TRADE COSTS, TRADE BALANCES AND CURRENT ACCOUNTS: AN APPLICATION OF GRAVITY TO MULTILATERAL TRADE

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Abstract

In this paper we test the well-known hypothesis of Obstfeld and Rogoff (2000) that trade costs are the key to explaining the so-called Feldstein-Horioka puzzle. Our approach has a number of novel features. First, we focus on the interrelationship between trade costs, the trade account and the Feldstein-Horioka puzzle. Second, we use the gravity model to estimate the effect of trade costs on bilateral trade and, third, we show how bilateral trade can be used to draw inferences about desired trade balances and desired intertemporal trade. Our econometric results provide strong support for the Obstfeld and Rogoff hypothesis and we are also able to reconcile our results with the so-called home bias puzzle.

Keywords: Feldstein-Horioka puzzle; trade costs; gravity model; home bias puzzle; current account; trade balance.

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A large body of work seeks to explain the so-called Feldstein–Horioka (FH) puzzle; the phenomenon of excessive reliance on domestic saving in order to finance domestic investment, which results in current account imbalances that are too small to be consistent with a world of high capital mobility. In a recent provocative paper, Obstfeld and Rogoff (2000) propose trade costs as the explanation for not only this puzzle but also five other major puzzles in international macroeconomics. Although there are now a large number of competing explanations for the FH puzzle (see, for example, Obstfeld (1986), Dooley, Frankel and Mathieson (1987), Gordon and Bovenberg (1996) and Taylor (2002)), Obstfeld and Rogoff (OR) emphasize that the alternative explanations often suffer from other problems. In this paper, we test OR's key emphasis on the role of trade costs in explaining the FH puzzle. We provide strong support for their hypothesis and we reconcile our results with the so-called home bias puzzle. Additionally, we shed light on the importance of national plans to borrow and lend in explaining bilateral trade. Our approach is perhaps best understood against the backdrop of OR's interpretation of the FH puzzle.

The OR story runs as follows. First, any shift in a country's trade balance requires some movement in the weight of its import prices relative to prices of home goods in its general price index. Since import prices include trade costs while home goods do not, trade costs alone imply that a real exchange rate change is required to alter trade balances. Pressures to resist such changes may then explain the observed sluggishness of trade balances. In developing their argument, OR rely heavily on the intertemporal budget constraint. For example, in the current period, a country with a large negative trade balance will face a higher proportion of prices inclusive of customs, insurance and freight (CIF) relative to those exclusive of these, or free on board (FOB), and thereby less favorable terms of trade. In the next period, however, there will be a resulting need to pay the added obligations on foreign debt and this will imply an opposite movement in the terms of trade. Thus, because of trade costs alone, negative trade balances today mean lower expected future consumer prices relative to present consumer prices and therefore imply higher expected real interest rates. The associated swings in trade balances, in turn, should lead to corresponding capital flows.

The reality, as Feldstein and Horioka and many others have observed, is quite different. Instead, there is a close link between national savings and national investment suggesting that international capital movements provide for only limited intertemporal substitution and permit only limited current account imbalances (relative to the imbalances that would exist if capital was truly highly mobile). The reason, in OR's view, is that agents recognize that, because of trade costs, swings in trade balances will imply dramatic movements in real interest rates that, in turn, are socially costly. The existence of trade costs therefore places limits on intertemporal substitution and the smoothing of consumption through trade. As a result, we observe rather sluggish current account behavior. OR, and also Bergin and Glick (2003), support this hypothesis with evidence of a strong negative correlation between average real interest rates and current account surpluses.

In this paper, we seek to test the OR hypothesis that trade costs are central to an understanding of the Feldstein-Horioka puzzle. Our approach has a number of novel features. First, in contrast to OR and others, we focus on the trade account, rather than the current account, as the key account in understanding the role of trade costs in explaining the Feldstein-Horioka puzzle. Why? The OR position is that current borrowers can expect to be future lenders within the foreseeable future. However, the evidence supports the view that many deficit countries can run deficits almost indefinitely because of previously accumulated net foreign assets, and conversely. For example, Lane and Milesi-Ferretti (2002a) (based on a study of 20 OECD countries) offer empirical support for this contention and in a further study, Lane and Milesi-Ferretti (2002b) (sample of 68 countries, over the period 1970-1998) also point out that a (small) majority of countries did not switch at any time between the state of net lender or net borrower. Moreover, when they used an error-correction representation of the data to estimate the speed of adjustment towards a trend value of the ratio of net borrowing to GDP, they found that the movement has a relatively slow half-life of 5-6 years.[1]

These considerations suggest a basic modification of OR's explanation of the FH puzzle that does not rely on the intertemporal budget constraint. Specifically, any country wish-

[1] In a study that focuses precisely on current account reversals (understood as sharp changes in a short period of time) in all countries of the world for which data are available, 157 of them, over 1970-2001, Edwards (2004) reports reversals constituting only 12 percent of the national observations.

ing to alter its current account position must alter its trade balance and therefore must move prices FOB relative to prices CIF, or vice versa. What our previous discussion suggests is that if the shift in relative prices needed to obtain a modest change in the current account is large, the resulting shift in prices will act as a deterrent. Small trade balances will ensue and this will render current account balances small too. On this view, the key to understanding the FH puzzle lies in understanding trade balance behavior. Trade costs underlie the FH puzzle, just as OR say, but we believe on more direct grounds than theirs.

The second novelty in our work involves using the gravity model to assess the role of trade costs in explaining the FH puzzle. We believe this has a number of advantages. First, it relates our results to a large body of earlier empirical work on trade flows. Second, by centering attention on bilateral trade rather than aggregate trade or the current account, our test procedure greatly widens the range of relevant observations available for testing. Third, by focusing on bilateral trade, the choice also enables us to treat the prices of imports relative to home goods as an exogenous variable. Evidently, the influence of a country's imports from any specific trade partner on its relative prices at home can be supposed small. Thus, single-equation estimation is reasonable.

The third novelty in our work concerns how bilateral trade data, used in our gravity study, may serve to make inferences about aggregate trade balances. We attempt to address this issue by conditioning our estimates of the influence of relative prices on bilateral trade on countries' desired aggregate trade balances (which, in turn, depend on their desired intertemporal substitution). It turns out that this intertemporal objective has a crucial role to play in generating sensible econometric results. In order to introduce the intertemporal objective in our work, we simply assume that the observed national trade balances over the study period correspond exactly to tastes and impose this assumption as a restriction in our bilateral trade estimates.

The outline of the remainder of the paper is as follows. In the next section we develop our theory and test specification. There we explain both our general version of the gravity model and the particular features of our model that allow us to discuss national trade balances despite our reliance on bilateral trade data. Our data set is discussed in Section 3. Section 4 contains our empirical results of the tests of the gravity equation, and we demonstrate that large movements in the trade balance require large changes in the prices of imports relative to home goods. According to our estimates, a one percentage-point movement in the trade balance would require a one and two-thirds percentage-point movement in consumer prices relative to domestic-output prices. Section 5 develops the reasoning underlying our view that this relative price influence can be properly seen as reflecting essentially trade costs. Next, section 6 reconciles our results with OR's analysis of the home bias puzzle, which emerges as an important issue, as we shall see. Section 7 concludes.

2. Theory and test specification

a. *Theory*

To estimate the magnitude of trade costs we use the gravity model and the theoretical underpinnings of that model are from Helpman (1987) and Anderson and van Wincoop (2003). In the standard gravity approach, it is assumed that all preferences for goods in the world are identical, output is exogenous, exports are demand-determined, bilateral trade costs are perfectly symmetric, and therefore there is generally no reason for systematic deviations from bilateral trade balance. Accordingly, researchers who rely on these assumptions usually take the dependent variable as total bilateral trade, measured as the sum, or the average, of bilateral imports both ways. Consequently, any influence of relative price is ignored, since the opposite influence of this variable on trade partners (in the case of an elasticity of substitution different from one) becomes impossible to study. In order to apply the gravity model to the impact of trade costs on trade balances we propose deviating from the simple form of the gravity model on a single point. Specifically, we assume that households in different countries differ in their tastes for intertemporal substitution which, in turn, means that each country may aim for a different trade balance.[2] Consequently, it makes sense to distinguish the desired imports of country A from country B and the desired imports of country B from country A. In this context, it is possible to study the influence of relative price on imports as distinct from

[2] Helpman, Melitz and Rubinstein (2004) make a similar point and then proceed to distinguish between bilateral imports and exports differently than we do: by allowing for heterogeneities between firms. But there is plainly no conceptual conflict between their manner of proceeding and ours.

exports in the framework of the simple gravity model.[3]

Suppose then that households in each country decide on their aggregate current consumption by maximizing an intertemporal utility function, subject to an intertemporal budget constraint. A certain desired level of current spending follows in each country depending on exogenous endowments, production functions and (assuming small countries) exogenous prices. Let us label this desired current spending, or absorption, by a particular country, i, as A_i. On the basis of divergences in desired intertemporal substitution between nationals of different countries, varying desired trade gaps between A_i and output, Y_i, can also appear in any period. Whatever the resulting desired borrowing or lending, all households decide the composition of their consumption spending by maximizing an identical CES utility function (more precisely, an identical intratemporal sub-element of their intertemporal utility function) of the following form:

$$U_i = \sum_{j=1}^{K} \beta_j^{\frac{1}{\theta}} c_{ij}^{\frac{\theta-1}{\theta}} , \tag{1}$$

where c_{ij} is country i's consumption (in physical units) of the goods (varieties) produced by country j, β_j is a distribution parameter, reflecting Y_j/Y_w, the output of country j relative to world output, and K is the number of countries in the world. Country i maximizes this function subject to the condition:

$$A_i = \sum_{j=1}^{K} p_{ij} c_{ij} , \tag{2}$$

where p_{ij} is the (common) price of goods (varieties) produced by country j and facing country i. The solution to the maximization problem yields:

$$c_{ij} = \beta_j \left(\frac{p_{ij}}{P_i} \right)^{-\theta} \frac{A_i}{P_i} , \tag{3}$$

where

$$P_i = \left(\sum_{j=1}^{K} \left(\beta_j p_{ij}^{1-\theta} \right) \right)^{\frac{1}{1-\theta}} . \tag{4}$$

Imports of country i from country j, m_{ij}, equal $p_{ij}c_{ij}$ and therefore:

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[3] For a notable example of a version of the gravity model which distinguishes between import and export behavior and where relative prices prominently enter, see Bergstrand (1985, 1989).

$$m_{ij} = \left(\frac{p_{ij}}{P_i}\right)^{1-\theta} \frac{A_i Y_j}{Y_W}. \qquad (5)$$

A similar relationship holds for bilateral imports of country j from i:

$$m_{ji} = \left(\frac{p_{ji}}{P_j}\right)^{1-\theta} \frac{A_j Y_i}{Y_W}. \qquad (6)$$

However, since A_iY_j need not equal A_jY_i, m_{ij} need not equal m_{ji}

Suppose, next, that trading costs drive a wedge between home and foreign prices:

$$p_{ij} = (1 + t_{ij})\, p_j \text{ and } p_{ji} = (1 + t_{ji})\, p_i, \quad t_{ij} > 0 \text{ for } i \neq j \text{ and } t_{ii} = 0 \qquad (7)$$

where t_{ij} reflects all border costs faced by country i in its trade with country j as a percentage of P_j, both monetary and non-monetary. p_{ij} will now differ considerably between countries even though p_j is everywhere the same, and partly so for non-monetary reasons. In the light of the trade costs, equation (6) can be written as:

$$m_{ij} = \left(\frac{(1 + t_{ij})\, p_j}{P_i}\right)^{1-\theta} \frac{A_i Y_j}{Y_W}. \qquad (8)$$

In this paper, we estimate a version of equation (8).

b. *Test specification*

In order to estimate equation (8), we need a measure of the term $(1+t_{ij})p_j/P_i$, which is often referred to as bilateral trade resistance relative to multilateral trade resistance, and where the t_{ij} term captures bilateral resistance and P_i (itself a weighted-average) reflects multilateral resistance. As is common in the gravity approach, we treat bilateral trade resistance and multi-lateral trade resistance separately. In the case of bilateral trade resistance, we introduce the usual gravity variables concerning impediments or aids to bilateral trade, such as distance, language and political associations.

Multilateral trade resistance requires special discussion. Assume that the price of GDP, P^i_{GDP}, is a reflection of p_i, the price of the home good(s). Suppose, in addition, that we can interpret the consumer price index, P^i_{CPI}, as a weighted average of prices of home goods and import prices. If P^i_{CPI} / P^i_{GDP} rises, there is then a rise in foreign relative to home prices and a negative price influence on country i's demand for foreign goods in general relative to home goods. This is clear in the case of final goods, to which we limit the theoretical discussion (like OR and most of the literature on the gravity model). Imports of intermediary goods may raise a complication, since they also affect P^i_{GDP}. However, they influence P^i_{CPI} as well. Thus, in their presence, if only the mix of final and intermediate goods in trade stays constant, a rise in imports will still increase P^i_{CPI} relative to P^i_{GDP}. Regardless, therefore, P^i_{CPI} / P^i_{GDP} is a basic reflection of multilateral trade resistance. Doubtless, better measures of relative prices exist, some of which relate more closely to trade costs, but their use would severely limit the number of observations in our study. However, in using this relative price term we also control for other factors which, we believe, allows us to interpret the coefficient on the relative price term as trade costs.

Our first additional control, which is doubtless important in a multiple currency world, is a weighted average of the exchange rate of the currency of country i with the other world currencies. Since this variable may be partly registered in P^i_{CPI} / P^i_{GDP} it is important to separate it from the relative price term to ensure that the coefficient on the relative price term is not picking up a multilateral exchange rate effect. The weighted-average nominal exchange rate of country i, is labeled E_i. In addition, since all bilateral trade frictions connected to third countries enter in country i's multilateral trade resistance (see equation (4)), P^i_{CPI} / P^i_{GDP} and E_i only cover two of many potential sources of this resistance affecting the country's bilateral trade. In order to reflect these other influences, we include a country fixed effect for country i. This dummy will then reflect all the missing effects on the country's desired imports from everyone. We also include a country fixed effect for country j in order to reflect p_j and therefore all the missing effects on j's exports to everyone. Once the country dummies are added, the estimates of the influences of P^i_{CPI} / P^i_{GDP} and E_i, which are both country-specific variables, will only relate to the time dimension or their movement over time.

In light of these considerations, we propose the following form of equation (8) for estimation, where we allow for movements over time and therefore introduce t subscripts:

$$\ln (m_{ij})_t = a_o + a_t + a_1 \ln (A_i Y_j)_t + a_2 \ln (P^i_{CPI} / P^i_{GDP})_t + a_3 \ln E_{it} + a_M Z^M_c + a_X Z^X_c + a_G G_{ijt} + \varepsilon_{ijt}, \quad (9)$$

a_o in this equation is a constant, a_t is a time fixed effect for all periods except one (and embraces the varying levels of Y_W over time), $a_M Z_c^M$ is the fixed effects of countries as importers and $a_X Z_c^X$ refers to the fixed effects of countries as exporters. The terms a_M and a_X are the fixed effects themselves while Z_c^M is a vector of indicator variables for importing countries (one per country) where Z_c^M equal one if c=i and is 0 otherwise, and Z_c^X is a vector of indicator variables for exporting countries (one per country) where Z_c^X equal one if c=j and is 0 otherwise. There is then a separate Z^M and Z^X dummy for each country. G_{ijt} is a matrix of bilateral gravity variables pertaining to bilateral trade resistance (relating specifically to trade of country i with the particular partner j). Some of the relevant gravity variables in G_{ijt}, like distance, are constants, but others, like currency union and free trade agreement, move (because of entries into and exits from both arrangements). This explains the time subscript in the matrix G_{ijt}. ε_{ijt} is a disturbance term with the usual properties. Based on equation (8), $a_1 = 1$.

Equation (9), however, only reflects the intertemporal concern of countries in the derivation in a vague way. The most direct reflection of this concern is the substitution of domestic absorption for domestic income to signify aggregate spending by the importer. The only other reflection is our distinction between bilateral imports and exports and our associated introduction of the price variables, (P_{CPI}^i / P_{GDP}^i) and E_i. But these features do little to insure that the desired trade balance has a basic role in the estimates. In sum, equation (9) offers inadequate reflection of the emphasis on desired intertemporal substitution in the theoretical derivation. In order to sharpen the role of the intertemporal aspect, we propose estimating equation (9) under the assumption that each country's trade balance between imports and exports over the observation period reflects its desired intertemporal substitution. We do so by imposing the equality of the estimated values of desired net import balances with the observed values over this period as a whole in our estimates.

Specifically, we proceed by introducing the following restriction on the coefficients of the fixed effects for the importing countries, a_M:

$$a_M N_i^M - a_X N_i^X = \sum_{t=1}^{t=T} \left(M_i - M_{ji} \right)_t , \tag{10}$$

where N_i^M is the number of in-sample observations of imports by country i, N_i^X is the number of in-sample observations of exports by country i, M_i are the imports of country i from its K–1 trade partners,

$$M_i = \sum_{j=1}^{K-1} m_{ij}, \qquad j \neq i, \tag{11}$$

and M_{ji} are the imports from country i by its K–1 trade partners,

$$M_{ji} = \sum_{j=1}^{K-1} m_{ji}, \qquad j \neq i. \tag{12}$$

Since we calculate the set of coefficients a_M over the entire period, we effectively suppose that countries satisfy their desired intertemporal substitution over this period but not necessarily over any shorter time stretch. Even as thus formulated for the period as a whole, the equation gives teeth to the idea that countries pursue a trade balance objective. Note also that imposing the constraint in equation (10) strictly on the fixed effects for the importing countries is precisely correct since exports are demand-determined according to the model.

Ideally, the constraint should refer to the difference between the imports and the exports of countries, X_i, rather than the difference between their imports and the imports of the rest from them M_{ji}. X_i is always lower than M_{ji} because of trade costs. Specifically,

$$X_i = \sum_{j=1}^{K-1} \left(m_{ji} - \tau_{ji} p_i c_{ji} \right), \qquad j \neq i \qquad 0 < \tau_{ij} < t_{ij}, \tag{13}$$

where τ_{ji} is the *money* difference between the price to the importer and the price to the exporter as a percentage of the export price p_i. τ_{ji} must be less than t_{ji} because, as mentioned earlier, at least on a cross-sectional basis, the demand for imports also depends on various non-monetary trade costs (related to language, cultural affinities and political ties, etc.) which do not affect the difference between the value of shipments from i and foreign purchases from i. But as we do not model the differences $X_i - M_{ji}$, or the K–1 monetary differences between prices FOB and prices CIF, $\tau_{ji}p_i$, in equation (13) (any more than we model other aspects of trade resistance), these differences must be seen as exogenous. Thus, imposing the restriction on $M_i - X_i$ or on $M_i - M_{ji}$ amounts to the same thing.

Equation (10) imposes K^M different restrictions on the estimates of equation (9), where K^M is the number of importing countries in our sample. In the absence of these restrictions, the correlation between $(M_i - M_{ji})_t$ and the estimated values $(\hat{M}_i - \hat{M}_{ji})_t$ in equation (9) is only 36%. This is rather low, thereby confirming our suspicion that the estimate of (9) reflects the trade balance behavior of the countries only in a vague way. However, once these restrictions are imposed, the correlation between $(M_i – M_{ji})_t$ and $(\hat{M}_i - \hat{M}_{ji})_t$ rises to over 80%. There is therefore little doubt that the restrictions serve their assigned role of reflecting the individual countries' aggregate net imports (which we identify with their desired net imports) over the observation period. As we shall see, the impact of P^i_{CPI} / P^i_{GDP} on trade only emerges significantly in our work following the introduction of these restrictions. This is very reassuring since, as we mentioned before, the role of P^i_{CPI} / P^i_{GDP} in our specification rests essentially on desired intertemporal substitution. It is thus entirely consistent with our analysis that P^i_{CPI} / P^i_{GDP} would emerge as significant when desired intertemporal substitution plays a major role in the estimate, but not otherwise.[4]

The main focus of our empirical work will be on the coefficient of the relative price term, P^i_{CPI} / P^i_{GDP}. This coefficient is our basis for inferring how large a movement in the price of imports relative to home goods a country must entertain if it wishes to change its trade balance. In other words, we base our conclusions entirely on the results following the restrictions in equation (10).

3. Data

Our data set consists of annual observations over 1980-2000 inclusively covering imports of 134 countries from 154 countries (see the data appendix for a full listing). The data on CIF bilateral imports, M_{ij}**,** come from the IMF Direction of Trade Statistics (DTS, 2002). They are expressed in US dollars and converted into constant dollars using the US Consumer Price Index. Our data set was chosen to ensure as wide a coverage of world trade as possible and indeed the IMF database accounts for 99% of world trade in merchandise. However, the percentage of trade in merchandise by the 134 importing countries in our regressions is somewhat lower because of missing data for some of the relevant macroeconomic variables aside from trade. The absorption of country i, A_i, is obtained by subtracting the trade balance

[4] Note, in this connection, that the trade balance constraint in our work operates completely differently in the observations for US imports from Japan than in the observations for Japanese imports from the US, for example. Note also, once again, that our treatment of P^i_{CPI} / P^i_{GDP} as an exogenous variable poses little problem since we estimate bilateral imports rather than aggregate imports or the trade balance.

from GDP_i, where both series come from the World Bank, *World Development Indicators* (WDI (2003)), are expressed in US dollars and divided by the US consumer price index. The ratio of consumer price indices, P_{CPI}, to GDP deflator indices, P_{GDP}, is taken from the World Bank CD-Rom (WDI, 2003). The nominal effective exchange rate is computed for each importing country, i, based on the nominal exchange rates found in the WDI (2003) and a matrix of imports weights for all the trading partners in the sample with a weight greater than one per cent.[5] The other variables are quite standard in the literature on the gravity model of trade. The computation of distance relies on the arc-geometry formula between the two most populous cities. Population is drawn from the WDI (2003). A set of dummies serve to identify whether two trading partners are in a free trade area, whether they share a border, whether they use the same currency, whether one of the two is a protectorate or an overseas territory (e.g. France and French Guyana), whether they have been in a colonial relationship post-1945, or they have had the same colonizer. The data appendix contains a full account of these dummies. The common language variable is from Melitz (2007), who calculates a continuous indicator with values going from 0 to 1 rather than a 0-1 dummy. A summary of the statistics and the correlation matrix are in the appendix.

4. Econometric Results

We turn in this section to the evidence regarding our basic equation (9). All of our tests are maximum likelihood. Table 1 presents the estimates of this equation in the absence of any constraints for the full sample period and for two sub-samples, 1980-1989 and 1990-2000. In these estimates, therefore, differences in desired trade balances between countries play only a vague role, as explained previously. The nominal exchange rate is also not included in the equations reported in Table 1. According to the full sample results, the coefficient on the relative price term P_{CPI}/P_{GDP} has the correct sign but is very small and indeed statistically indistinguishable from zero. In addition, all of the coefficients relating to distance and absorption, two essential gravity terms, bear the correct signs, are significant and have

[5] We experimented with different alternative specifications of the nominal effective exchange rate. Since these different measures did not materially affect any of our results, they are not reported in the paper but are available on request from the authors.

plausible coefficient values. The remaining gravity terms, except for the Common Country and Free Trade Area dummies, are also statistically significant and have plausible magnitudes. One interesting result is that the common language dummy has a larger impact on trade than the currency union dummy, which is similar in magnitude to the figure initially proposed by Rose (2000) in his provocative study. In general, the results for the two sub-samples resemble those for the full sample, though the coefficient on the relative price term is barely statistically significant at the 10% confidence level in the sub-sample of 1980 to 1989.

The previous results do not impose intertemporal preferences in equation (9) precisely. Imposing such preferences in the manner we discussed produces the set of results contained in Table 2 (we emphasize that the relevant constraint, which forces the actual trade balance to equal the desired balance over the sample period as a whole, reflects an assumption about preferences and their satisfaction and nothing else). Once again, we offer these results separately for the full sample period and for the two sub-samples of 1980-1989 and 1990-2000. Crucially, the coefficient on the P_{CPI}/P_{GDP} term is now highly statistically significant in the entire period as well as in both sub-periods. In all three cases, it has a value of approximately 0.3. In addition, the sign, magnitude and significance of the usual gravity variables are broadly similar to those reported in Table 1 where the trade balance constraint was not imposed. Once again, the coefficients on the gravity terms are broadly similar across the two sub-samples (although, in this case, there are some differences).[6]

We believe that these results strongly support the theory. In principle, the relative price term affects imports relative to exports rather than total trade in the model. Thus, it makes sense that its impact would only show up clearly once desired intertemporal trade came explicitly into play. On the other hand, the other influences (apart from the nominal exchange rate) affect total trade, rather than the trade balance. Therefore, they should all be essentially independent of intertemporal considerations and that is in fact exactly what we find.

It is worth highlighting that our results incorporate the impact of all relative price movements at the world level, since such movements will be perfectly correlated with the

[6] For example, the population term shows up with the wrong sign in the first sub-sample and the coefficient on the FTA term becomes significant at the 10% level in this sub-sample. For a clear statement of the reason to expect a negative sign of the population term in the gravity model, see Frankel and Romer (1999).

time dummies. Thus, the estimates allow for the three oil shocks (1974, Iranian revolution, Gulf War) as well as all other changes in relative prices during the period. This will be important below in our interpretation of the impact of P_{CPI}/P_{GDP} as relating to trade costs.

In Table 3 we present the regressions with the nominal exchange rate as a separate conditioning variable. As we noted earlier, this serves the essential role of clarifying whether the coefficient on our relative price term partly reflects the influence of the nominal exchange rate on trade as well as trade costs. In accordance with the theoretical analysis, the nominal exchange rate we use is the effective rate, constructed on the basis of the import trade weights. The results are interesting: the coefficient on the nominal exchange rate is statistically significant in the constrained regression at the 10 percent confidence level. But its magnitude is numerically very close to zero, and its presence does not affect the magnitude or the significance of the coefficient on the relative price term.[7] Of some interest too, the variable is completely insignificant in the unconstrained regression. This reinforces our view that the constraint is important in bringing to light the effects of price variables that influence the desired trade balance or imports relative to exports.

Our 'headline' figure for the elasticity of the influence of P^i_{CPI}/P^i_{GDP} on m_{ij} is 0.3. By implication, this 0.3 estimate also applies (with the opposite sign) to the impact of P^i_{CPI}/P^i_{GDP} on country i's exports to its trading partners. If we start from balanced trade, it follows that the elasticity of influence of our relative price term on the aggregate balance of trade is 0.6, where this figure refers to the change in exports minus imports as a percentage of trade (exports plus imports divided by two). Consequently, the required percentage change in this relative price term in order to obtain a one percent movement in the trade balance is 1.67 percent.

Two fundamental issues remain for discussion. One is why we can reasonably conclude that trade costs are the essential factor underlying our estimates of the impact of P^i_{CPI}/P^i_{GDP}. The other is the reconciliation of our proposed solution to the FH puzzle with OR's explanation of the "home bias" puzzle.

[7] This need not be surprising since our estimates pertain to long run adjustments in trade balances. Nominal exchange rate movements promote real exchange rate changes in the short run. But their contribution to long run movements in the real exchange rate is not nearly as plain.

5. Trade Costs and the Influence of Consumer Prices Relative to Producer Prices

In this section we provide further justification for interpreting the coefficient on the relative price of the CPI to GDP deflator as reflecting trade costs. The consumer price index comprises the prices of imports and home-produced goods. To highlight the usefulness of the coefficient on the relative price term, assume that producer and consumer prices on home-produced goods are equated. This accords with our theoretical discussion, where we suppose zero trade costs at home, although, as we shall see shortly, this assumption is inessential. Then if we let p_i be the index of the production price of the home good, p_j be the index of the production price of the good of country j and K be the number of countries, we may write P^i_{CPI}/P^i_{GDP} as:

$$\frac{P^i_{CPI}}{P^i_{GDP}} = \frac{\alpha_i p_i + (1-\alpha_i)\bar{p}_j(1+\bar{\tau}_i)}{p_i} = \alpha_i + (1-\alpha_i)\frac{\bar{p}_j(1+\bar{\tau}_i)}{p_i} \tag{14}$$

where $\bar{p}_j = \frac{1}{1-\beta_i}\sum_{j=1}^{K-1}\beta_j p_j$ and $\bar{\tau}_i = \frac{1}{1-\beta_i}\sum_{j=1}^{K-1}\beta_j \tau_{ij} \quad i \neq j$

τ_{ij} in equation (14), we may recall, is the fraction of t_{ij} consisting exclusively of money trade costs or differences between prices CIF and FOB.

P^i_{CPI}/P^i_{GDP} thus depends on $\bar{p}_j/p_i$ and $\bar{\tau}_i$, and it is important to note that values of $\bar{p}_j/p_i$ are negatively related across countries and average around one. If production costs and mark-ups are low (below one) in some countries relative to others, they must be high (above one) elsewhere, at least on average. Therefore, if we suppose symmetry of positive and negative effects, the costs and mark-ups have no significant impact on the coefficient of P^i_{CPI}/P^i_{GDP} on the whole. In fact, this reasoning applies to domestic trade costs too, so that our earlier assumption of no domestic trade costs is unnecessary, as stated above (but it aids the exposition). On the other hand, foreign trade costs necessarily raise consumer prices relative to production prices everywhere. Indeed, we believe this factor to be implicit in OR's emphasis on trade costs as the key to the six major puzzles in international macroeconomics.

However, and as we have seen, we make allowance for some major deviations from this general reasoning in our empirical tests. More specifically, we allow for asymmetric effects of changes in $\overline{p}_j / p_i$ on importing and exporting countries by controlling for the net impact of all *movements* in production costs, mark-ups and domestic trade costs (including taxes) at the world level on desired imports by using time dummies. Thus, as explained before, the net difference between the impact of the oil shocks on the demand for imports of oil importers and oil exporters is accounted for in our estimation. In addition, we control for movements in the nominal effective exchange rate. By construction, this price must work in the same direction for all countries on the demand for imports (that is, in the case of pass-through). Given that we control for all changes at the world level over time and the nominal effective exchange rate, we conclude that the coefficient of P^i_{CPI} / P^i_{GDP} in our work truly reflects the impact of $\overline{\tau}_i$ or trade costs and little else.[8]

6. Trade Costs and the Home Bias Puzzle

A higher coefficient of P^i_{CPI} / P^i_{GDP} than .3 would have meant a lower required change in P^i_{CPI} / P^i_{GDP} in order to obtain a one percent change in the trade balance. Evidently, therefore, our explanation of the FH puzzle depends on a low, yet significant, impact of trade costs on imports. However, in contrast, OR require a large impact of trade costs on imports to explain the “home bias” puzzle using trade costs. There would therefore seem to be a basic tension between our proposed solution to the FH puzzle and OR’s explanation of the “home bias” puzzle.[9] In addressing this issue, we shall proceed in two steps. First, we explain why our estimate for the impact of P^i_{CPI} / P^i_{GDP} on the trade balance of 0.3 is really too low to explain the “home bias” puzzle based on trade costs alone, along the lines of OR. Second, we shall go on to suggest a solution and also try to justify it.

[8] In the case of the price of oil, we experimented with the separate effects on demand for imports of oil importers and exporters. (Our measure of the real oil price is the average crude oil 3-month spot price in US dollars obtained from the IMF *International Financial Statistics* CD-Rom (IFS, 2002), divided by the US consumer price index.) The results confirm the usual impression that the adverse impact of the oil shocks on the imports of the oil-importing nations exceeded the impact on the oil-exporting ones. Since some collinearity arises between the relative oil price for importers and P^i_{CPI} / P^i_{GDP}, and since we wish to isolate the impact of P^i_{CPI} / P^i_{GDP}, it seems right to focus on the results in the absence of any disaggregation of the price of oil.

[9] OR effectively sidestep this difficulty by switching to an analysis of the impact of the real interest rate on the current account when they turn from the “home bias” to the FH puzzle. Even a moderate percentage change in relative prices may imply a large percentage movement in present relative to future real interest rates. Therefore, even should the change in relative prices be moderate, as OR argue, it would still contribute heavily, in their reasoning, to the FH puzzle as well.

OR's results can be shown to follow exactly in our set up, given their assumptions. Consider two nations of equal size, and therefore $Y_i = Y_j$, and assume balanced trade, or $Y_i = A_i$. Additionally, assume endowment economies with all relative prices the same and equal to one. Under these assumptions, (since $t_{ii} = 0$) our equation (8) says that the ratio of home trade to foreign trade of either country with the other, m_{ii}/m_{ij}, is:

$$(1 + t_{ij})^{\theta-1}.$$

According to OR's suggested baseline figures, θ equals 6 and the export price is 25% below the import price. Given their further assumption that all trade costs are money costs, or $t_{ij} = \tau_{ij}$, this implies a value of $1+t_{ij}$ of 1/0.75, or 1.33. Consequently, m_{ii}/m_{ij} is about 4.2, which implies a degree of openness of 0.19 (a ratio of 81/19 of home to foreign goods). These are precisely the numbers that OR propose as reasonable for the world as a whole. In this schema, if t_{ij} were zero, m_{ii}/m_{ij} would be one. Thus, all of "home bias" stems from trade costs. However, the implied value of t_{ij} that we recover from our regressions using OR's assumptions is considerably lower, at approximately 0.1.[10]

In fact, the problem is more complicated for two reasons. OR's ratio of 4.2 for m_{ii}/m_{ij} only looks reasonable because of their two-country example. In a multi-country framework with 100 countries this ratio would change dramatically to around 422 and $1 + t_{ij}$ becomes around 3.35.[11] This then widens the gap between our estimate of t_{ij}, of only .1, and the value necessary for the benchmark of .19 openness (the needed t_{ij} becomes 235%).[12] This figure

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[10] To derive this number note, first, that P^i_{CPI}/P^i_{GDP} in our work does not correspond exactly to the import price relative to the export price in OR's example. Instead, from equation (13) it refers to $\alpha_i + (1-\alpha_i)(1 + t_{ij})$, after equating τ_{ij} and t_{ij} and setting $\overline{p}_j$ and p_i equal to one. Thus, in terms of OR's schematic example, our estimate relates to the value of $(1-\alpha_i)(1+t_{ij})^{1-\theta}$. For m_{ii}, $(1+t_{ij})^{1-\theta}$ reduces to 1, and therefore our estimate of the impact of P^i_{CPI}/P^i_{GDP} on m_{ii}/m_{ij} corresponds to $(1-\alpha_i)\,(1+t_{ij})^{\theta-1}$ rather than $(1+t_{ij})^{\theta-1}$. We estimate this value as .3. Therefore, if we assign a value of .81 to α_i, we have an estimate of $(1+t_{ij})^{\theta-1}$ of around 1.58, which implies a value of t_{ij} of around .1.

[11] Take the same parameter values as OR, but assume 100 identical countries so that country i imports from 99 others. In that case, the baseline situation without trade costs is one of .99 openness. Trade costs raising the ratio m_{ii}/m_{ij} by a factor of 4.2 in relation to each of the 99 foreign countries would then yield a rise in the percentage of home consumption from .01 to approximately .041. So to reduce the value of openness to a level as low as .19, OR require a value of m_{ii}/m_{ij} of approximately 422 or about 100 times 4.2.

[12] Anderson and van Wincoop (2004) recently estimate t_{ij} as 170%. This might suggest that 235% is not as outlandish as it seems at first blush. However, their figure includes the tax equivalent of all non-money impedi-

also raises doubts about OR's claim that moderate trade costs suffice to generate the observed degree of home bias in the world under their assumptions.

The second problem relates to the identification of t_{ij} and τ_{ij}. To the extent that t_{ij} exceeds τ_{ij}, our implicit figure for money trade costs will be even lower than .1. But we regard this problem as minor relative to the distortion introduced by limiting the analysis to a two-country framework. As indicated before, non-money trade costs matter mostly on a cross-sectional basis, or in choosing to trade between alternative foreign partners. In the strict temporal dimension, money costs probably dominate trade costs. Our estimate of the impact of P^i_{CPI}/P^i_{GDP} relates strictly to the temporal dimension. Thus, we do not believe that equating t_{ij} and τ_{ij} is a big problem in our context or OR's. This same line of reasoning probably underlies OR's willingness to identify trade costs with the monetary costs.

How can we reconcile our relatively low value of t_{ij} with that of OR? As a preliminary remark, note that our estimate of τ_{ij} of .1 is highly sensitive to the coefficient of .3. Even if we stick with all of OR's assumptions, $\alpha_i = .81$ and $\theta=6$, a doubling of the estimate of the impact of P^i_{CPI}/P^i_{GDP} or a rise to .6 leads to a rise of τ_{ij} from around .1 to .26 ($x \cong 1.26$ for $x^5 = .6 \div .19$), which is clearly much closer to OR's ballpark figure of 0.33. (Lower values of $1-\alpha_i$ and θ further reduce the problem of raising τ_{ij}.). How might this higher figure obtain?

In answer, the assumption of flat values of τ_{ij} is dubious, as OR recognize themselves. As ratios of trade to output rise, trade in highly heterogeneous goods and in heavy, difficult-to-transport goods, must increase. Consequently, even if values of τ_{ij} of around .3 exist in trade, the values of τ_{ij} relating to many goods that are not traded may well be over 100 percent.[13] (Betts and Kehoe (2001) and Bergen and Glick (2004) recently reason on this basis.) As a result, there are really two separate values of trade costs that enter in case of movements of bilateral trade. One of them is relevant when the movements concern mere redistributions of output between existing firms or the churning of firms and varieties without any change in

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ments to trade that enter in the cross-sectional dimension in our estimates as well as the domestic impediments to trade.

[13] In addition, elasticities of substitution may vary between goods, going from extremely high figures for home goods with very close substitutes abroad to very low figures. Consequently, as long as t_{ij} is non-trivially greater than zero, θ alone may account for a significant rise of α above .01 in our example with 100 countries (because of the low values of θ). This further reduces the difficulty of obtaining high values of α in equation (13).

aggregate trade at a given level of output. The other is relevant when the ratio of trade to output changes. The first level, occurring when the trade ratio or degree of openness stays the same, is lower than the second, occurring when the trade ratio moves. The first one is also the relevant one in the case of the FH puzzle, while the second is the relevant one in the case of the "home bias" puzzle. Our estimates relate to the first. OR clearly have in mind the second.[14]

In sum, since our analysis focuses on the trade balance, our estimate of trade costs relates to the lower margin. The higher margin relates to openness and therefore to the ratio of total trade to output, which we do not analyze. If our interpretation is correct, movements in the ratios of trade balances to output for our sample period should be largely independent of movements in the ratios of trade to output. We therefore investigated the correlation between the two ratios in our panel. The exact calculation and the result are as follows:

$$\mathrm{Corr}\left(\frac{M_i + M_{ji}}{2Y_i}, \frac{|M_i - M_{ji}|}{Y_i}\right) = -0.0168 \ \ (0.405)$$

(where the number in parentheses is the p value). The correlation is negligible, negative and statistically insignificant. We conclude that our estimate relates to the lower margin for trade costs.[15]

[14] There are, in fact, several reasons why the two values of trade costs may be expected to differ even at the margin. If additional trade means that new goods (not simply new varieties) enter into foreign trade, the rise in trade costs at the margin may jump up rather than go up continuously. In addition, the trade costs may be higher at first than they will become later, after the initial information and distribution problems of launching the new products abroad settle down. In this connection, a lot of recent empirical work shows that entry of individual firms into export activity always entails major once-and-for-all costs of production and distribution. (See Roberts and Tybout (1997), Bernard and Jensen (2001) and Bernard and Wagner (2001).) Such fixed costs may well be more severe if entry means introducing new products abroad (rather than previously exported ones or newly exported ones that are merely differentiated, as is more likely to happen when the adjustments concern the trade balance at a set level of total national trade).

[15] Ruhl (2003) makes a similar point in a closely related context. Specifically, he seeks to reconcile the low estimates of the elasticity of substitution between home and foreign goods in the business cycle literature with the much higher estimates of this same elasticity in the literature on the growth of trade, where the concern is with the impact of trade liberalization, free trade agreements and the like. In the former literature, the elasticities regard responses to transitory shocks whereas in the latter, they relate to responses to permanent shocks. He considers the former adjustments as ones on the "intensive margin" and the latter as ones on the "extensive margin". Our context differs because the adjustments in trade balance that we are interested in may well be persistent. However, the similarity remains so far as those adjustments do not necessarily require any change in the size of the traded goods sector relative to the economy as a whole, and therefore in the total range of goods entering into trade (ordered by trade costs). Thus, his distinction between adjustments at the intensive margin (same range of goods) and the extensive margin (wider range of goods) is apt.

7. Concluding discussion

In this paper, we have provided empirical support for OR's hypothesis that trade costs contribute to resolving the FH puzzle. According to our estimates, countries require a 1.67 percent adjustment in the price of the goods they consume relative to the price of the goods they produce for every percentage movement in their trade balance. Based on our interpretation of the relative price term, trade costs are the essential factor in the explanation. In support of this view, we have admitted time fixed effects and the nominal effective exchange rate as separate conditioning variables. Therefore, we can exclude relative price movements at the world level and the effective exchange rate as influences in our estimates.

In closing, two further points deserve emphasis. Our effort to resolve the FH puzzle in terms of trade costs deviates from OR in one crucial respect: we do not rely on expected future reversals in trade balance positions for our solution. Rather, in our view, the argument for their position can be made without going beyond the implications of their stand relating to trade balances. The reason for this deviation from OR seems to us strong: countries with trade balance deficits tend to be net creditors, while those with trade surpluses tend to be net debtors. Studies of the FH puzzle cover wide samples of countries. Therefore, in dealing with the puzzle, it seems precarious to us to treat trade imbalances as unsustainable. There is little reason for markets systematically to expect trade balances to reverse and to embed such reversals in their real interest rate expectations (all the less so since the countries with trade deficits may have adequate future income prospects). This deviation from OR brings us close to Lane and Milesi Ferretti (2002a) and their emphasis on the stability of trade balance positions. The same time series evidence, though, is consistent with our view that both the small size and the sluggishness of trade balances are the key to the small size and the sluggishness of current accounts.

In conclusion, certain econometric features of our work deserve emphasis. We have used a gravity framework and data on bilateral trade to draw out implications about the impact of relative prices on national trade balances. Previous researchers have also introduced relative prices into the gravity framework, but their emphasis was on separate import and export responses to such prices (see, for example, Bergstrand (1989) and Bayoumi (1989)). As far as we are aware, ours is the first attempt to use the gravity model to address the relationship between relative prices and national trade balances. In order to do so, despite the essential bilateral trade orientation of the model, we adopted a simple yet popular version of the gravity approach with passive export behavior, in which we incorporated desired intertemporal substitution at the national level. The relevant macroeconomic concern with the future has a profound role on our estimates. When we do not incorporate this effect, the relative price variable has no influence on bilateral trade, but when we do incorporate it the influence of this variable emerges clearly.

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Table 1 – Unconstrained Estimates

	1980–2000	1980-1989	1990-2000
Log(A_i*Y_j)	**.670**	**.466**	**.546**
	(.020)	**(.028)**	**(.026)**
Log(P_{CPI} / P_{GDP})	-.056	-.154*	.139
	(.062)	(.093)	(.091)
Log(Distance)	**-1.345**	**-1.250**	**-1.390**
	(.030)	**(.036)**	**(.030)**
Common Border (0,1)	**.418**	.266*	**.546**
	(.130)	(.145)	**(.135)**
Common Country (0,1)	.255	-.049	.196
	(.407)	(.705)	(.532)
Ex-Common Colonizer (0,1)	**.572**	**.531**	**.589**
	(.070)	**(.084)**	**(.074)**
Ex-Colonial Relationship (0,1)	**1.525**	**1.471**	**1.541**
	(.140)	**(.142)**	**(.145)**
Log($Population_i$*$Population_j$)	**-.023**	-.016	**-.020**
	(.008)	(.022)	**(.006)**
Free Trade Area (0,1)	.176	.272**	.119
	(.110)	(.125)	(.110)
Currency Union (0,1)	**.776**	**.920**	**.656**
	(.165)	**(.192)**	**(.171)**
Common Language	**.894**	**.803**	.945
	(.067)	**(.076)**	(.071)
Number of Observations	186362	70682	115680
Wald-χ^2 Test	5741.59	35327.02	58058.14
	p=[.000]	p=[.000]	p=[.000]
Rho	.364	-	-

NOTES: Regressions include time fixed effects and separate countries fixed effects for countries as importers and as exporters (see equation (11) in the text). The coefficients of these dummies are not reported; robust standard errors in parentheses; correction for clustering of country pairs; characters in bold indicate coefficients significant at the 1% level; ** and * denote significance at the 5% and at the 10% level, respectively. *Rho* denotes the correlation between observed net imports and predicted net imports: Corr($\Sigma_t(M_i - M_{ji})_t$, $\Sigma_t(\hat{M}_i - \hat{M}_{ji})_t$)

Table 2 – Constrained Estimates

	1980–2000	1980-1989	1990-2000
Log(A_i*Y_j)	**.508** **(.033)**	**.402** **(.044)**	**.412** **(.048)**
Log(P_{CPI} / P_{GDP})	**-.306** **(.102)**	-.285** (.127)	-.291* (.160)
Log(Distance)	**-1.339** **(.030)**	**-1.271** **(.037)**	**-1.393** **(.030)**
Common Border (0,1)	**.447** **(.132)**	.309** (.146)	**.573** **(.140)**
Common Country (0,1)	.698 (.492)	.366 (.561)	.630 (.772)
Ex-Common Colonizer (0,1)	**.683** **(.072)**	**.563** **(.086)**	**.605** **(.076)**
Ex-Colonial Relationship (0,1)	**1.429** **(.145)**	**1.338** **(.149)**	**1.434** **(.156)**
Log($Population_i$*$Population_j$)	**-.175** **(.019)**	.062* (.034)	.020 (.014)
Free Trade Area (0,1)	.152 (.110)	.216* (.127)	.097 (.111)
Currency Union (0,1)	**.602** **(.183)**	**.710** **(.221)**	**.577** **(.184)**
Common Language	**.893** **(.070)**	**.775** **(.081)**	**.920** **(.074)**
Number of Observations	186362	70682	115680
Wald-χ^2 Test	49317.01 p=[.000]	26898.35 p=[.000]	56381.22 p=[.000]
Rho	.813	-	-

NOTES: Regressions include time fixed effects and separate countries fixed effects for countries as importers and as exporters (see equation (11) in the text). The coefficients of these dummies are not reported; robust standard errors in parentheses; correction for clustering of country pairs; characters in bold indicate coefficients significant at the 1% level; ** and * denote significance at the 5% and at the 10% level, respectively. *Rho* denotes the correlation between observed net imports and predicted net imports: Corr($\Sigma_t(M_i-M_{ji})_t$, $\Sigma_t(\hat{M}_i - \hat{M}_{ji})_t$)

Table 3 – Regressions with the Nominal Effective Exchange Rate (1980-2000)

	Unconstrained	Constrained
$Log(A_i*Y_j)$	**.674** **(.020)**	**.544** **(.037)**
$log(P_{CPI}/P_{GDP})$	-.062 (.062)	**-.322** **(.103)**
Log of Nominal Effective Exchange Rate	.000 (.001)	.005* (.003)
Log(Distance)	**-1.346** **(.030)**	**-1.34** **(.030)**
Common Border (0,1)	**.419** **(.130)**	**0.446** **(.133)**
Common Country (0,1)	.252 (.412)	0.653 (.504)
Ex-Common Colonizer (0,1)	**.568** **(.070)**	**0.673** **(.072)**
Ex-Colonial Relationship (0,1)	**1.517** **(.141)**	**1.425** **(.146)**
$Log(Population_i*Population_j)$	**-.023** **(.008)**	**-.177** **(.020)**
Free Trade Area (0,1)	.187* (.110)	.168 (.111)
Currency Union (0,1)	**.793** **(.166)**	**.618** **(.184)**
Common Language	**.894** **(.068)**	**.898** **(.070)**
Number of Observations	184806	184806
Wald-χ^2 Test	56475.82 p=[.000]	48556.18 p=[.000]
Log-Likelihood	-377463	-415926

NOTES: Regressions include time fixed effects and separate countries fixed effects for countries as importers and as exporters (see equation (11) in the text). The coefficients of these dummies are not reported; robust standard errors in parentheses; correction for clustering of country pairs; characters in bold indicate coefficients significant at the 1% level; ** and * denote significance at the 5% and at the 10% level, respectively.

DATA APPENDIX

M_{ij}: Bilateral Imports CIF of i from j (Source: IMF Directions of Trade Statistics, DOTS 2002), expressed in US$ and transformed in constant dollars by dividing by the US CPI

$Distance_{ij}$: Great circle distances are calculated using the arc-geometry formula on the latitude and longitude coordinates of the most populous city.

A_i: Absorption of country i. The figure is obtained by subtracting the trade balance (in US$, divided by the US CPI) from the GDP (in US$ divided by the US CPI). Both series are taken from the World Bank World Development Indicators (hereafter WDI (2003))

Y_j: Gross Domestic Product of country j in current US$ divided by the US CPI series. Both series are taken from the WDI (2003)

P_{CPI}: Consumer Price Index (1995=100) taken from the WDI (2003)

P_{GDP}: GDP Deflator (1995=100) taken from the WDI (2003)

Real Price of Oil: Average crude oil price 3-months Spot Price Index from the IMF-IFS CD-Rom (2002), line 00176AADZF). The series is in US$ and has been divided by the US CPI.

Population: Population taken from the WDI (2002)

Common Language: See Melitz (2004)

List of Countries
I.S. Of Afghanistan*, Albania, Algeria, Angola, Antigua And Barbuda*, Argentina, Aruba*, Australia, Austria, The Bahamas, Bahrain, Bangladesh, Barbados, Belgium, Belize, Benin, Bhutan*, Bolivia, Brazil, Brunei Darussalam*, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Central African Rep., Chad, Chile, People's Rep Of China, Colombia, Comoros*, Dem. Rep. Of Congo, Republic Of Congo, Costa Rica, Cote D'Ivoire, Cyprus, Czech Republic, Denmark, Djibouti*, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Finland, France, Gabon, The Gambia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea*, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, I.R. Of Iran, Iraq*, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Kiribati*, Kuwait, People's Dem. Rep. Of Lao, Lebanon*, Liberia*, Libya*, Macedonia, Republic Of, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Nepal, Netherlands, Netherlands Antilles*, New Caledonia*, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar*, Romania, Russian Federation, Rwanda, Samoa, Sao Tome & Principe*, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia*, South Africa, South Korea, Spain, Sri Lanka, St. Kitts And Nevis, St. Lucia, St. Vincent & Grens., Sudan, Suriname, Sweden, Switzerland, Syrian Arab Republic, Tanzania, Thailand, Togo, Tonga, Trinidad And Tobago, Tunisia, Turkey, Uganda, United Arab Emirates*, United Kingdom, United States, Uruguay, Venezuela, Vietnam, West Bank*, Zambia, Zimbabwe.

*the country is only an exporter in the dataset

Free Trade Areas
Regional Trade Agreements notified to the GATT/WTO and in force.
(Source: http://www.wto.org as of 30th of June 2002)

*1) **EC/EEA/EFTA/EU***
Belgium, Bel-Lux, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands, UK, Norway, Switzerland, Malta, OCTs (Greenland, New Caledonia, French Polynesia, St. Pierre and Miquelon, Aruba, New Antilles, Falklands, St. Helena);
Austria (since 1995), Finland (since 1995), Sweden (since 1995), Greece (since 1981), Portugal (since 1986), Spain (since 1986).
*2) **NAFTA*** Free Trade Agreement, since 1994
Canada, Mexico, USA
*3) **CARICOM*** Customs Union, since 1973
Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Haiti, Jamaica, Trinidad and Tobago, St. Vincent and Grenadines, St. Kitts and Nevis, Suriname
*4) **SPARTECA*** Free Trade Agreement, since 1977
Australia, New Zealand, Fiji, Kiribati, Nauru, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu.
*5) **MERCOSUR*** Customs Union, since 1991
Argentina, Brazil, Paraguay, Uruguay
*6) **BAFTA*** Free Trade Agreement, since 1994
Estonia, Latvia, Lithuania
*7) **CACM*** Customs Union, since 1961
Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua.
*8) **US-ISRAEL*** Free Trade Agreement, since 1985
United States, Israel
*9) **CER*** Free Trade Agreement, since 1983
Australia and New Zealand

Common Countries
(Source: CIA World Factbook 2002)

China, Hong Kong (since 1997) and Macao; *Denmark,* Faeroe Islands and Greenland; *France,* French Polynesia, Guadeloupe, French Guiana, Martinique, New Caledonia, Reunion, and St. Pierre & Miquelon; *The Netherlands,* —Aruba and Netherlands Antilles; *United Kingdom,* Bermuda, Falkland Islands, Gibraltar, and St. Helena; *United States,* American Samoa and Guam.

Ex-Colonial Relationship and Ex-Common Colonizer
(Source: CIA World Factbook 2002)

Australia and Papua New Guinea; **Belgium** and Burundi, Dem. Rep. Of Congo; **France** and Algeria, Benin, Burkina Faso, Cambodia, Cameroon, Central African Rep., Chad, Congo Rep. Of, Djibouti, Gabon, Guinea, Lao People's Rep, Madagascar, Mali, Mauritania, Morocco, Niger, Senegal, Syrian Arab Rep., Togo, Tunisia, Vietnam; **Italy** and Libya; **New Zealand** and Samoa; **Portugal** and Angola, Cape Verde, Guinea-Bissau, Mozambique, Sao Tome & Principe, Timor; Spain and Equatorial Guinea; **South Africa** and Namibia; **The Netherlands** and Indonesia, Suriname; **Japan** and North Korea, South Korea; *USA* and Palau, Philippines; **United Kingdom** and The Bahamas, Bahrain, Bangladesh, Barbados, Belize, Bhutan, Botswana, Brunei Darussalam, Cyprus, Dominica, Fiji, The Gambia, Ghana, Grenada, Guyana, Hong Kong, India, Jamaica, Jordan, Kenya, Kiribati, Kuwait, Lesotho, Malawi, Malaysia, Maldives, Malta, Mauritius, Myanmar, Nauru, Nigeria, Pakistan, Qatar, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenadines, Sudan, Swaziland, Tanzania, Tonga, Trinidad and Tobago, Tuvalu, Uganda, United Arab Emirates, Vanuatu, Zambia, Zimbabwe. (Countries in bold characters are the ex-colonizers).

Currency Unions
(Source: Glick and Rose (2002), updated with information from the IMF International Financial Statistics Book (2002))

1) Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenadines;
2) Aruba, Netherlands Antilles, Suriname (until 1994); Australia, Kiribati, Nauru, Tonga (until 1991), Tuvalu;
3) Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, The Netherlands, Portugal and Spain (Since 1999);
4) Cameroon, Togo;
5) Central African Rep., Benin, Burkina Faso, Chad, Comoros (until 1994), Rep. of Congo, Ivory Coast, Equatorial Guinea, Gabon, Guinea-Bissau, Madagascar (until 1982), Mali, Niger, Senegal, Togo;
6) Denmark, Faeroe Islands, Greenland;
7) France, French Guiana, Guadeloupe, Martinique, Reunion, St. Pierre & Miquelon;
8) Lesotho, South Africa, Swaziland;
9) New Caledonia, French Polynesia, Wallis & Futuna;
10) Qatar, United Arab Emirates;
11) United Kingdom, Falkland Islands, Gibraltar, St. Helena;
12) United States, American Samoa, Bahamas, Bermuda, Dominican Rep. (until 1985), Guam, Guatemala (until 1986), Liberia, Panama.