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## **Common Currencies and Market Integration across Cities: How Strong is the Link?**

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**Abstract:** Using two balanced panels of up to 124 goods and services prices and up to 116 international cities, this paper studies the determinants of price dispersion across city pairs in 2001. Using controls for cities located in the same country, regional trading areas, common languages and historical links, price dispersion increases with geographical distance, nominal bilateral exchange rate volatility, and differences in economic development. Price dispersion is significantly lower across cities located in the euro area. It is also lower for cities that use the U.S. dollar or have currencies hard pegged to it, though the effect is less robust. (JEL F15, F33)

### **1 Introduction**

The removal of trade barriers associated with the process of economic integration leads to an expansion of markets across countries. As national borders become less relevant in determining the origin of goods consumed in a country, two effects are likely

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to occur. First, international trade is likely to increase for goods whose domestic prices differed most visibly before the removal of trade barriers. Second, as there are more possibilities for arbitrage across countries, domestic prices should become more similar across economically integrated countries.

Despite the presumption that borders should matter less and less as economic integration progresses, the empirical literature has produced some surprising results. John McCallum (1995) measured for the first time how larger are trade flows within a country compared to trade flows across countries. He found that trade flows across Canadian provinces were more than twenty times larger than trade flows across Canadian provinces and U.S. states, after accounting for the effect of geographic distance and economic size.<sup>1</sup> The border effect has also been found to be relevant when looking at price variability across pairs of cities. In a regression framework similar to McCallum's (1995), Charles Engel and John H. Rogers (1996) found that consumer prices were significantly more variable for pairs of cities located across the U.S.-Canadian border than for pairs of cities located within the same country.

Among several possible explanations of why borders matter so much, even for pairs of countries with no trade barriers and extensive trade links such as United States and Canada under the FTA, the exchange rate regime has received much attention lately. In particular, and motivated by the introduction of the euro, the hypothesis that currency unions lead to increases in trade among its member countries has been closely examined. Trade might increase partly because of the removal of transaction costs associated with exchange rate operations. More importantly, the use of the same currency eliminates the uncertainty associated with the actual or potential volatility in the nominal exchange rate.

Although importers and exporters can protect themselves from such uncertainty, at least in the short run with the use of forward markets, long term commercial plans involving imports or exports are subject to substantially more uncertainty than commercial plans that rely mainly on the domestic market. This extra uncertainty might be at the root of the border effects found in the data.

The evidence obtained thus far supports the hypothesis of a positive link between membership of currency unions and trade. Andrew K. Rose (2000, 2002, and joint work with Eric van Wincoop, 2001 and Reuven Glick, 2001) has found that countries that belong to the same currency union trade with each other around twice as much as countries that use different currencies. Increased trade, however, is not the only possible effect of the greater economic integration associated with the use of a shared currency. As argued for example by Richard B. Freeman (1995), the mere threat of increased competition from foreign producers may cause domestic producers to lower their prices, even if imports do not increase much. Therefore, if the use of a common currency expands markets beyond national borders, we should expect to see less price dispersion across cities that belong to the same currency union.

In a recent study based on a large sample of 95 consumer prices across 83 cities around the globe, David C. Parsley and Shang-Jin Wei (2001) have found evidence that prices are more similar for pairs of cities located in countries that share the same currency. Their main regression was similar to the one by Engel and Rogers (1996) mentioned above, but because the latter was based on only two countries (U.S. and Canada) that did not share the same currency, it could only assess the existence of a border effect. By having a much larger sample that includes countries that belong to

currency unions, such as the euro or the CFA franc, or have a hard peg regime to the U.S. dollar, such as Panama and Hong Kong, Parsley and Wei were able to explore a much richer set of hypotheses.

This paper follows the footsteps of Parsley and Wei (2001) in trying to probe the relationship between currency unions (and hard pegs) and price dispersion across cities. Although I use the same source of disaggregated price data as Parsley and Wei (2001), from The Economist Intelligence Unit, I focus on data for 2001, which was not available in their sample. In addition, I break up the data in different ways and add explanatory and control variables that were not previously explored in studies of price dispersion across cities. In so doing I attempt to probe how strong is the link between shared currencies and market integration for consumer goods and services across cities.

## **2. Data and Methodology**

The main data source is the Economist Intelligence Unit's *CityData* database.<sup>2</sup> This database includes annual observations of domestic currency prices for over 160 goods and services for up to 123 cities during the period 1990-2001. In this paper I use prices for the year 2001 only. Of all the goods and services available some were excluded from the analysis because they had too many missing observations; others were excluded because they did not add significant information. Many goods in the database have two prices, such as supermarkets and mid-price stores. In these cases the lower of the two prices was kept.<sup>3</sup> Two services, taxi rides and residential telephone service, were difficult to compare across cities because their pricing differs often substantially across

cities (for example, some cities have just a flat rate, while others have a fixed plus a variable rate). In these cases, I combined the information on fixed and variables rates in the database into a single price.<sup>4</sup> After these initial exclusions and adjustments, the number of goods was reduced to 140. Of all the cities, I needed to eliminate Lyon because of data problems, winding up with 122 cities.

An important problem of the data set is that many cities have incomplete price data. As a result, the two-way panel of cities and goods is unbalanced. This is problematic because the price data is used to construct measures of price dispersion across pairs of cities, such as the standard deviation or the inter-quartile range (IQR)<sup>5</sup> of

$$(1) \quad q_{ij,k} = \log(p_{ik} / x_i) - \log(p_{jk} / x_j) ,$$

where  $i$  and  $j$  index cities,  $k$  indexes good, and  $p$  and  $x$  represent, respectively, the domestic currency price of  $k$  and the exchange rate (defined as units of local currency per U.S. dollar). Clearly, if the number of goods  $k$  available differs across city pairs, the standard deviation or IQR of  $q_{ij,k}$  may vary arbitrarily, regardless of underlying economic causes.

Because of the potential problems of using an unbalanced panel, I work with two balanced subpanels, which I refer to as the diverse and the OECD panels. The diverse panel was obtained by maximizing the geographical coverage subject to the constraint of having a reasonably large basket of goods and services to compare. Dropping the six cities with most missing goods led to a panel of 116 cities and 69 goods and services. This panel includes 55 cities from high-income OECD countries and 61 cities from

developing countries. The OECD panel, in contrast, was obtained by maximizing the number of goods and services subject to the constraint of having a reasonable number of cities. Dropping the 17 goods with most missing cities led to a panel of 79 cities and 123 goods and services. This panel includes all the 55 cities from high-income OECD countries plus 24 cities from developing countries.

The main items compared across cities, in order of importance, include food and beverages, household supplies and personal care items, and clothing (75 percent of the diverse panel and 67 percent of the OECD panel). A variety of services, ranging from color film development to a routine checkup with a family doctor represent around 15% of the items in both panels. The availability of a rather complete basket of 19 nontradeable services for the OECD panel allows me to run separate regressions for tradeables and nontradeable. For comparison purposes I also run a regression for the unbalanced panel used by Parsley and Wei (2001), which includes 83 cities and between 60 and 95 goods per city. A detailed list of the cities and goods and services available in each of the three panels is included in appendices 1 and 2.

The dependent variable of the analysis, the standard deviation or the IQR of  $q_{ij,k}$ , is computed for all the possible pairs of cities included in each panel. For example, the diverse panel has  $116 \times 115 / 2 = 6,670$  observations and the OECD panel has  $79 \times 78 / 2 = 3,081$  observations. However, many of these observations may not convey useful information. Not all the countries are commercially integrated with each other. As a matter of fact some countries do not even trade with other countries or trade so little to be commercially irrelevant to each other. In a robustness check I reduce the sample by eliminating all the pair of countries with little or no trade.

The data on bilateral trade flows used to select pairs of countries with little or no trade was extracted mainly from the dataset prepared by Glick and Rose (2001).<sup>6</sup> Because that dataset did not include Taiwan, I complemented the information with the *World Trade Flows, 1980-1997* database compiled by Robert C. Feenstra.<sup>7</sup> For each pair of countries in the sample I computed the following measure of trade importance for the year 1997:

$$(2) \quad t_{ij} = 0.5 \left( \left( \frac{m_{ij} + x_{ij}}{M_i + X_i} \right) + \left( \frac{m_{ji} + x_{ji}}{M_j + X_j} \right) \right),$$

where  $m_{ij}$  represents imports of country  $i$  from country  $j$ ,  $x_{ij}$  exports of country  $i$  to country  $j$ , and  $M_i$  and  $X_i$  are, respectively, total imports and total exports of country  $i$ . The first term of the sum represents the importance of trade with country  $j$  from the perspective of country  $i$ , and the second term represents the importance of trade with country  $i$  from the perspective of country  $j$ . If the average is low, it means that the countries are unimportant to each other as trade partners. In some of the regressions I eliminate pairs of countries for which  $t_{ij}$  is less than one percent.

The regression model estimated is

$$(3) \quad \begin{aligned} s_{ij}(q_k) = & \beta_0 + \beta_1 \log(d_{ij}) + \beta_2 (\log(d_{ij}))^2 + \beta_3 \log(\bar{y}_{ij}) + \beta_4 \max\{y_i, y_j\} / \bar{y}_{ij} \\ & + \beta_5 s_{ij}(x_t) + \gamma_1 euro_{ij} + \gamma_2 CFA_{ij} + \gamma_3 dollar_{ij} + \delta_1' RTA_{ij} + \delta_2' country_{ij} \\ & + \delta_3' language_{ij} + \delta_4' history_{ij} + \varepsilon_{ij}. \end{aligned}$$

The dependent variable  $s_{ij}(q_k)$  represents the dispersion of goods and services prices between city  $i$  and city  $j$ . This dispersion is measured as either the standard deviation or the IQR of a basket of  $k$  goods and services.  $d_{ij}$  is the great circle distance between cities  $i$  and  $j$ .<sup>8</sup>  $\bar{y}_{ij}$  is the mean per capita GDP of the countries where cities  $i$  and  $j$  are located. The GDP figures are for 1999 and are converted from local currencies to U.S. dollars using market rates.<sup>9</sup> The variable  $\max\{y_i, y_j\} / \bar{y}_{ij}$  is the ratio between the maximum and the mean per capita GDP of the countries where cities  $i$  and  $j$  are located. This measure, which ranges from 1 to 2, is introduced to capture income inequalities across the two cities.  $s_{ij}(x_t)$  represents the volatility over time ( $t$ ) of the bilateral exchange rate between the countries where cities  $i$  and  $j$  are located. It is computed as the standard deviation of monthly log differences in the nominal bilateral exchange rate between January 1999 and April 2001.<sup>10</sup>

The dummy variables  $euro_{ij}$ ,  $CFA_{ij}$ , and  $dollar_{ij}$  take a value of one when cities  $i$  and  $j$  are located in countries that belong to the same currency union or that have a hard peg arrangement with the same currency. For example,  $CFA_{ij} = 1$  when  $i$  and  $j$  are located in either Cameroon, Cote d'Ivoire, Gabon, Senegal, or France, and  $dollar_{ij} = 1$  when  $i$  and  $j$  are located in either Argentina, Ecuador, Hong Kong, Panama, or United States.

The vectors of dummy variables **RTA<sub>ij</sub>**, **country<sub>ij</sub>**, **language<sub>ij</sub>**, and **history<sub>ij</sub>** control for other characteristics that might reduce the volatility of prices across city pairs. **RTA<sub>ij</sub>** takes a value of one when both cities are located in the same regional trading

area. See the Appendix for the list of RTAs considered. **country<sub>ij</sub>** takes a value of one when both cities are located in the same country. The diverse and OECD panels contain, respectively, 18 and 12 countries with multiple cities. These control variables are particularly important to differentiate between the use of the same currency from other unobservable institutional characteristics associated with being located in the same country. Finally, **language<sub>ij</sub>** and **history<sub>ij</sub>** take a value of one when the cities are located in countries that share, respectively, the same main language or a common historical link. Refer to the Appendix 3 for a definition of these dummy variables.

To provide some insight on the dataset, Table 9.1 presents information on the goods and services which are least and most expensive, and least and most variable compared to the median U.S. prices. Not surprisingly, nine out of the twenty least expensive goods and services are nontradeable services. Five other goods are fresh fruits and vegetables, which, although potentially tradeable, are probably cheaper when bought from local producers. In contrast, all but one of the most expensive goods are tradeable, mostly nonperishable goods. As it can be inferred from the table, there is a high negative correlation ( $r = -0.65$ ) between median goods price and price dispersion (measured as the IQR): goods or services with the lowest prices tend to have the highest dispersion across cities. Notice that nine of the twenty cheapest goods are among the twenty with the highest dispersion and six of the twenty most expensive are among the twenty with the lowest price dispersion.

Table 9.2 presents the cities whose prices are least and most expensive, and least and most variable compared to the median U.S. prices. As it would be expected, all the least expensive cities are located in developing countries. There is also a negative

correlation between median city price and price dispersion ( $r = -0.55$ ), and 11 of the least expensive cities are also among the 20 with the most variable prices.<sup>11</sup>

The remarkable dispersion of prices associated with the presence of cities belonging to countries with very different levels of development motivates the inclusion as explanatory variables of the mean GDP per capita and the measure of inequality in GDP per capita described above. Based on the information presented in Tables 9.1 and 9.2, it is to be expected that price dispersion is inversely related to GDP per capita and directly related to the measure of inequality in GDP per capita.

### **3. Results**

Before estimating Equation (3), I present in Table 9.3 the results of a more parsimonious specification with only five dummy variables: same currency, same regional trading area, same country, same language, and same historical links. These dummy variables take a value of one whenever cities  $i$  and  $j$  share each of those characteristics. For example, the same currency dummy is coded as one for cities that share the use of either the euro, the CFA franc, or the dollar (or that have a hard peg regime to the dollar). These regressions show that sharing the currency leads to a reduction of the order of 2% to 3% in the standard deviation of log price differences across city pairs, depending on the panel. This effect is significantly larger than the effect of language or historical links, which have the expected negative signs. Somewhat surprisingly, the effect of sharing the currency is also larger than the effect of belonging to the same regional trading area, which has the wrong sign in two of the panels.

Moreover, the effect of sharing the currency on price dispersion is significant even while the regressions control for cities that are located in the same country. The “same currency” effect represents between a third and a half of the “same country” effect.

Table 9.4 shows estimation results for Equation (3) for the diverse and OECD panels, with the dependent variable measured as the standard deviation of log price differences across city pairs. In these regressions, the effect of distance is the usual one. Cities that are further apart are less commercially integrated, and, therefore, their prices are less similar. The effect of the developmental variables is very important statistically, in particular the effect of income inequality among the countries where the cities are located. An increase of one standard deviation in the inequality measure (about 0.33) leads to an increase in the standard deviation of prices of 5 percent. This increase in price dispersion is roughly equivalent to an increase of between 200% and 300% in the physical distance between the cities, depending on the estimate. This suggests that the economic distance is as or more important than the geographical distance.

As for the effect of currency areas, use of the euro leads to a significant reduction in the standard deviation of price differences, of around 5 percent. As noted by Parsley and Wei (2001) the effect of currency unions is one order of magnitude more important than a mere reduction in exchange rate volatility. This is verified in the regressions, where an important reduction of 10 percent in the nominal bilateral exchange rate volatility is associated with a reduction of only around 0.6 percent in price dispersion. Countries of the dollar area, including the U.S., and those that have a hard peg with the U.S. dollar (such as Argentina up to 2001 and Hong Kong) or that use the dollar (such as Panama and Ecuador) have smaller price dispersion in the diverse panel, but the effect is small

and insignificant in the OECD panel. Finally, the effect of the CFA franc on price dispersion is close to zero.

Regional trading areas tend to reduce price dispersion among its countries, as it would be expected. The effect is particularly strong for the free trade area between Australia and New Zealand, followed in importance by NAFTA and MERCOSUR. The effect of the European Union varies according to the panel used, being economically important and statistically significant in the OECD panel but positive and insignificant in the diverse panel. Finally, ASEAN countries have lower price dispersion among them, but the effect is not statistically significant.

With almost no exception, the country dummies have the expected negative sign, meaning that prices are more alike within a country than across countries. This effect is important in both developed and developing countries. In order of importance, the effect is strongest in Russia, Spain, Switzerland, India and China. It is also important for Japan, Brazil, and Italy in the OECD panel. The only positive coefficients are for Australia and Germany, but they are not statistically significant.

When people speak Spanish in both cities price dispersion is significantly reduced, and the same is true for cities where people speak Arabic. This similarity might reflect both the effect of language on trade links or the fact that both languages are spoken in regions that are relatively homogenous in economic terms. Use of the English language is associated with lower price dispersion only in the OECD panel, but with more price dispersion in the diverse panel. As far as historical links are concerned, developing countries that were colonies of England or that were under the hegemony of the former Soviet Union have lower price dispersion (though the effect is only significant

in the diverse panel). In contrast, countries that were former colonies of France, Spain or Portugal tend to have less similar prices.

Because outliers in the price data might lead to artificially high standard deviations, I repeat the regression analysis using the inter-quartile range of log price differences across cities as an alternative dependent variable. The results are shown in Table 9.5, which includes for comparison purposes estimates for the Parsley and Wei panel. The results do not change much qualitatively. Although the goodness of fit is reduced and the standard errors are larger, the basic picture presented above is not dramatically changed.

Some of the coefficients become larger in absolute value. For example the inequality measure increases in both the diverse and the OECD panels. Now a one standard deviation increase in this measure leads to an increase in price dispersion of somewhat more than 6%. In addition, many of the country dummies coefficients increase noticeably, in some cases doubling the values of the previous estimates, and some estimates that were previously insignificant become now significant.

Table 9.5 also includes results using the P&W panel. One noticeable difference with the previous diverse and OECD panels is that the euro becomes insignificant. A possible explanation of this result is that the P&W panel includes only one city per country, with the exception of the United States. Therefore, the sample of city pairs where the euro is used is significantly reduced in the P&W panel. On the other hand, it is important to notice that the euro is significant in the diverse and OECD panels after controlling for the effect of cities located in the same country.

As for the dollar area, although cities that use the dollar or have a hard peg regime with the dollar have less price dispersion, the effect is not always significant. Using the IQR, the coefficient on the dollar dummy decreases to -3.4 percent and becomes statistically significant in the OECD panel, but the same coefficient turns insignificant in the diverse panel. In the next two regressions we explore possible explanations for this lack of robustness.

Table 9.6 presents regression results using the original dependent variable but excluding pairs of cities located in countries that have little or no bilateral trade. The rationale for excluding these observations is that without trade links, there is little reason to believe that the goods markets of these countries would be integrated. As a result, there is little reason to expect good prices in these countries to be similar.

By eliminating the countries with little commercial links, the size of the diverse panel is cut almost in half, while the OECD panel is reduced by a third. The reduced panels include city pairs that are somewhat closer of each other. The mean distance is reduced from 6,400 to 5,400 kilometers in the diverse panel, and from 6,000 to 5,000 kilometers in the OECD panel. More importantly, the average income of the countries of the city pairs included increases from \$11,000 to \$16,000 in the diverse panel, and from \$18,500 to \$22,000 in the OECD panel. Finally, the proportion of city pairs located in the same country increases from 2.5 to 4.6 percent in the diverse panel, and from 5.1 to 7.7 percent in the OECD panel.

The regression results show an improvement in the adjusted  $R^2$ s, from 0.51 to 0.58 for the diverse panel and from 0.64 to 0.66 for the OECD panel. The effect of distance on price dispersion, while still important, is significantly less so than when using

the full sample. This reflects that fact that the countries included are closer to each other. Similarly, because the included countries are more economically homogeneous, the mean income variable becomes statistically insignificant in the OECD panel, though the inequality in per capita GDP variable remains very significant and with similar coefficients in both panels. In these regressions the use of the euro continues to be an important factor in reducing price dispersion, and the use of the dollar is now significant in both panels.

In a final refinement, I compute the price dispersion measure separately for goods and services. Because the services included in the database are nontradeable, their inclusion in the data might be a source of noise, since it is known that deviations in services prices from PPP are much more long-lasting than for goods (see e.g. Parsley and Wei, 1996). Because of data availability, the split between tradeables and nontradeables is performed only for the OECD panel. I use the IQR measure of price dispersion for these regressions, because the small number of services available makes the standard deviation particularly susceptible to the influence of outliers.

The results presented in Table 9.7 are somewhat surprising. As a matter of fact there are not such striking differences between tradeables and nontradeables. The coefficients of the main explanatory variables are similar and similarly significant. There are, though, some important differences. In particular, the effect of shared currencies on price dispersion is strong and significant only for tradeables. For example, the coefficient on the dollar is now stronger for tradeable, decreasing from  $-3.4$  percent (Table 9.5) to  $-5$  percent, but it becomes positive and insignificant for nontreadables.

#### **4. Conclusions**

This paper examines the link between the use of a shared currency and the extent of integration in consumer goods and services markets across cities. It extends previous work by Parsley and Wei (2001) in several directions. First it combines a more complete cross-section of goods and cities into two balanced panels that maximize, respectively, the geographical diversity of the cities included and the size of the basket of goods and services used to compute measures of price dispersion across city pairs. Second, it explores the effect of eliminating city pairs located in countries that have little or no commercial links with each other. Third it decomposes price variability into tradeables and nontradeables. And finally, it includes explanatory variables that, to the best of my knowledge, have not been previously employed in studies of price dispersion across cities.

The results confirm many of the results of Parsley and Wei (2001), while adding some new insights that deserve more research in future. Geographical distance continues to be an obvious impediment to market integration, but so is economic distance, as measured by the inequality in per capita GDP of the countries where the cities are located. This suggests that development-related variables should be considered more closely in studies of international economic integration. As far as currencies are concerned, the effect of the euro in reducing price dispersion across cities is robust and significant, even controlling for trade integration and for unobserved institutional features shared by cities located in the same county. Cities located in countries that use the dollar

or that have currencies pegged to the dollar by a currency board system also have reduced price dispersion, though the effect is not always statistically significant.

Finally, the results show that some of the results may be affected by the selection of the sample of city pairs, by the goods and services included in the measure of price dispersion, and by the measure of dispersion itself. For example, the effect of the dollar use in reducing price dispersion across city pairs is stronger and statistically significant when we drop pairs of cities located in countries with little or no trade or when we consider only goods. Also, the use of a robust measure such as the IQR is clearly preferable to the standard deviation, for outliers (which are not unusual in price data) can greatly distort the results.

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**Table 1: Price Comparisons across Goods, 2001**

Lowest Prices	Median	Highest Prices	Median
<b>One X-ray at doctor's office or hospital</b>	-0.93	Paperback novel (at bookstore)	0.31
<b>Routine checkup at family doctor</b>	-0.90	<b>Television color (66 cm)</b>	0.28
<b>Cigarettes local brand (pack of 20)</b>	-0.83	Ham: whole (1 kg)	0.27
<b>Tomatoes (1 kg)</b>	-0.80	Regular unleaded petrol (1 l)	0.24
Gas monthly bill	-0.78	International foreign daily newspaper	0.23
Carrots (1 kg)	-0.69	Laundry (one shirt)	0.16
<b>Hire of tennis court for one hour</b>	-0.68	Facial tissues (box of 100)	0.16
<b>Taxi rate for a 5 km ride</b>	-0.66	<b>Instant coffee (125 g)</b>	0.13
Onions (1 kg)	-0.63	Lamb: Stewing (1 kg)	0.12
<b>Lemons (1 kg)</b>	-0.63	Bacon (1 kg)	0.12
Soap (100 g)	-0.63	Gin Gilbey's or equivalent (700 ml)	0.12
Visit to dentist (one X-ray and one filling)	-0.62	Electric toaster (for two slices)	0.12
White bread 1 kg	-0.61	Peas canned (250 g)	0.09
<b>Cigarettes Marlboro (pack of 20)</b>	-0.61	<b>Shampoo &amp; conditioner in one (400 ml)</b>	0.08
<b>Beef: filet mignon (1 kg)</b>	-0.57	Laundry detergent (3 l)	0.07
Water monthly bill	-0.56	<b>Child's jeans</b>	0.07
Taxi: airport to city center	-0.56	Ground coffee (500 g)	0.04
Potatoes (2 kg)	-0.55	Business shirt white	0.04
Unfurnished residential apartment: 2 bedrooms	-0.55	<b>Compact disc album</b>	0.04
Frozen fish fingers (1 kg)	-0.49	<b>Batteries (two size D/LR20)</b>	0.02

  

Lowest Price Dispersion	IQR	Highest Price Dispersion	IQR
<b>Compact disc album</b>	0.28	<b>Routine checkup at family doctor</b>	1.48
Lipstick (deluxe type)	0.29	Gas monthly bill	1.44
Personal computer (64 mb)	0.30	Entrance fee to a public swimming pool	1.22
Low priced car (900-1299 cc)	0.32	<b>Cigarettes local brand (pack of 20)</b>	1.17
Child's shoes sportswear	0.35	<b>Taxi rate for a 5 km ride</b>	1.12
Compact car (1300-1799 cc)	0.36	<b>One X-ray at doctor's office or hospital</b>	1.06
Chicken: frozen (1 kg)	0.38	<b>Tomatoes (1 kg)</b>	1.05
Electric toaster (for two slices)	0.38	Veal: fillet (1 kg)	1.04
Coca-Cola (1 l)	0.39	<b>Hire of tennis court for one hour</b>	1.03
<b>Television color (66 cm)</b>	0.41	<b>Beef: filet mignon (1 kg)</b>	0.99
Toilet tissue (two rolls)	0.43	Veal: chops (1 kg)	0.99
<b>Shampoo &amp; conditioner in one (400 ml)</b>	0.43	<b>Cigarettes Marlboro (pack of 20)</b>	0.98
Peas canned (250 g)	0.43	Electricity monthly bill for a family of four	0.97
<b>Instant coffee (125 g)</b>	0.44	<b>Lemons (1 kg)</b>	0.95
Family car (1800-2499 cc)	0.45	Green fees on a public golf course	0.93
Butter 500 g	0.45	Daily local newspaper	0.92
<b>Child's jeans</b>	0.45	White rice 1 kg	0.92
Sliced pineapples canned (500 g)	0.45	Dry cleaning woman's dress	0.90
<b>Batteries (two size D/LR20)</b>	0.46	Mushrooms (1 kg)	0.88
Insect-killer spray (330 g)	0.46	Aspirins (100 tablets)	0.88

Medians and inter-quartile ranges (IQR) are computed separately for each good  $g$  across cities for the log difference between the dollar price of good  $g$  in city  $c$  and the median price of good  $g$  in US cities. The overall median and IQR are, respectively, -0.15 and 0.69. Goods in bold appear in both in the upper left and lower right (or in the upper right and the lower left) sections of the table.

**Table 2: Price Comparisons across Cities, 2001**

Lowest Prices		Median	Highest Prices		Median
<b>Tehran</b>	<b>Iran</b>	-1.12	Tokyo	Japan	0.52
<b>New Delhi</b>	<b>India</b>	-1.02	Osaka/Kobe	Japan	0.47
<b>Karachi</b>	<b>Pakistan</b>	-0.89	Libreville	Gabon	0.28
<b>Belgrade</b>	<b>Yugoslavia</b>	-0.85	Hong Kong	Hong Kong	0.23
<b>Mumbai</b>	<b>India</b>	-0.85	Beijing	China	0.20
Budapest	Hungary	-0.83	Tel Aviv	Israel	0.19
<b>Tripoli</b>	<b>Libya</b>	-0.76	Seoul	Korea	0.12
<b>Bucharest</b>	<b>Romania</b>	-0.74	<b>Chicago</b>	<b>United States</b>	0.12
Manila	Philippines	-0.73	Reykjavik	Iceland	0.12
<b>Harare</b>	<b>Zimbabwe</b>	-0.64	Oslo	Norway	0.11
Johannesburg	South Africa	-0.64	<b>New York</b>	<b>United States</b>	0.10
<b>Colombo</b>	<b>Sri Lanka</b>	-0.59	Buenos Aires	Argentina	0.09
Jakarta	Indonesia	-0.59	<b>Los Angeles</b>	<b>United States</b>	0.08
Tunis	Tunisia	-0.58	Zurich	Switzerland	0.07
<b>Asuncion</b>	<b>Paraguay</b>	-0.54	Mexico City	Mexico	0.07
<b>Dhaka</b>	<b>Bangladesh</b>	-0.54	Vienna	Austria	0.06
Bangkok	Thailand	-0.53	London	Great Britain	0.06
Kuala Lumpur	Malaysia	-0.48	Moscow	Russia	0.06
Bogotá	Colombia	-0.47	Taipei	Taiwan	0.04
Prague	Czech Republic	-0.47	Tianjin	China	0.04

  

Lowest Price Dispersion		IQR	Highest Price Dispersion		IQR
Washington DC	United States	0.18	<b>Karachi</b>	<b>Pakistan</b>	1.21
<b>Los Angeles</b>	<b>United States</b>	0.18	<b>New Delhi</b>	<b>India</b>	1.17
Pittsburgh	United States	0.22	<b>Mumbai</b>	<b>India</b>	1.13
Boston	United States	0.23	<b>Dhaka</b>	<b>Bangladesh</b>	1.13
Houston	United States	0.24	<b>Harare</b>	<b>Zimbabwe</b>	1.11
Detroit	United States	0.25	<b>Tehran</b>	<b>Iran</b>	1.11
San Francisco	United States	0.26	<b>Bucharest</b>	<b>Romania</b>	1.03
<b>Chicago</b>	<b>United States</b>	0.26	<b>Tripoli</b>	<b>Libya</b>	1.01
<b>New York</b>	<b>United States</b>	0.27	Libreville	Gabon	0.99
Seattle	United States	0.28	<b>Asuncion</b>	<b>Paraguay</b>	0.98
Miami	United States	0.30	<b>Colombo</b>	<b>Sri Lanka</b>	0.95
Minneapolis	United States	0.31	<b>Belgrade</b>	<b>Yugoslavia</b>	0.94
Lexington	United States	0.31	Shenzhen	China	0.92
Cleveland	United States	0.32	Lagos	Nigeria	0.91
Atlanta	United States	0.35	Hanoi	Viet Nam	0.91
Honolulu	United States	0.35	Cairo	Egypt	0.90
Montreal	Canada	0.39	Nairobi	Kenya	0.88
Toronto	Canada	0.42	Amman	Jordan	0.86
Melbourne	Australia	0.43	Dakar	Senegal	0.86
Vancouver	Canada	0.44	Baku	Azerbaijan	0.86

Medians and inter-quartile ranges (IQR) are computed separately for each city  $c$  across goods for the log difference between the dollar price of good  $g$  in city  $c$  and the median price of good  $g$  in US cities. The overall median and IQR are, respectively, -0.15 and 0.69. Cities in bold appear in both in the upper left and lower right (or in the upper right and the lower left) sections of the table.

**Table 3: Determinants of Price Dispersion across City Pairs – Abridged Regressions**

Variable	Diverse Panel		OECD Panel		P&W Panel	
	Estimate	<i>T</i> -stat	Estimate	<i>T</i> -stat	Estimate	<i>T</i> -stat
Intercept	0.051	0.8	0.187***	2.7	0.13	1.3
Log Distance	0.161***	10.5	0.119***	7.2	0.151***	6.3
Log Distance Squared	-0.009***	-9.6	-0.007***	-6.7	-0.008***	-5.6
Log Mean GDPPC	-0.042***	-34.4	-0.028***	-10.6	-0.049***	-30.0
Inequality in GDPPC	0.153***	42.4	0.114***	20.7	0.155***	31.2
Nominal ER Volatility	0.056***	13.1	0.067***	15.3	0.044***	8.8
Same Currency / Hard Peg	-0.021***	-3.5	-0.021***	-4.0	-0.032***	-4.2
Same Regional Trading Area:	0.001	0.2	-0.016***	-3.5	0.01	2.4
Same Country	-0.064***	-7.8	-0.043***	-5.7	-0.065***	-5.6
Same Language	-0.002	-0.6	-0.04***	-11.7	-0.005	-1.3
Same Historical Links	-0.007**	-2.6	-0.031***	-8.7	-0.007**	-2.0
<i>n</i>	6670		3081		3403	
Adj. <i>R</i> <sup>2</sup>	0.497		0.601		0.539	

The dependent variable is the standard deviation of the log price differences between a pair of cities. The number of goods and services prices and the number of city pairs vary in the three panels.

**Table 4: Determinants of Price Dispersion across City Pairs – Base Regressions**

Variable	Diverse Panel		OECD Panel	
	Estimate	T-stat	Estimate	T-stat
Intercept	0.024	0.3	0.170 **	2.3
Log Distance	0.177 ***	10.5	0.112 ***	6.4
Log Distance Squared	-0.010 ***	-10.1	-0.006 ***	-5.8
Log Mean GDPPC	-0.044 ***	-38.4	-0.029 ***	-10.4
Inequality in GDPPC	0.155 ***	47.2	0.131 ***	28.8
Nominal ER Volatility	0.058 ***	13.4	0.064 ***	14.9
Currency / Hard Peg:				
Euro	-0.056 ***	-4.8	-0.041 ***	-4.5
CFA	-0.062	-1.4		
Dollar	-0.025 **	-2.4	-0.008	-1.0
Regional Trading Area:				
EU	0.015	1.5	-0.022 **	-2.6
NAFTA	-0.052 ***	-5.3	-0.018 *	-1.9
EFTA	0.027	0.7	-0.016	-0.6
ASEAN	-0.029	-1.5	-0.035	-1.3
ANZCERTA	-0.203 ***	-7.7	-0.124 ***	-5.9
MERCOSUR	-0.058 **	-2.0	-0.040	-1.6
Andean Common Mkt.	-0.015	-0.4	-0.029	-0.4
CACM	-0.034	-0.4		
Same Country:				
Australia	0.041	1.1	0.017	0.6
Brazil	-0.041	-0.4	-0.169 **	-2.1
Canada	-0.021	-0.6	-0.010	-0.4
China	-0.091 **	-2.0		
Germany	0.051	1.6	0.024	1.0
UK	-0.024	-0.3	0.028	0.4
India	-0.139 *	-1.7		
Italy	-0.129	-1.6	-0.147 **	-2.3
Japan	-0.102	-1.2	-0.171 ***	-2.6
New Zealand	0.008	0.1	-0.005	-0.1
Russia	-0.194 **	-2.3		
Saudi Arabia	-0.036	-0.7		
Spain	-0.219 ***	-2.6	-0.243 ***	-3.7
Switzerland	-0.187 **	-2.0	-0.177 **	-2.5
UAE	0.075	0.9	-0.035	-0.5
USA	-0.024	-1.5	-0.012	-0.9
Vietnam	-0.145 *	-1.7		
Common Language:				
Spanish	-0.057 ***	-4.7	-0.042 ***	-3.2
English	0.010 **	2.5	-0.084 ***	-19.4
French	-0.013	-0.4		
German	0.009	0.5	-0.015	-1.1
Dutch	0.027	0.3	0.047	0.7

Chinese	-0.008	-0.3	-0.011	-0.2
Arabic	-0.078 ***	-5.5	-0.030	-1.0
Portuguese	-0.079	-1.4	-0.004	-0.1
Malay	0.013	0.2		
Historical Link:				
Spain / Portugal	0.024 **	2.1	0.035 **	2.6
England	-0.017 **	-2.4	-0.026	-1.5
France	0.062 ***	3.3		
Former Soviet Block	-0.060 ***	-3.7	0.018	0.5
China	-0.025	-0.3		
<i>n</i>	6670		3081	
Adj. $R^2$	0.512		0.641	

The dependent variable is the standard deviation of the log price differences between a pair of cities. The number of goods and services prices and the number of city pairs vary in the two panels.

**Table 5: Price Dispersion across City Pairs – Dispersion Measured as the Inter-Quartile Range in Log Price Differences**

Variable	Diverse Panel		OECD Panel		P&W Panel		
	Estimate	<i>T</i> -stat	Estimate	<i>T</i> -stat	Estimate	<i>T</i> -stat	
Intercept	-0.064	-0.6	0.180	1.5	0.362	**	2.1
Log Distance	0.221 ***	8.0	0.092 ***	3.2	0.158 ***		3.8
Log Distance Squared	-0.012 ***	-7.4	-0.005 ***	-2.7	-0.009 ***		-3.6
Log Mean GDPPC	-0.053 ***	-28.2	-0.015 ***	-3.3	-0.063 ***		-23.9
Inequality in GDPPC	0.224 ***	41.4	0.193 ***	25.9	0.213 ***		27.4
Nominal ER Volatility	0.032 ***	4.5	0.060 ***	8.6	0.054 ***		6.5
Currency / Hard Peg:							
Euro	-0.074 ***	-3.9	-0.050 ***	-3.3	-0.018		-0.7
CFA	-0.105	-1.4			-0.108		-1.4
Dollar	-0.025	-1.5	-0.034 **	-2.6	-0.043 **		-2.4
Regional Trading Area:							
EU	-0.002	-0.1	-0.065 ***	-4.7	-0.067 ***		-2.9
NAFTA	-0.092 ***	-5.7	-0.039 **	-2.5	-0.060 **		-2.3
EFTA	0.029	0.5	-0.058	-1.2	0.010		0.1
ASEAN	-0.059 *	-1.9	-0.039	-0.9	-0.113 **		-2.5
ANZCERTA	-0.283 ***	-6.5	-0.172 ***	-5.0	-0.323 **		-2.4
MERCOSUR	-0.094 *	-2.0	-0.058	-1.4	0.036		0.6
Andean Common Mkt.	0.021	0.4	-0.068	-0.6	0.005		0.1
CACM	0.039	0.3			0.009		0.1
Same Country:							
Australia	0.011	0.2	-0.030	-0.6			
Brazil	-0.082	-0.5	-0.333 **	-2.5			
Canada	-0.121 **	-2.1	-0.061	-1.3			
China	-0.207 ***	-2.8					
Germany	0.034	0.7	0.006	0.1			
UK	-0.009	-0.1	0.095	0.9			
India	-0.348 **	-2.6					
Italy	-0.120	-0.9	-0.217 **	-2.0			
Japan	-0.239 *	-1.8	-0.370 ***	-3.5			
New Zealand	-0.020	-0.1	-0.034	-0.3			
Russia	-0.215	-1.6					
Saudi Arabia	-0.077	-1.0					
Spain	-0.341 **	-2.5	-0.433 ***	-4.0			
Switzerland	-0.276 *	-1.8	-0.242 **	-2.0			
UAE	0.009	0.1	-0.191	-1.6			
USA	-0.045 *	-1.8	-0.002	-0.1	-0.076 **		-2.2
Vietnam	-0.251 *	-1.8					
<i>n</i>	6670		3081		3403		
Adj. <i>R</i> <sup>2</sup>	0.419		0.565		0.427		

The dependent variable is the inter-quartile range of the log price differences between a pair of cities. The regressions include language and historical links dummies, but they are not shown to save space.

**Table 6: Determinants of Price Dispersion across City Pairs – Pairs of Cities in Countries with Little or No Trade Excluded**

Variable	Diverse Panel		OECD Panel	
	Estimate	T-stat	Estimate	T-stat
Intercept	0.348 ***	4.2	0.145	1.2
Log Distance	0.088 ***	4.6	0.052 ***	2.7
Log Distance Squared	-0.005 ***	-3.7	-0.002 *	-1.8
Log Mean GDPPC	-0.044 ***	-20.6	-0.006	-0.8
Inequality in GDPPC	0.164 ***	37.9	0.139 ***	17.6
Nominal ER Volatility	0.063 ***	8.2	0.075 ***	11.5
Currency / Hard Peg:				
Euro	-0.062 ***	-5.2	-0.043 ***	-4.6
CFA	-0.044	-0.8		
Dollar	-0.037 ***	-3.5	-0.017 **	-2.0
Regional Trading Area:				
EU	0.022 **	2.1	-0.012	-1.4
NAFTA	-0.048 ***	-4.9	-0.013	-1.4
EFTA	0.037	0.8	-0.009	-0.2
ASEAN	-0.043 **	-2.2	-0.001	0.0
ANZCERTA	-0.195 ***	-7.6	-0.109 ***	-5.3
MERCOSUR	-0.051 *	-1.7	-0.014	-0.5
Andean Common Mkt.	0.005	0.1	0.007	0.1
CACM	-0.012	-0.2		
Same Country:				
Australia	0.041	1.2	0.016	0.6
Brazil	-0.138 *	-1.7	-0.176 ***	-2.7
Canada	-0.018	-0.5	-0.002	-0.1
China	-0.071	-1.6		
Germany	0.034	1.1	0.017	0.7
UK	-0.045	-0.6	0.018	0.3
India	-0.146 *	-1.8		
Italy	-0.136 *	-1.7	-0.147 **	-2.4
Japan	-0.111	-1.4	-0.176 ***	-2.8
New Zealand	-0.002	0.0	-0.002	0.0
Russia	-0.217 ***	-2.7		
Saudi Arabia	-0.031	-0.6		
Spain	-0.203 **	-2.5	-0.224 ***	-3.5
Switzerland	-0.211 **	-2.3	-0.190 ***	-2.6
UAE	0.040	0.5	-0.028	-0.4
USA	-0.009	-0.6	-0.006	-0.5
Vietnam	-0.064	-0.8		
<i>n</i>	3594		2034	
Adj. <i>R</i> <sup>2</sup>	0.579		0.663	

The dependent variable is the standard deviation of the log price differences between a pair of cities. Pairs of cities located in countries with little or no trade have been excluded in the estimation. The regressions include language and historical links dummies, but they are not shown to save space.

**Table 7: Determinants of Price Dispersion across City Pairs – Dispersion Computed Separately for Tradeables and Nontradeables in the OECD Panel**

Variable	Tradeables		Nontradeables	
	Estimate	<i>T</i> -stat	Estimate	<i>T</i> -stat
Intercept	0.271 **	2.1	-0.072	-0.3
Log Distance	0.073 **	2.4	0.234 ***	3.5
Log Distance Squared	-0.004 *	-2.0	-0.014 ***	-3.4
Log Mean GDPPC	-0.017 ***	-3.5	-0.035 ***	-3.2
Inequality in GDPPC	0.183 ***	23.4	0.176 ***	10.0
Nominal ER Volatility	0.053 ***	7.1	0.086 ***	5.2
Currency / Hard Peg:				
Euro	-0.047 ***	-2.9	-0.010	-0.3
Dollar	-0.050 ***	-3.5	0.043	1.4
Regional Trading Area:				
EU	-0.073 ***	-5.0	-0.019	-0.6
NAFTA	-0.029 *	-1.8	-0.127 ***	-3.4
EFTA	-0.110 **	-2.2	0.011	0.1
ASEAN	-0.059	-1.3	0.059	0.6
ANZCERTA	-0.154 ***	-4.2	-0.372 ***	-4.5
MERCOSUR	-0.036	-0.9	-0.324 ***	-3.4
Andean Common Mkt.	-0.001	0.0	-0.122	-0.5
Same Country:				
Australia	-0.043	-0.9	0.071	0.6
Brazil	-0.347 **	-2.4	-0.092	-0.3
Canada	-0.055	-1.1	-0.012	-0.1
Germany	-0.003	-0.1	0.095	1.0
UK	0.101	0.9	0.039	0.2
Italy	-0.246 **	-2.2	-0.229	-0.9
Japan	-0.354 ***	-3.2	-0.204	-0.8
New Zealand	-0.033	-0.3	-0.015	-0.1
Spain	-0.430 ***	-3.8	-0.304	-1.2
Switzerland	-0.219 *	-1.8	-0.140	-0.5
UAE	-0.142	-1.1	-0.019	-0.1
USA	0.006	0.3	-0.021	-0.4
<i>n</i>	3081		3081	
Adj. <i>R</i> <sup>2</sup>	0.542		0.156	

The dependent variable is the standard deviation of the log price differences between a pair of cities. The standard deviation is computed separately for prices of goods and services. The regressions include language and historical links dummies, but they are not shown to save space.

Appendix 1: Cities Included in the Regression Analysis

City	Panel	City	Panel	City	Panel
Abidjan, Cote d'Ivoire	d p	Guatemala City, Guatemala	d p	Osaka/Kobe, Japan	d o
Abu Dhabi, UAE	d p o	Hamburg, Germany	d o	Oslo, Norway	d p o
Adelaide, Australia	d o	Hanoi, Vietnam	d	Panama City, Panama	d p o
Al Khobar, Saudi Arabia	d	Harare, Zimbabwe	d	Paris, France	d p o
Amman, Jordan	d p o	Helsinki, Finland	d p o	Perth, Australia	d o
Amsterdam, Netherlands	d p o	Ho Chi Minh City, Vietnam	d	Pittsburgh, USA	d p o
Asuncion, Paraguay	d p o	Hong Kong, Hong Kong	d p o	Port Moresby, Papua New Guinea	p
Athens, Greece	d p o	Honolulu, USA	d p o	Prague, Czech Republic	d p o
Atlanta, USA	d p o	Houston, USA	d p o	Quito, Ecuador	d p o
Auckland, New Zealand	d p o	Istanbul, Turkey	d p	Reykjavik, Iceland	d o
Bahrain, Bahrain	d p	Jakarta, Indonesia	d p	Rio de Janeiro, Brazil	d o
Baku, Azerbaijan	d	Jeddah, Saudi Arabia	d	Riyadh, Saudi Arabia	d p
Bangkok, Thailand	d p o	Johannesburg, South Africa	d p o	Rome, Italy	d p o
Barcelona, Spain	d o	Karachi, Pakistan	d p	San Francisco, USA	d p o
Beijing, China	d p	Kuala Lumpur, Malaysia	d p o	San Jose, Costa Rica	d p
Berlin, Germany	d p o	Kuwait, Kuwait	d p	Santiago, Chile	d p o
Bogotá, Colombia	d p o	Lagos, Nigeria	d p	Sao Paulo, Brazil	d p o
Boston, USA	d p o	Lexington, USA	d o	Seattle, USA	d p o
Brisbane, Australia	d o	Libreville, Gabon	d p	Seoul, Korea	d p
Brussels, Belgium	d p o	Lima, Peru	d p	Shanghai, China	d
Bucharest, Romania	d	Lisbon, Portugal	d p o	Shenzhen, China	d
Budapest, Hungary	d p o	London, UK	d p o	Singapore, Singapore	d p o
Buenos Aires, Argentina	d p o	Los Angeles, USA	d p o	St. Petersburg, Russia	d
Cairo, Egypt	d p	Luxembourg, Luxembourg	d p o	Stockholm, Sweden	d p o
Calgary, Canada	d o	Madrid, Spain	d p o	Sydney, Australia	d p o
Caracas, Venezuela	d p	Manchester, UK	d o	Taipei, Taiwan	d p o
Casablanca, Morocco	d p o	Manila, Philippines	d p o	Tehran, Iran	p
Chicago, USA	d p o	Melbourne, Australia	d o	Tel Aviv, Israel	d p o
Cleveland, USA	d p o	Mexico City, Mexico	d p	Tokyo, Japan	d p o
Colombo, Sri Lanka	d p	Miami, USA	d p o	Toronto, Canada	d p o
Copenhagen, Denmark	d p o	Milan, Italy	d o	Tunis, Tunisia	d p
Dakar, Senegal	d p	Minneapolis, USA	d o	Vancouver, Canada	d o
Detroit, USA	d p o	Montevideo, Uruguay	d p o	Vienna, Austria	d p
Douala, Cameroon	d p	Montreal, Canada	d o	Warsaw, Poland	d p o
Dubai, UAE	d o	Moscow, Russia	d p	Washington DC, USA	d p o
Dublin, Ireland	d p o	Mumbai, India	d p	Wellington, New Zealand	d o
Dusseldorf, Germany	d o	Munich, Germany	d o	Zagreb, Croatia	d
Frankfurt, Germany	d o	Nairobi, Kenya	d p		
Geneva, Switzerland	d o	New Delhi, India	d		
Guangzhou, China	d	New York, USA	d p o		

“o”, “p”, and “p” stand, respectively, for the OECD, diverse, and Parsley and Wei (2001) panels.

## Appendix 2: Goods and Services Included in the Regression Analysis

Description	Panels	Description	Panels
White bread, 1 kg	o p	Chicken: frozen (1 kg)	p
Butter, 500 g	o p d	Chicken: fresh (1 kg)	o p
Margarine, 500g	o d	Frozen fish fingers (1 kg)	p
White rice, 1 kg	o p d	Fresh fish (1 kg)	o p
Spaghetti (1 kg)	o p d	Instant coffee (125 g)	o p d
Flour, white (1 kg)	o p d	Ground coffee (500 g)	o p
Sugar, white (1 kg)	o p d	Tea bags (25 bags)	o p d
Cheese, imported (500 g)	o p d	Cocoa (250 g)	o p
Cornflakes (375 g)	o p d	Drinking chocolate (500 g)	o p
Yogurt, natural (150 g)	o p	Coca-Cola (1 l)	o p d
Milk, pasteurized (1 l)	o p d	Tonic water (200 ml)	o p
Olive oil (1 l)	o p d	Mineral water (1 l)	o p d
Peanut or corn oil (1 l)	o p d	Orange juice (1 l)	o p
Potatoes (2 kg)	o p d	Wine, common table (750 ml)	o p
Onions (1 kg)	o p d	Wine, superior quality (750 ml)	o p
Mushrooms (1 kg)	o	Wine, fine quality (750 ml)	o p
Tomatoes (1 kg)	o p d	Beer, local brand (1 l)	o p
Carrots (1 kg)	o p d	Beer, top quality (330 ml)	o p
Oranges (1 kg)	o p d	Scotch whisky, six years old (700 ml)	o p
Apples (1 kg)	o p d	Gin, Gilbey's or equivalent (700 ml)	o p
Lemons (1 kg)	o p d	Vermouth, Martini & Rossi (1 l)	o p
Bananas (1 kg)	o p d	Cognac, French VSOP (700 ml)	o p
Lettuce (one)	o p d	Liqueur, Contra (700 ml)	p
Eggs (12)	o p d	Soap (100 g)	o p d
Peas, canned (250 g)	o p	Laundry detergent (3 l)	o p d
Tomatoes, canned (250 g)	o p	Toilet tissue (two rolls)	o p d
Peaches, canned (500 g)	o p	Dishwashing liquid (750 ml)	o p d
Sliced pineapples, canned (500 g)	o p	Insect-killer spray (330 g)	o p d
Beef: filet mignon (1 kg)	o p	Light bulbs (two, 60 watts)	o p d
Beef: steak, entrecote (1 kg)	o p	Batteries (two, size D/LR20)	o p d
Beef: stewing, shoulder (1 kg)	o p	Frying pan (Teflon or good equivalent)	o p d
Beef: roast (1 kg)	o p	Electric toaster (for two slices)	o d
Beef: ground or minced (1 kg)	o p	Laundry (one shirt)	o d
Lamb: leg (1 kg)	p	Dry cleaning, man's suit	o d
Lamb: chops (1 kg)	p	Dry cleaning, woman's dress	o d
Lamb: Stewing (1 kg)	p	Dry cleaning, trousers	o d
Pork: chops (1 kg)	o p	Aspirins (100 tablets)	o p d
Pork: loin (1 kg)	o p	Razor blades (five pieces)	o p d
Ham: whole (1 kg)	o p	Toothpaste with fluoride (120 g)	o p d
Bacon (1 kg)	o p	Facial tissues (box of 100)	o p d

Appendix 2: Goods and Services Included in the Regression Analysis (cont'd)

Description	Panels	Description	Panels
Hand lotion (125 ml)	o p d	Kodak color film (36 exposures)	o p d
Shampoo & conditioner in one (400 ml)	o d	Cost of developing 36 color pictures	o d nt
Lipstick (deluxe type)	o p	International foreign daily newspaper	o p d
Man's haircut (tips included)	o d nt	Daily local newspaper	o
Woman's cut & blow dry (tips included)	o d nt	Paperback novel (at bookstore)	o
Cigarettes, Marlboro (pack of 20)	o p d	Personal computer (64 MB)	o
Cigarettes, local brand (pack of 20)	o p	Low priced car (900-1299 cc)	o
Telephone, monthly charges based on 300 min./month of local calls	o nt	Compact car (1300-1799 cc)	o d
Electricity, monthly bill for family of four	o nt	Family car (1800-2499 cc)	o
Men's business suit, two piece, medium weight	o p d	Cost of a car tune up (but no major repairs)	o d nt
Men's business shirt, white	o p d	Annual premium for car insurance	o nt
Men's shoes, business wear	o p d	Regular unleaded petrol (1 l)	o d
Men's raincoat, Burberry type	p	Taxi rate for a 5 km ride	o nt
Socks, wool mixture	o p d	Taxi: airport to city center	o d nt
Women's dress, ready to wear, daytime	o p d	Unfurnished residential apartment: 2 bedrooms	o d nt
Women's shoes, town	o p d	Unfurnished residential house: 3 bedrooms	o nt
Women's cardigan sweater	o p	Routine checkup at family doctor	o d nt
Women's tights, panty hose	o p	One X-ray at doctor's office or hospital	o d nt
Child's jeans	o p d	Visit to dentist (one X-ray and one filling)	o d nt
Child's shoes, dress wear	o p	Green fees on a public golf course	o nt
Child's shoes, sportswear	o p d	Cost of six tennis balls e.g. Dunlop, Wilson	p
Girl's dress	o	Moderate hotel, single room, one night including breakfast	o d nt
Boy's jacket, smart	o p	Simple meal for one person	o d nt
Boy's dress trousers	o p	Fast food snack: hamburger, fries and drink	o p nt
Compact disc album	o	Hire car, weekly rate for lowest price classification	o nt
Television, color (66 cm)	o d	One good seat at cinema	o nt

“o”, “p”, and “p” stand, respectively, for the OECD, diverse, and Parsley and Wei (2001) panels. “nt” represents nontradeable services.

### Appendix 3: Dummy Variables Defined at the Country Level

Variable	Countries Included
Currency area	<i>Euro</i> : Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain <i>CFA franc</i> : Cameroon, Cote d'Ivoire, Gabon, Senegal <i>Dollar</i> : Argentina, Ecuador, Hong Kong, Panama, United States
Regional trading area	<i>European Union</i> : Euro countries plus Denmark, UK, Sweden <i>EFTA</i> : Iceland, Norway, Switzerland <i>ANZCERTA</i> : Australia, New Zealand <i>ASEAN</i> : Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam <i>NAFTA</i> : Canada, Mexico, USA <i>MERCOSUR</i> : Argentina, Brazil, Paraguay, Uruguay <i>Andean Common Market</i> : Colombia, Ecuador, Peru, Venezuela <i>CACM (Central American Common Marker)</i> : Guatemala, Costa Rica
Common language	<i>Arabic</i> : Bahrain, Egypt, Jordan, Kuwait, Libya, Morocco, Saudi Arabia, United Arab Emirates <i>Chinese</i> : China, Hong Kong, Taiwan <i>Dutch</i> : Belgium, Netherlands <i>English</i> : Australia, Canada, Great Britain, India, Kenya, New Zealand, Nigeria, Pakistan, Singapore, South Africa, Sri Lanka, United States, Zimbabwe, Ireland <i>French</i> : Cameroon, Cote d'Ivoire, Gabon, Senegal, Tunisia, France <i>German</i> : Switzerland, Austria, Germany, Luxembourg <i>Malay</i> : Indonesia, Malaysia <i>Portuguese</i> : Brazil, Portugal <i>Spanish</i> : Argentina, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Panama, Paraguay, Peru, Uruguay, Venezuela, Spain
Common historical link	<i>China</i> : Honk Kong, Taiwan <i>England</i> : Bahrain, Bangladesh, Egypt, India, Jordan, Kenya, Kuwait, Malaysia, Nigeria, Pakistan, Papua New Guinea, Saudi Arabia, Singapore, South Africa, Sri Lanka, United Arab Emirates, Zimbabwe <i>France</i> : Cameroon, Cote d'Ivoire, Gabon, Morocco, Senegal, Tunisia, Vietnam <i>Former Soviet Block</i> : Azerbaijan, Croatia, Czech Republic, Hungary, Poland, Romania, Russia, Yugoslavia <i>Spain/Portugal</i> : Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico, Panama, Paraguay, Peru, Philippines, Uruguay, Venezuela

## Endnotes

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<sup>1</sup> While McCallum's (1995) data were for 1988, before the signing of the Free Trade Agreement, subsequent work by John F. Helliwell (1998) corroborated the importance of the border effect during the first half of the 1990's.

<sup>2</sup> The EIU markets this database mainly for marketing managers, business travelers, and human resources officers who need to design compensation packages for expatriate workers. The price data is collected twice a year by local researchers who physically visit outlets to record price levels. For more information, refer to the EIU data services web site <http://www.eiu.com/data>.

<sup>3</sup> I preferred to use the lower of the two prices rather than selecting supermarkets because in developing countries supermarkets are sometimes more expensive than small stores.

<sup>4</sup> For example, the database includes the initial meter charge for a taxi ride and the rate per additional kilometer. I combine both pieces of information as the price of a 5 kilometers taxi ride. Similarly, I compute the price for residential telephone service on the basis of 300 minutes a month of local calls.

<sup>5</sup> The IQR (defined as the distance between the third and the first quartile) is a simple measure of spread that gives the range covered by the middle half of the data. In contrast to the standard deviation, the IQR is robust to outliers.

<sup>6</sup> This database is available in STATA format at Andrew Rose's web site <http://www.haas.berkeley.edu/~arose/RecRes.htm> (accessed January 2002).

<sup>7</sup> For further information on the *World Trade Flows, 1980-1997* database refer to <http://www.iga.ucdavis.edu/wtf.html>.

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<sup>8</sup> The latitude and longitude of each city, which was necessary to compute the great circle distance formula, was obtained from the United Nations's web site <http://www.un.org/Depts/unsd/demog/ctry.htm> (accessed January 2002).

<sup>9</sup> Source: United Nations's web site <http://www.un.org/Depts/unsd/social/inc-eco.htm> (accessed March 2002). The figure for Taiwan was obtained from the publication *The Republic of China – Five Decades on Taiwan*, consulted on-line at <http://www.taipei.org/info/roc/decades.htm> (accessed March 2002).

<sup>10</sup> Source: International Monetary Fund's *International Financial Statistics* database. The exchange rate for Taiwan was obtained from the U.S. Federal Reserve's *FRED* database at <http://www.stls.frb.org/fred/data/exchange.html> (accessed March 2002).

<sup>11</sup> Although it is not surprising that U.S. cities have the lowest price dispersion (because prices are compared to the median U.S. prices), notice that this dispersion is not trivial.