

# FRBSF ECONOMIC LETTER

Number 2006–23, September 15, 2006

## The Exchange Rate–Consumer Price Puzzle

Since February of 2002, the dollar has lost 27% of its value relative to other major currencies. Over the same period, consumer prices (excluding food and energy goods) have increased by a much smaller amount—8.9%. To economists, and particularly to central bankers and others who think about forecasting inflation, this relative insensitivity of consumer prices to exchange rates is a puzzle; indeed, it is one that has a long history and that is a characteristic not only of the U.S. but of other countries as well.

Why is it a puzzle? Because international trade theory argues that, if all goods and services were traded at a negligible cost and if their prices reflected only their production costs, then retail prices should be very responsive to exchange rate changes.

Of course, one might expect that the solution to the puzzle is in part related to the distances and costs involved in shipping goods, as that would clearly imply that trading costs are not negligible. But recent research suggests that other factors are better at explaining not only why consumer prices are relatively insensitive to exchange rate movements but also why they are even less sensitive than import prices. One explanation rests on the inclusion of non-traded good and service costs as part of the consumer price index (CPI). While import prices may respond to exchange rate changes, consumer prices, which include many non-traded cost components, may not. A second explanation arises from the profit margins that foreign exporters and local distributors have as a result of imperfect competition. Exporters and distributors may choose to adjust their profit margins rather than change price levels in response to exchange rate changes, for example, to maintain market share.

This *Economic Letter* first reviews the empirical evidence on exchange rates, import prices, and consumer prices. It then discusses recent studies that evaluate alternative theories to explain the puzzle.

### Empirical evidence

In principle, retail prices should primarily reflect the dollar production cost of a good. If all U.S. and foreign goods and services were traded at a negligible cost and their markets were perfectly com-

petitive (so that their prices reflected only the costs of producing them) then their prices would be very sensitive to the exchange rate. For example, suppose you were importing a car from South Korea. In a simple economic model, the U.S. price of the car would simply be the price of the car in Korean won multiplied by the dollar–won exchange rate. If the dollar depreciates against the won, then the cost of the same car in dollars would increase in the same proportion.

However, in practice, final goods prices are not very sensitive to the exchange rate. Indeed, as Campa and Goldberg (2006) find, consumer prices are much less sensitive to exchange rate changes than import prices. They use quarterly import price, CPI, and exchange rate data from 13 OECD countries spanning the period 1975 to 2003. Campa and Goldberg find that, in the long run (measured over four quarters), a 10% depreciation of the local currency leads to an average 6% increase in import prices and to only a 2% increase in consumer prices. For the United States in particular, the authors find that the same depreciation leads to a 4% increase in import prices and only a 0.1% increase in consumer prices.

### Possible solution to the puzzle: distance?

It is natural to guess that consumer prices are insensitive to the exchange rate because of the substantial costs involved in shipping goods over the long distances between countries; for example, a large fraction of the U.S. cost of a car made in South Korea will reflect the shipping costs. Suppose the South Korean won appreciates vis-à-vis the dollar. This raises the dollar cost of the car in Korea. But if the shipping costs are substantial and are not affected by the appreciation of the won, then the cost of the car at the U.S. dock also may not be affected much.

Engel and Rogers (1996), however, present evidence that suggests that geographical distance is not the main determinant for the lack of consumer price sensitivity to exchange rate movements. Engel and Rogers study the behavior of consumer prices between cities in Canada and the United States, which share a very large and relatively open border. The study finds that consumer prices in near-

by cities within each country, say, New York and Philadelphia or Ottawa and Quebec, tend to move more closely together than prices of cities further apart, say, New York and Los Angeles or Ottawa and Victoria. This reflects the fact that cities in close proximity face lower transport costs. However, Engel and Rogers also find that prices between distant cities in the same country, say, New York and Los Angeles, move more closely together than prices between nearby cities in different countries, such as New York and Toronto. In fact, they estimate that the national border between the United States and Canada adds the equivalent of an extra 1,700–20,000 miles of distance in explaining the differences between prices in U.S. cities and Canadian cities.

Thus, it appears that national borders play a more important role than physical distance in explaining the behavior of consumer prices. Moreover, given the greater sensitivity of import prices to exchange rate fluctuations relative to consumer prices (Campa and Goldberg 2006, Valderrama 2004), the low sensitivity of final goods prices seems to be related to what happens to imported goods after they arrive at the port and before they reach consumers.

#### **Possible solution to the puzzle: non-traded goods and services?**

One reason why measures of consumer prices are so insensitive to exchange rate movements is that some goods and services may not be traded internationally at all. Consider, for example, services, such as haircuts and other kinds of personal grooming, as well as office and retail rental space, and many managerial and other specialized services. The prices of these goods may be determined entirely by domestic conditions. Many of these non-traded good and service prices are directly included in the CPI.

The retail price of many traded consumer goods also includes many non-tradable goods and services as cost components. These costs include transportation, marketing, wholesaling, and retailing, which may be intensive in local labor and services; I will call these distribution costs. Feenstra (1998) provides an illuminating illustration of how sizable such non-tradable distribution costs can be: In 1996 a Barbie doll shipped from China to the United States cost about \$2, where it sold for about \$10. The manufacturer, Mattel, earned about \$1 of profit on this doll. The remaining \$7 represented payments for transportation in the United States and other distribution costs.

Burstein, Neves, and Rebelo (2003) find that distribution costs are a large component—about 40%—of overall U.S. consumer prices. Campa and Goldberg (2006) find that distribution margins average about 20% of the price in 29 industries and can be as high as 70% to 90%. Transportation costs amount to only about 5% of these costs, except for mining and resource-intensive industries. As a share of output for each country, distribution margins average 15% to 25%, and for the U.S. specifically, they are 24%.

#### **Possible solution to the puzzle: changing profit margins?**

An alternative explanation for the insensitivity of consumer prices to the exchange rate is that retail prices do not fully reflect changes in costs. In practice, many goods and services are produced in imperfectly competitive markets. In terms of prices for these goods, firms are able to make a profit margin over costs. Firms may choose not to pass on the full change in costs brought about by changing exchange rates and instead choose to change their profit margins, thus reducing the sensitivity of consumer prices to the exchange rate. Since the evidence suggests that consumer prices are more insensitive to exchange rate movements than import prices, this explanation would imply that there may be imperfectly competitive domestic firms that distribute imported goods and are willing to adjust their margins in response to import price changes.

Bacchetta and van Wincoop (2002) build a model that ignores the non-tradable distribution costs and instead focuses on differences in competition between foreign and domestic firms. In their model, foreign exporters send goods to domestic firms, which in turn sell them to consumers, and both foreign exporters and domestic firms are imperfectly competitive. Each firm makes pricing decisions to maximize profits. Foreign exporters face competition for their product from all other goods that consumers demand, including some non-tradables. Domestic firms, however, compete only with other domestic firms. Since foreign exporters face more competition, they choose to price their goods in terms of domestic costs. Thus, when the domestic exchange rate rises and the cost of imported goods in terms of domestic currency rises, foreign exporters choose to pass the cost increase to import prices. However, since domestic distribution firms face competition only from other domestic distribution firms, they choose to keep prices stable in terms of the domestic currency. In this model, import prices fully reflect changes in

the exchange rate, while consumer prices do not. Indeed, Campa and Goldberg (2006) find that the relative lack of competition in the distribution sector is an important determinant of the relative insensitivity of consumer prices to the exchange rate.

### Conclusions

The insensitivity of consumer prices to exchange rate fluctuations represents a price puzzle to economists. While distance and transportation costs might seem natural solutions to the puzzle, research suggests that non-tradable costs of distributing goods domestically and adjusting profit margins of imperfectly competitive firms are two more plausible explanations.

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