

The Effect of Globalization on Market Structure, Industry Evolution and Pricing

By Michael Sposi



The Globalization and Monetary Policy Institute and Swiss National Bank enlisted researchers from both sides of the Atlantic for a conference

focused on the determinants and dynamics of prices in a globalized economy. Increased globalization has heightened research and policy interest in external factors as drivers of inflation. Firms' pricing decisions are at the core of the analysis.

When firms sell in multiple markets, they face greater competition and experience additional complexities in their choice of a currency in which to set prices. Globalization has fundamentally altered the pricing power of many firms as markets become more competitive.

All papers considered various aspects of prices. One section focused on cross-country price differences and attempted to outline the sources of cross-country variation: from currency invoicing to market power as well as pricing to market and quality differentiation. Another section focused on how external factors affect price dynamics. It examined the role of currency invoicing, industrial composition and firm heterogeneity. Yet another section examined and quantified how responsive quantities are to changes in external factors, such as exchange rate movement and trade liberalization.

Significance of Cross-Country Prices

There is substantial variation in prices of goods across countries, even for goods that are traded. For instance, Chart 1 shows a histogram representing the distribution of prices of consumption goods across 19 developed countries in 2010. The key challenges are to, first, carefully measure where the deviations from the law of one price (LOP) exist, and second, to identify the sources of deviations from LOP. The underlying mechanism that drives differences in prices across

countries is crucial to the way we think about the dynamics of prices. Does industrial composition matter? Do developments in foreign economies have any impact on domestic prices? Does the currency in which goods are invoiced matter? If so, how much?

Roberto Rigobon from the Massachusetts Institute of Technology (MIT) and National Bureau of Economic Research (NBER) opened with his paper, "Product Introductions, Currency Unions and the Real Exchange Rate" (coauthored with Alberto Cavallo of MIT and Brent Neiman of the University of Chicago and NBER). This research uses novel data from the Billion Prices Project, an academic initiative at MIT. The dataset contains weekly prices for about 90,000 goods in 81 countries from 2008 to 2012 that are "scraped" from web pages of online retailers. First, the detailed nature of the data avoids issues of noncommon baskets encountered in price indexes. Second, by comparing the same product and retailer combination, researchers eliminate the issue of differences in quality of similar goods. Third, given that the data are from online retailers, as opposed to brick-and-mortar stores, there is no issue of price variability within a country that could arise from local-distribution cost differences.

A key finding is that the LOP holds almost perfectly within currency unions for thousands of goods. That is, the real exchange rate at a good level for many tradable goods equals 1 within currency unions. However, prices of the same goods deviate from LOP in countries outside of currency unions even when the nominal exchange rate is pegged. Rigobon and his coauthors argue this evidence suggests that it is the common currency per se, and not a lack of nominal volatility, that results in the lack of price deviations across countries within a currency union.

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Rigobon then argues that cross-sectional variation in real exchange rates at the level of individual goods reflects differences in prices at the time a product is introduced in various locations. International relative prices measured at the time of introduction move together with the nominal exchange rate. This is important because it implies that differences in prices across countries are not a result of price changes during the life of a good. The implications for measuring differences in real exchange rates stretch far. For instance, LOP deviations are best understood by measuring relative price levels at the time a product is introduced. Moreover, the evidence suggests that there is a limit on how much change among external factors can pass through into domestic prices of existing goods.

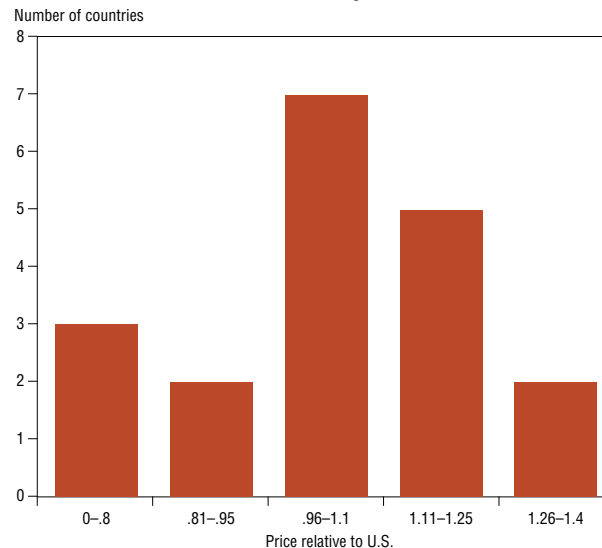
Economists often face complications when using cross-country price data arising from aggregation of nonidentical baskets of goods, differences in distribution costs and quality differences. Moreover, in the presence of imperfect competition, firms can charge different markups for the same good across different locations. Thus, there is still much room in decomposing price differences that stem from these other sources.

Benjamin Mandel of the Federal Reserve Bank of New York provides a new method to decompose prices of imports into a cost component and a markup component in his paper, “Chinese Exports and U.S. Import Prices.” He uses this methodology to study how competition from Chinese imports affects U.S. prices and found that increased competition from China leads other foreign producers (and domestic ones as well) to decrease their markup. In addition, increased competition also leads to higher marginal costs, which he argues could be the result of producers changing their output composition to higher-quality varieties or of increased demand for industry-specific factors. So, pricing to market as well as quality differentiation appear to be important features of pricing behavior and are dependent on industrial structure.

In “Export Destinations and Input Prices: Evidence from Portugal,” Paulo Bastos of the World

Bank (with World Bank colleague Joana Silva and Eric Verhoogen of Columbia University) argue that cross-country price differences reflect, at least in part, differences in the quality of goods. Country-specific prices of similar goods are positively correlated with income. Two strands of literature have attempted to reconcile why. One focuses on pricing to market. This theory requires some degree of pricing power. Another theory hinges on the fact that the quality of the goods is higher in rich countries, and thus, rich countries pay higher prices. The quality argument has been difficult to test empirically because measuring and quantifying quality are extremely challenging tasks. This paper provides new evidence in line with the quality theory using a novel idea. Producing higher-quality output requires higher-quality inputs. This paper looks at firm-level data for Portuguese exporters and finds that firms that export to richer destinations pay higher prices for imported inputs. This fits the notion that firms produce different quality for different destinations and also pay a higher price

Chart 1

Distribution of the Price of Consumption Across Countries

NOTE: Chart depicts the price of consumption relative to the U.S. for the 17 euro-area countries, the U.K. and Japan.
SOURCE: Penn World Tables, version 7.1, 2010.

This fits the notion that firms produce different quality for different destinations and also pay a higher price for higher-quality inputs. This evidence suggests that pricing to market is not the full story.

for higher-quality inputs. This evidence suggests that pricing to market is not the full story. If the export prices were purely due to pricing to market, the firms would not pay more for inputs.

The paper's focus on differences in relative prices offers important insight regarding the origination of variation in real exchange rates. This insight is key to how economists think about pass-throughs, on which a large portion of the conference was focused.

Understanding Pass-Through

It is widely accepted that prices respond less than fully to exchange rate and cost changes. An implication is that the nominal exchange rate tracks movements in the real exchange rate very closely, as shown in Chart 2. If prices responded fully to nominal exchange rates, the real exchange rate would be constant over time because the prices in each country would adjust to offset any changes in the nominal exchange rate.

Chart 2 plots the real and nominal exchange

rates of the dollar and the euro from January 2000 to July 2013. The fact that the real exchange rate moves closely with the nominal exchange rate suggests that factors such as distribution costs or pricing to market influence prices after a good is produced and even after it is shipped.

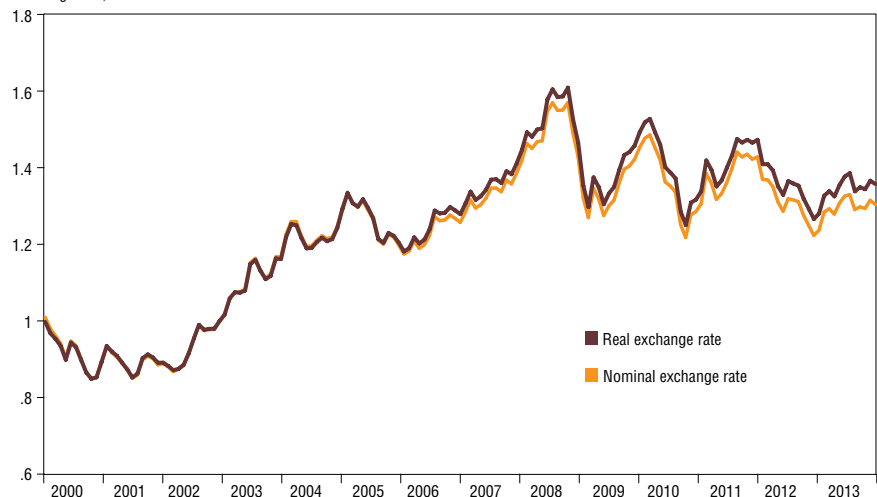
Understanding exchange rate pass-through is crucial to understanding the dynamics of real exchange rates, which depend on the nominal exchange rate and the relative price levels across countries. Understanding cost pass-through is equally important because models of price dynamics must be able to identify the source of price shocks, particularly to understand the effects of monetary policy and its implications for inflation. Additionally, the extent that firms can absorb cost shocks carries implications for how much prices respond to external shocks affecting productivity and wages, for example.

As Rigobon's paper suggests, currency invoicing helps determine whether any two countries have similar pricing. A follow-up question might

Chart 2

Dynamics of Real and Nominal Exchange Rates

Exchange rate, dollar/euro



NOTE: The real exchange rate is computed as the ratio of consumer prices in the U.S. relative to consumer prices in the euro area times the nominal exchange rate. The real exchange rate is normalized to be equal to the nominal exchange rate in 2005. SOURCES: Organization for Economic Cooperation and Development; Haver Analytics; Federal Reserve Board.

probe whether currency invoicing affects how much prices respond to exchange rate movements. Ben Tomlin from the Bank of Canada addressed this in his presentation, “Exchange Rate Pass-Through, Currency Invoicing and Trade Patterns.” The paper (coauthored with Michael Devereux of the University of British Columbia and Wei Dong of the Bank of Canada) constructs a novel dataset and documents that the invoicing currency of imported goods affects pass-through arising from exchange rate and import price changes. The dataset focuses on Canadian-apparel imports and separates these imports into two groups: goods invoiced in U.S. dollars and those invoiced in Canadian dollars.

There were two key findings. First, the authors found that exchange rate pass-through is much higher for U.S. dollar-invoiced goods than for Canadian dollar-invoiced goods. Second, the pass-through coefficient for goods shipped directly from China or India to Canada is higher than the pass-through coefficient for the same goods that have a “layover” in the U.S. during shipment, even if in both cases the goods are invoiced in U.S. dollars. Thus, a key challenge for economists is to understand why the currency in which goods are invoiced matters.

In “Market Structure and Cost Pass-Through in Retail,” Nicholas Li of the University of Toronto (with Gee Hee Hong of the Bank of Canada) focuses on how vertical and horizontal market structures affect cost pass-through to retail prices. Previous literature has looked at each structure individually but has not combined them. The authors focus on three types of goods: national brands, private-label goods that are not produced by the retailer and private-label goods that are retailer-manufactured. The paper employs scanner transaction data for thousands of UPC barcodes that contain both prices and quantities.

The authors estimate pass-through from commodity to wholesale price, and from wholesale to retail price. They find that firms and goods with a large market share tend to have lower cost



Participants (from left) Michael Devereux of the University of British Columbia, Mario Crucini of Vanderbilt University and Roberto Rigobon of the Massachusetts Institute of Technology.

pass-through because these goods/firms have more pricing power and are thus able to absorb cost shocks. In terms of vertical market structure, they find that intrafirm prices exhibit greater pass-through. One explanation is that vertical integration leads to goods priced closer to marginal cost, which eliminates variable markups that may serve as a buffer between costs and prices. The authors then argue that vertical and horizontal market structures are not independent of one another. For instance, increased vertical specialization can increase market share. Since these both have opposite effects on the extent of pass-through, the authors develop a framework that decomposes these two effects. Their main finding: When controlling for increased market share, increased vertical integration still increases pass-through but by a lesser degree than when market share is not controlled for.

Another aspect of exchange rate pass-through is heterogeneity among firms. Oleg Itskhoki of Princeton University presented “Importers, Exporters and Exchange Rate Disconnect,” cowritten with Mary Amiti of the Federal Reserve Bank



Conference attendees examined how globalization has altered the pricing power of firms as markets become more competitive.

Firms appear to take actions that affect their current and future revenue in response to past tariff reductions. These findings are consistent with the fact that exports respond very little to movements in the exchange rate and more to tariff reductions.

of New York and Jozef Konings of the University of Leuven, which provides a novel perspective on the behavior of aggregate exchange rate pass-through by exploiting heterogeneity in pass-through across different firms. Small exporters that import none of their intermediate inputs exhibit almost full pass-through. Exporters with large market shares that import a large share of their intermediate inputs exhibit substantially lower pass-through rates: An increase in the exchange rate may make marginal costs higher, but it will also reduce the price of exports. Because large exporters are also large importers, these firms account for a bulk of total trade, and hence, we observe low levels of pass-through at the aggregate level.

These implications shed light on a large puzzle in international economics: why large movements in nominal exchange rates have small effects on prices of traded goods. That is, the real exchange rate does not move closely with the nominal exchange rate.

Assessing Elasticities

The values assumed for certain structural parameters, such as elasticities of substitution between different types of goods, are key to determining price sensitivity through modeling. Elasticities of substitution have important implications for the degree of market power each firm has and, thus, are crucial in understanding the pricing decisions firms make. In turn, the degrees of both

exchange rate pass-through and external adjustment depend critically on the size of elasticities.

Raphael Auer of the Swiss National Bank presented “The Mode of Competition Between Foreign and Domestic Goods, Pass-Through and External Adjustment,” a paper cowritten with Raphael Schoenle of Brandeis University, which focuses on how “origin differentiation” affects exchange rate pass-through and external adjustment.

First, the authors estimate that the elasticity of substitution between different goods of the same origin and within the same sector is more than twice as large as the elasticity between domestic and foreign goods within the same sector. The small elasticity between foreign and domestic goods implies that foreign goods and domestic goods are relatively differentiated, and thus, the quantity of imported goods does not change very much in response to changes in the relative price of imports.

But there are also key implications for pricing behavior on which the authors shed light. Foreign firms, even if relatively small, can employ substantial price discrimination. In addition, domestic firms will not alter their price by a substantial amount in response to changes in import prices. As a result, both external adjustment and exchange rate pass-through are limited by the large degree of origin differentiation—that is, the relatively small elasticity of substitution between foreign and domestic goods.

The elasticity of substitution is clearly an important parameter. However, depending on the type of models being used, there is disagreement as to what value should be assigned. For instance, calibrated open-economy macro models such as the classic international real business cycle require a small elasticity of substitution between home and foreign goods to match comovements between relative prices (real exchange rates) and relative quantities. Trade models require substantially larger elasticities of substitution between home and foreign goods to account for how trade changes in response to changes in trade

costs. Leading explanations in the literature are tied to sunk costs of entry into export markets. In particular, if business-cycle shocks that lead to exchange rate movement are less persistent or more volatile than trade liberalization shocks, sunk costs of entry imply that the extensive margin of trade will react more to trade liberalization than to real exchange rate movements.

Doireann Fitzgerald from Stanford University presented “Exporters and Shocks,” cowritten with Stefanie Haller of University College Dublin, which provides evidence of how firms respond to both exchange rate shocks and to trade liberalization shocks.

The authors find that the sales of existing exporters (intensive margin) are more responsive to tariff reductions than they are to movements in the real exchange rate, and the estimated elasticities at the firm level are close to the aggregate elasticity. Also, they find that export participation (extensive margin) is also more sensitive to tariffs than to exchange rate movements and supports the sunk-cost story. However, the magnitudes are small and the sizes of entering/exiting firms are small and, thus, the extensive margin of trade cannot fully account for the elasticity puzzle.

As a result, the authors argue that much of the answer to the elasticity puzzle lies in better understanding the intensive margin. In particular, the authors argue that market-specific costs of adjustments for continuing exporters may significantly explain the elasticity puzzle. Such adjustment costs may include changing the currency in which goods are invoiced after a trade-agreement episode.

To support this hypothesis, they find that a firm’s probability of exit is negatively related to its attachment to that market. They also find that the growth rate of a firm’s sales in a particular market is negatively related to tenure in that market and that the growth rate responds to lagged tariff changes but not to lagged real exchange rate movements. That is, firms appear to take actions that affect their current and future revenue in

response to past tariff reductions. These findings are consistent with the fact that exports respond very little to movements in the exchange rate and more to tariff reductions.

Globalization and Pass-Throughs

In recent years we have experienced increasing globalization. Firms sell output in more markets than ever, while supply chains have become increasingly fragmented across multiple locations. This has led to increased competition, changes in the market structure in which firms operate and altered pricing strategies.

Conference papers can be classified into three broad sections: 1) cross-country differences in price levels, 2) channels through which changes in external factors pass through to price changes and 3) the sensitivity of both prices and quantities to changes in external factors.

These three elements are, however, intimately linked. For instance, we learned that the currency of invoicing matters for differences in price levels across countries, as well as how prices in one country respond to external factors.

We also learned that market structure matters for price-level differences as well as how prices respond to external factors. Competitive changes alter the landscape of markets through vertical and horizontal integration—both of which affect firm costs, the markups that firms apply to their prices and the quality of output produced. Quality differences are reflected in price levels and can explain why prices are higher in rich countries than in poorer ones. Firm heterogeneity also plays a key role in determining how external factors pass through into prices.

Finally, modeling the extent to which prices respond to various external factors requires carefully measuring elasticities of substitution. The degree to which goods from various sources are differentiated affects the price-setting environment as well as how quantities respond to prices. Recognizing adjustment costs of existing firms is an important channel for understanding why trade flows are so sensitive to tariff changes.

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