** (0.007)
Global		0.176*** (0.003)	0.191*** (0.005)	0.191*** (0.005)	-0.017*** (0.005)	-0.018*** (0.005)
EZ \times Post99			0.052** (0.021)	0.070** (0.029)	0.079*** (0.028)	0.076*** (0.028)
NEZ \times Post99			-0.009 (0.010)	-0.023* (0.012)	-0.016 (0.011)	-0.016 (0.011)
Global \times Post99			-0.021*** (0.006)	-0.003 (0.007)	-0.003 (0.007)	-0.003 (0.007)
EZ \times Post02				-0.027 (0.027)	-0.032 (0.025)	-0.031 (0.025)
NEZ \times Post02				0.018 (0.011)	0.017* (0.010)	0.018* (0.010)
Global \times Post02				-0.029*** (0.007)	-0.021*** (0.006)	-0.021*** (0.006)
Size					0.154*** (0.001)	0.154*** (0.001)
LW Import						-0.175*** (0.013)
Openness						0.000 (0.002)
Observations	102,905	102,905	102,905	102,905	102,905	102,905
R-squared	0.065	0.074	0.074	0.074	0.273	0.275

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

to the 95th percentiles. The grey area displays its corresponding 95th confidence interval. The horizontal solid and dashed lines represent the OLS effect with its 95th confidence interval. We observe here that the actual OLS effect conceals a great deal of heterogeneity in the euro effect, where the most severe downward adjustments in the markups are to be found in the largest markups. Observe that the negative slope depicted by the graph across the quantiles is tantamount to observing an effect which decreases the variance of the dependent variable, that is, firm markup. Therefore by boosting competition, the introduction of the euro has reduced heterogeneity in market power across firms.

If we interact the post1999 dummy and the export status, we observe, as before, that while the decrease in markup happens irrespective of the export status, it was more accentuated for global exporters. The quantile regression brings some nuanced results regarding the less negative impact of the euro introduction on eurozone exporters markups found in the fixed effects regression: it is mostly a result due to firms from the upper half of the markup distribution. For other eurozone exporters – the lower half of the distribution – there were no differentiated effect compared to other firms. Finally, the quantile regression brings another result regarding firm export status: Firms in the last decile of the markups distribution display no differentiated response to the introduction of the euro compared to domestic firms (column (6)).

On the opposite, firm-specific characteristics, whether size or productivity, had an effect contrary to the euro effect in terms of markups heterogeneity: Firm-specific characteristics increased heterogeneity. Firm’s size and productivity are very good predictor of markups and have both positive influence on markups. The quantile regression tells us that a change in size has a larger impact on markups when firms have a strong market power – a large markup. Reversely, a change in size has a smaller effect on markup when firms have markup closer to one. This reinforcing effect is also observed for productivity. Figure 5 illustrates clearly and neatly the marginal effect of size and of productivity and the increasing slope indicating that both size and productivity enlarge the heterogeneity in markups.

Finally, we obtained interesting results regarding the marginal effects of the competition control variables – LW Import share and Openness. Both had a negative significant effect on markups in fixed effects regression. The quantile regression allows to observe a very different impact of openness conditional on markups quantiles: the effect is negative for low markups firms and become positive as we move to firm with large markups. Righthandside graph in Figure 5 shows a clear increasing marginal effect across deciles of markups. Openness had a very differentiated effect whether firms have or not strong market power. Openness happens to be a “markup opportunity” for big markup firm and played a pro-competitive effect only for low markup firms. Regarding the Low wage Import share, its marginal effect was also very different with respect to markup level. The

effect was negative for all deciles of the distribution but more negative for the extreme part of the distribution. A non-shown interaction between export status and LW Import showed that global exporters were mostly the cause of this non linear marginal effect.

Table 7: Quantile Regression – Markups as Dependent Variable – Restrictive Sample 1995-2007

VARIABLES	(1) OLS	(2) Q10	(3) Q25	(4) Q50	(5) Q75	(6) Q90
Post99	-0.174*** (0.007)	-0.088*** (0.009)	-0.115*** (0.008)	-0.153*** (0.008)	-0.185*** (0.010)	-0.227*** (0.016)
Productivity ω	0.201*** (0.007)	0.032*** (0.005)	0.090*** (0.004)	0.175*** (0.004)	0.293*** (0.005)	0.411*** (0.009)
EZ	0.014 (0.017)	0.077*** (0.026)	0.052** (0.022)	0.010 (0.022)	-0.011 (0.028)	0.016 (0.046)
NEZ	-0.018** (0.007)	0.010 (0.010)	-0.016* (0.008)	-0.020** (0.009)	-0.038*** (0.011)	-0.057*** (0.018)
Global	-0.018*** (0.005)	0.040*** (0.006)	0.008 (0.005)	-0.017*** (0.005)	-0.046*** (0.007)	-0.068*** (0.011)
ES \times Post99	0.054*** (0.020)	0.003 (0.030)	0.025 (0.025)	0.058** (0.025)	0.078** (0.032)	0.044 (0.052)
NEZ \times Post99	-0.003 (0.009)	-0.005 (0.012)	0.003 (0.010)	0.002 (0.010)	0.011 (0.013)	0.019 (0.021)
Global \times Post99	-0.017*** (0.005)	-0.008 (0.007)	-0.008 (0.006)	-0.015** (0.006)	-0.018** (0.008)	-0.006 (0.013)
Size	0.154*** (0.001)	0.093*** (0.001)	0.118*** (0.001)	0.147*** (0.001)	0.178*** (0.001)	0.205*** (0.002)
LW Import	-0.175*** (0.013)	-0.207*** (0.016)	-0.117*** (0.013)	-0.089*** (0.013)	-0.162*** (0.017)	-0.217*** (0.028)
Openness	0.000 (0.002)	-0.037*** (0.002)	-0.031*** (0.002)	-0.014*** (0.002)	0.020*** (0.002)	0.062*** (0.004)
Constant	-0.222*** (0.017)	0.159*** (0.015)	0.030** (0.012)	-0.161*** (0.012)	-0.406*** (0.015)	-0.608*** (0.025)
Observations	102,905	102,905	102,905	102,905	102,905	102,905
R-squared	0.275					

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4 Conclusion

This paper investigated the effects of the introduction of the euro on the markups of French manufacturing firms. For this purpose, we rely on the recent methodology from

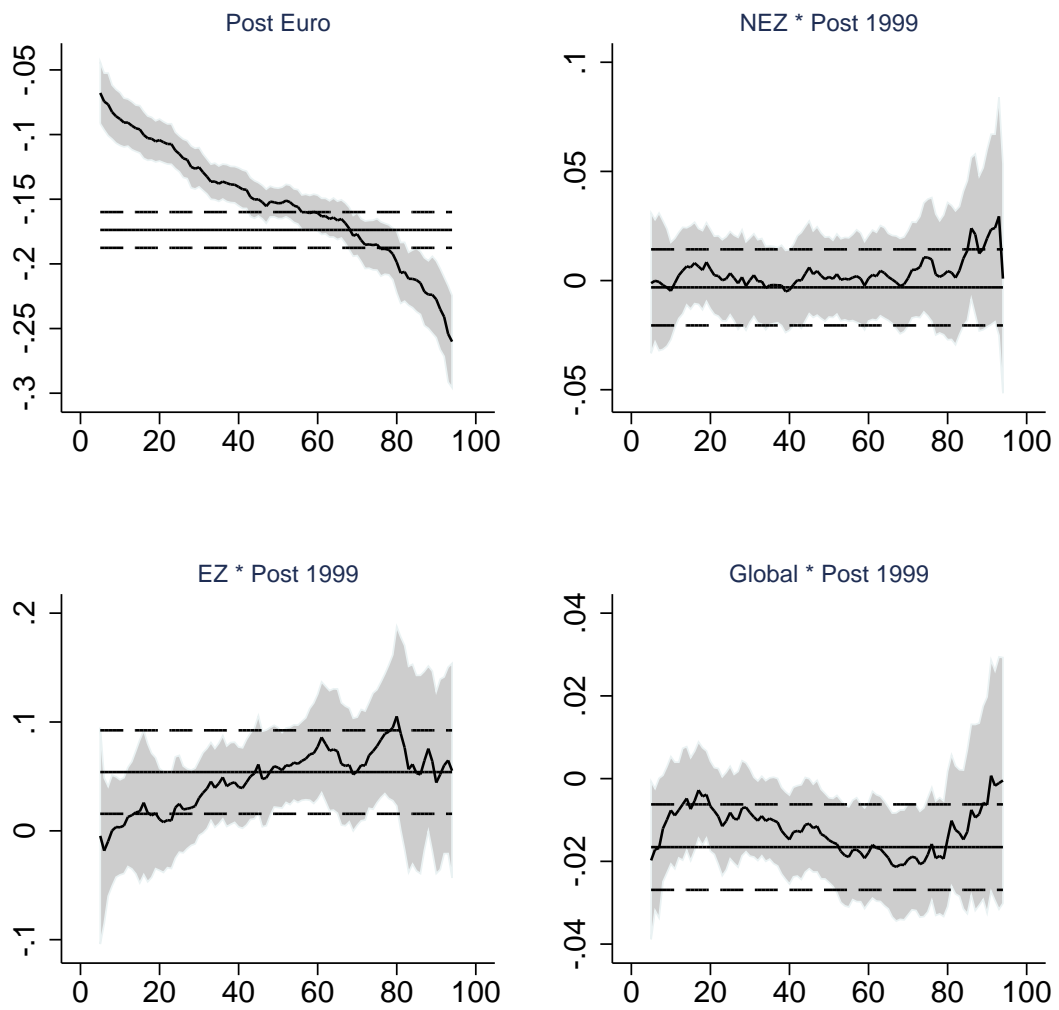


Figure 4: Marginal Effects of explicative variables per Quantile

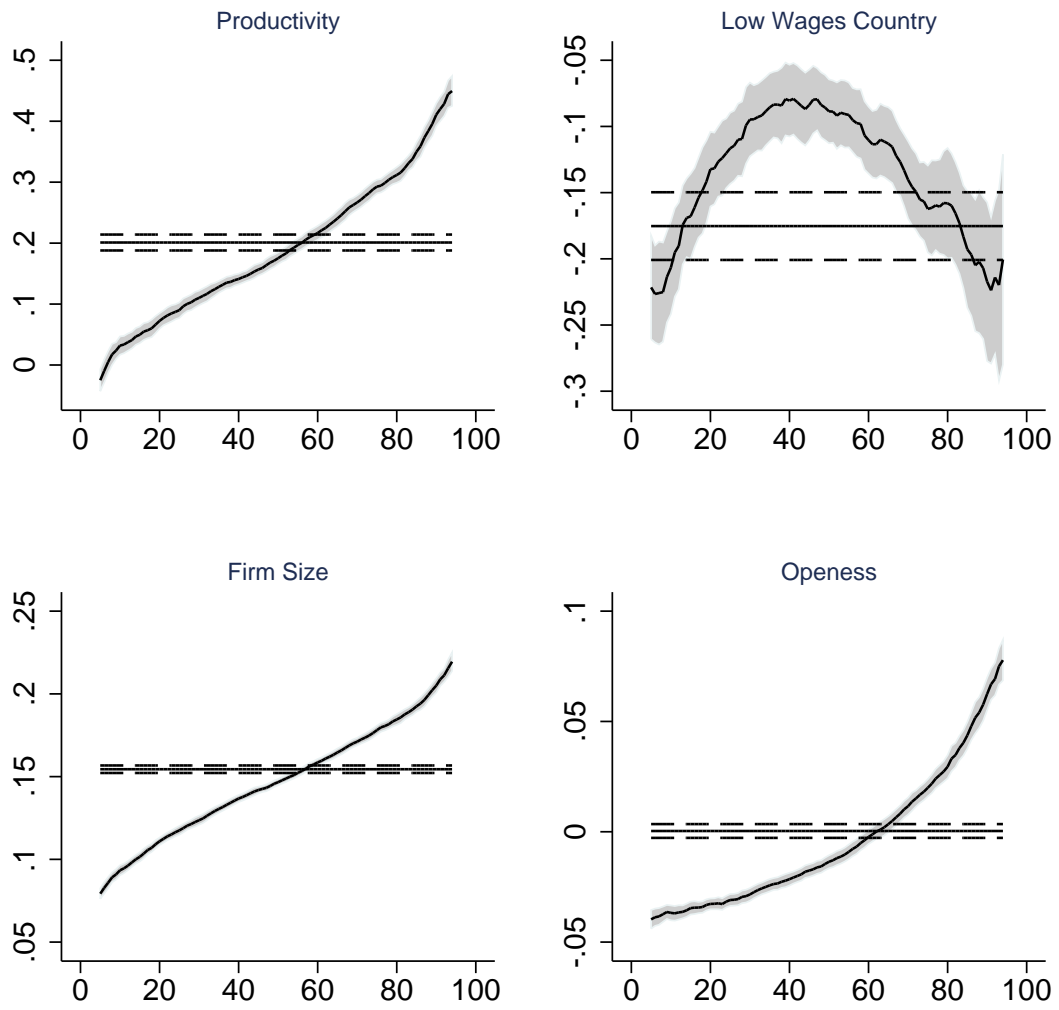


Figure 5: Marginal Effects of explicative variables per Quantile

De Loecker & Warzynski (2012) that allowed us to compute markups per year and per firm. We showed that the introduction of the euro led to a decrease in the markups mean. The introduction of variables specifying the firm export status brings additional results. First being an exporter irrespective of the destination is associated with larger markups. This is coherent with the empirical literature on exporters showing exporters's better performance relative to their non exporter counterparts. Second, interactions variables between year dummies and export status show a clear distinct behavior whether firms are exporting only in the eurozone or outside the eurozone. The decrease in markups following the introduction of the euro was lower for firm exporting in the eurozone while global exporters experienced a higher decrease. Our intuition is that European exporters were more encline to restore their margin when benefiting from a decrease in transaction costs instead of reducing their price. They didn't passthrough the decrease in cost they encountered thanks to the introduction of the euro. Unlike European exporters, global exporters didn't benefit from a reduction in fixed export costs and faced a larger decreased in markups.

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