



# Price dispersion and the euro: Micro heterogeneity and macro implications<sup>☆</sup>

Julien Martin<sup>a,\*</sup>, Isabelle Mejean<sup>b</sup>

<sup>a</sup> Université Catholique de Louvain, Pl. Montesquieu, 3, 1348 Louvain-la-Neuve, Belgium

<sup>b</sup> Ecole Polytechnique, CREST and CEPR, France

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## ABSTRACT

What is the impact of monetary unions on the integration of goods markets? We address this issue by investigating the effect of the euro on French exporters' pricing strategies toward members of the eurozone. We adopt a difference-in-difference strategy and estimate that the single currency reduced the relative dispersion of export prices in the eurozone by 1 percentage point in comparison to the rest of the European Union. Moreover, we show that the single currency has affected large firms more strongly. When we take this heterogeneity into account, we find a stronger impact for the euro, by 4 percentage points.

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## 1. Introduction

More than ten years after the creation of the European Monetary Union (EMU), it is now possible to empirically assess how monetary integration has affected market equilibria in Europe. By furthering market integration, the EMU was expected to impact trade patterns within the monetary zone as well as between the EMU and the rest of the world; this is the well-known Rose effect.<sup>1</sup> Another manifestation that has been investigated in the empirical literature is the impact of the EMU on the dispersion of prices. According to the law of one price (LOOP), an integrated market should have a single price for each (properly defined) product. Deviations from this single price can be linked to the degree of economic integration. Anything furthering market integration, notably the creation of a currency union, is expected to induce a convergence toward the LOOP.<sup>2</sup>

The increasing availability of highly disaggregated firm-level data allows researchers to investigate these questions from a microeconomic perspective. The effect of the euro on trade patterns has thus been studied using such data, accounting for the reaction of firms in terms of entry and exit, sales, or the product mix they supply to foreign markets (Berthou & Fontagné, 2011; Fontagné, Mayer, & Ottaviano, 2009). In parallel, micro-price data have been used to measure the consequences of the common currency on the dispersion of consumer prices among euro countries (Engel & Rogers, 2004).

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\* Corresponding author. Tel.: +32 10 47 39 74.

E-mail addresses: [j.martin@uclouvain.be](mailto:j.martin@uclouvain.be) (J. Martin), [isabelle.mejean@polytechnique.edu](mailto:isabelle.mejean@polytechnique.edu) (I. Mejean).

<sup>1</sup> See Rose (2000) or Baldwin, DiNino, Fontagné, Santis, and Taglioni (2008).

<sup>2</sup> On its website, the EU Commission thus assessed that the euro would increase price transparency, mute exchange rate fluctuations between members, and increase competition ([http://ec.europa.eu/economy\\_finance/euro/why/consumer/index\\_en.htm](http://ec.europa.eu/economy_finance/euro/why/consumer/index_en.htm)). Altogether, those effects were expected to ease arbitrage behavior, decrease markups, and in turn lower price dispersion. This paper proposes an empirical test of the previous price convergence effect, asking whether the introduction of the euro has induced a decrease in the dispersion of prices inside the euro area.

Our paper contributes to the literature on the microeconomic impact of monetary integration. Namely, we use a panel of firm-level data to ask whether the introduction of the euro has induced a convergence of prices set by French firms in EMU markets. Importantly, we exploit the very detailed structure of the dataset to allow for a heterogeneous response of firms to the common currency.

To that aim, we use a measure of price discrepancies across EMU markets, computed at the firm-level. Contrary to most of the literature (Engel & Rogers, 2004), we have access to producer prices and can thus interpret changes in the magnitude of those price discrepancies in terms of the ability of firms to price discriminate.<sup>3</sup> We compare the distribution of producer prices within the EMU before and after the introduction of the euro to see whether the institutional change has affected pricing behaviors. In order to control for other sources of price convergence at the firm-level, we use a difference-in-difference strategy in which the control group is the rest of the European Union that decided not to enter the monetary union. Changes in the magnitude of price discrepancies measured at the firm-level within this control group can be attributed to firm-specific determinants that are unrelated to monetary integration. An additional convergence of prices within the EMU can be interpreted instead as the firm modifying its pricing policy because of the common currency.

Using data covering the world of French exporters and the set of destinations they serve over a period from 1996 to 2005, we find evidence of price convergence after the common currency was introduced. Namely, the coefficient of variation of export prices decreased by an extra 1 percent within the EMU after 1999, in comparison with the rest of the European Union. This small but significant “euro” effect is consistent with the shrinking ability of firms to price discriminate in a monetary union. Moreover, the small effect identified in pooled data is magnified once we account for the heterogeneous response of firms to the introduction of the euro. Namely, our data show that large firms are more strongly affected. Before the EMU, the dispersion of export prices inside and outside the euro area increased with a firm's size. One potential explanation is that there are fixed costs associated with price discrimination that large firms are more likely to pay since they lose more from setting a homogeneous price in all foreign markets. After the euro was introduced, this heterogeneity in the across-firm magnitude of price discrimination decreased. The reason is that the convergence of prices within EMU is stronger for larger firms.

Given that large firms account for the lion's share of French exports, their behavior is likely to matter at the aggregate level. When we account for the heterogeneity across firms, we find a much greater impact of the euro on price dispersion indeed. Namely, the introduction of the European single currency is associated with a 4-percentage-point decrease in the dispersion of prices across EMU members when the difference-in-difference regression is run using weighted least squares.

There are several reasons why we should expect the common currency to restrict the ability of firms to price discriminate. First, the suppression of intra-EMU exchange rate fluctuations should almost mechanically decrease the extent to which destination-specific prices, once converted into the same currency, differ. Second, one may expect monetary integration to decrease destination-specific distribution costs. If they are heterogeneous across European markets, these costs can explain a wedge in cross-country prices at the firm's optimum that decreases in a monetary union. Finally, one may expect the EMU to decrease the ability of firms to set different prices in different markets, through enhanced arbitrage. This paper investigates whether these forces toward price convergence can be tracked empirically in a comparison of pre- and post-EMU prices.

The possibility that a single macroeconomic shock can have a heterogeneous impact on firms' behaviors is largely neglected in the literature, while it potentially has important aggregate implications (Berman, Martin, & Mayer, 2012; Drozd & Nosal, 2008). Since the arguments in favor of monetary integration were largely based on the expected impact it would have on microeconomic behaviors, it is important to take this dimension into account. The increasing availability of firm-level data makes it possible and we are not the first ones to use them for this purpose. Our paper is thus related to Méjean and Schwellnus (2009) who study the convergence of prices inside and outside the EU and how it is affected by extensive versus intensive adjustments. Berman et al. (2012) also consider the heterogeneous response of firms to macroeconomic shocks. Their estimates suggest that more productive exporters adjust their markup more and their volume less than less productive ones following an exchange rate shock.

Contrary to those papers, we explicitly focus on the natural experiment of European monetary integration. To our knowledge, we are the first ones to document systematic changes in pricing strategies related to the common currency. We find that monetary integration has heterogeneous effects on firms of different sizes; this result has important consequences, both at the empirical and the theoretical levels.

The rest of the paper is organized as follows. The next section discusses the theoretical channels through which the introduction of the euro may impact the extent of price discrimination. Our partial equilibrium model explicitly accounts for the heterogeneity of firms and depicts the conditions under which the same shock can induce different responses across firms. Section 3 describes the data and provides some stylized facts about the magnitude of price discrepancies inside and outside the eurozone. Section 4 presents the empirical strategy and details the results. First, we run the difference-in-difference regression using data that are pooled across firms. Next, we investigate how the characteristics of firms relate to the magnitude of price adjustments. Section 6 concludes.

<sup>3</sup> The literature looking at the convergence of consumer prices instead compares the prices of similar products, in different distribution stores in various locations. Whether these prices converge or not depends on the behavior of the producing firms and the distributors. We can interpret changes in the distribution of destination-specific prices instead as changes in the producers' pricing strategies. It should be noted that such changes in price discrimination by exporters does not necessarily translate into changes in the prices faced by consumers in the importing countries, as the distribution margin or productivity might also change over time. Thus, inference regarding actual price convergence or about relative purchasing power parity cannot be drawn from our results.

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