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# Behavior of retail prices in common currency areas: The case of the Eurozone

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## ABSTRACT

Does a common currency lead to price convergence? In this paper we both theoretically and empirically show that the effect of a common currency is ambiguous. First, we extend the Ganslandt and Maskus (2007) model of vertical pricing with parallel trade. Our innovation is to consider both domestic trade, where trading costs are relatively low, and international trade, where trading costs are relatively high. If trading costs decline, the model predicts price divergence in the former case, and price convergence in the latter case. Second, using the introduction of the euro as a natural experiment that reduced trading costs, we employ difference-in-differences estimation strategy to test the model's predictions. Our results show that while individual goods prices between countries converged by 2%, within-country prices diverged by 4%, supporting the predictions of our model.

## 1. Introduction

It is generally assumed that adopting a common currency should lead to market integration within a currency union, primarily through a reduction in trade costs. As trade costs decline, arbitrage becomes more profitable, leading to increased quantities of trade and price convergence. However, in this paper we not only show that the effect of the falling trade costs on prices is ambiguous, but also provide a potential explanation.

There could be several reasons why trade costs, which consist of transportation, transaction, local distribution, and other costs, decline following the adoption of a common currency. Among those reasons are increased competition and the loss of monopolistic power, as well as the elimination of foreign exchange risks. And indeed, accepting the euro has decreased trade costs within the Eurozone, as evidenced by the increased volume of trade, including parallel trade, between the Eurozone countries (Frankel, 2010; Glick and Rose, 2015).<sup>1</sup>

Yet, the empirical evidence on the effect of a single currency on prices, rather than trade volumes, is mixed.<sup>2</sup> While some studies find a significant converging effect (Allington et al., 2005; Goldberg and Verboven, 2005; Glushenkova and Zachariadis, 2014), others find no effect at all (Engel and Rogers, 2004; Bergin and Glick, 2007a; Parsley

and Wei, 2008; Fischer, 2012; Ogrokhina, 2015). Regardless, significant price differences still remain even fifteen years following the introduction of the euro, presenting a challenge for economists and policymakers alike.

Several theoretical papers have tried to reconcile the lack of price convergence or the presence of divergence with the integrative policies designed to promote trade. In other words, as trade continues to grow, why do we not see a corresponding decrease in international price dispersion? For example, Bergin and Glick (2007b) look at the nature of falling trade costs and hypothesize that only the reduction in per unit trade costs should have a direct impact on price-setting behavior. Or in another paper, using a model of vertical pricing where distributors are allowed to parallel trade, Ganslandt and Maskus (2007) show that as trading costs between two locations decline, a manufacturer with market power may decide to profit by artificially limiting competition, causing prices to diverge.

In addition, several empirical papers have also addressed this issue. For example, Kyle (2011) explains the lack of price convergence across the EU countries by showing that manufacturers may choose to rely on non-price responses to reduce the arbitrage opportunities of parallel traders, while Dvir and Strasser (2014) show that manufacturers sustain the price differences by price discriminating not only between

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<sup>1</sup> Parallel trade is defined as unauthorized reselling of goods without permission from the intellectual property right owner. Parallel trade is allowed within the EU due to the free movement of goods and services implemented to boost market integration.

<sup>2</sup> See Rose (2016) for a good summary on the effect of the euro on trade.

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countries, but within countries as well.

Although the behavior of prices *between* countries is a well-researched topic, the dynamics of prices *within* a country is relatively under-studied.<sup>3</sup> Since trade costs include all transport, transaction, and local distribution costs from the manufacturer to the consumer, the effect of the falling trade costs may manifest itself not only when studying between-countries prices, but also when looking at the behavior of prices at different locations within the same country.

While the effect of removing trade and other barriers—including the adoption of a single currency—should be more pronounced on price differences between countries (due to presumably larger initial trade costs and a drastic decline in those costs after 1999), domestic within-country trade should be affected as well. Some of the mechanisms could be a decrease in transportation and distributor costs as a result of increased competition from out-of-country transportation companies, as well as higher labor efficiency due to improved labor mobility. However, we were unable to find empirical evidence in the existing literature for or against within-country price convergence as the result of the single currency. To sum up, there appears to be an inconsistency when it comes to analyzing the behavior of prices following the introduction of a common currency. Some empirical studies find that prices converge, which is in line with most theoretical predictions, other studies find that prices diverge. As a result, these inconsistencies raise further questions.

Our contribution to the literature is twofold. First, we extend the [Ganslandt and Maskus \(2007\)](#) model of vertical pricing with parallel trade, and show that the disparity of previous findings could be attributed to different levels of trade costs preceding a policy change. For the larger initial trading costs observed between countries, a reduction in these costs should lead to price convergence. For the smaller initial trading costs observed within countries, a reduction in the trading costs should result in price divergence. Second, using the introduction of the euro as a natural experiment, which reduced trade costs and boosted parallel trade ([National Economic Research Associates, 1999](#)), we empirically test and confirm the theoretical predictions of our model.

The model with parallel trade is particularly relevant, because parallel trade exists in the EU under the principle of “community exhaustion”. This principle suggests that upon the first sale within the EU market, the holder of property rights (the manufacturer) transfers those ownership rights to the buyer.<sup>4</sup> As a result, the manufacturer cannot control the movement of the good—either between EU countries or within an EU country—in order to prevent parallel traders (distributors) from importing this good from cheaper markets and reselling it in more expensive ones.<sup>5</sup> Thus, the effect of the parallel trade is twofold. On one hand, parallel trade promotes competition at the retail level by reducing the ability of firms to set differential prices within the EU markets. On the other hand, this impediment to price-discriminate erodes manufacturer's profits and forces them to segment the markets by setting different wholesale prices. Consequently, depending on the initial level of trade costs, a further reduction in those costs can lead to price convergence—when the manufacturer does not segment the markets, or price divergence—when the manufacturer does segment them.

To test the predictions of our model we use a proprietary dataset from the Economist Intelligence Unit (EIU) that includes individual good-level prices from both the Eurozone (treated) and non-Eurozone (control) cities for the period of 1990–2015. Applying the difference-in-

differences (DID) framework, we estimate the effect of the euro on absolute relative prices—price differentials between two locations—separately for within-countries and between-countries. Because our data includes observations both pre- and post-euro and cover both Eurozone and non-Eurozone cities, the DID framework allows us to account for secular trends and separate the effect the euro had on relative prices. For the within-countries sample, where we assume trade costs were initially low, the introduction of the euro resulted in price divergence as relative prices increased between 12% and 4% depending on the specification. For the between-countries sample, where we assume trade costs were initially high, the introduction of the euro resulted in price convergence as relative prices fell by approximately 2%.

Our data allows us to observe prices from two different outlets within the same city, and further test the predictions of the model by separately studying the price data collected from supermarkets and local convenience stores.<sup>6</sup> First, we compare the within-countries response of supermarket prices and local convenience store prices following the introduction of the euro. We hypothesize that trading costs for supermarkets are lower than trading costs for local convenience stores since supermarkets have well developed distribution networks and can take advantage of economies of scale. Therefore, the model predicts more divergence for the supermarket prices than for local convenience store prices. Second, we compare the between-countries response of supermarket prices and local convenience store prices following the introduction of the euro. In this case, the model predicts more convergence for the local convenience store prices than for supermarket prices, as already high between-country trade costs are even higher for local convenience stores than supermarkets. Empirical results confirm these predictions, and they are robust to various specifications.

Our results emphasize the need for continuous study of both international prices between Eurozone countries as well as the domestic prices within Eurozone countries. If the observed price divergence is a result of economic distortions caused by market inefficiencies, then lasting price divergence will lead to inefficient allocation of resources and have negative implications not only for competitiveness, but will have a significant destabilizing effect on an already struggling monetary union.

The rest of the paper is organized as follows: In the next section we build a theoretical model of vertical pricing with parallel trade, and set up an empirical specification. We discuss our data in [Section 3](#) and proceed to testing the model in [Section 4](#). Finally, the last [Section 5](#) concludes.

## 2. Model

### 2.1. Theoretical model

Following [Ganslandt and Maskus \(2007\)](#), we set up a model of vertical pricing with parallel trade. Our model considers trade between different countries—international trade—as well as trade between different cities within the same country—domestic trade. Following the discussion above, as the result of a policy change such as the introduction of the euro in 1999, trading costs declined. However, while trading costs declined for both international and domestic trade, we assume that the initial *level* of costs was higher for the former relative to the latter.

Let us assume there exists a manufacturer  $M$  which produces a unique good sold through exclusive distributors; i.e., one distributor per market. For simplicity, we assume the existence of only two markets, the central market  $A$  where manufacturer  $M$  operates and

<sup>3</sup> Few studies emphasize the importance of studying regional within-country inflation differences. See for instance [Beck et al. \(2009\)](#); [Vaona and Ascari \(2012\)](#).

<sup>4</sup> This principle also applies to the Eurozone countries which constitute a subsample of the EU countries.

<sup>5</sup> Moreover, the volumes of parallel trade are considered to be significant. However, the European statistical agencies do not collect data on the actual volumes of parallel trade, because the authorities do not distinguish parallel trade from other trade flows.

<sup>6</sup> While the EIU calls local convenience stores mid-priced stores, we will refer to them as “local convenience stores” for consistency and clarity.

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