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Monetary Integration and Trade: What Do We Know?*

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Abstract
In this essay, I discuss the potential effects of monetary integration on trade from a European perspective. I begin by briefly reviewing the recent literature on the trade effects of monetary unions. I then discuss reasons why the trade effects of monetary integration might differ across regions. In particular, I argue that, if anything, trade effects can be expected to be particular strong for Europe. Finally, I present some new evidence on the trade effects of the euro.

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I. Entrée

What is the effect of monetary integration on international trade? About a decade ago, an informed answer to this question would have been: Presumably positive, but negligibly small in magnitude. While exchange rate fluctuations were widely viewed (both in policy circles and among business people) as a major business risk that may seriously inhibit cross-border transactions, econometric evidence that exchange rate stability enhances trade remained surprisingly weak. Figure 1 provides an (admittedly rough) illustration of this (non-) result at a very aggregate level. The figure plots the evolution of world trade and average real effective exchange rate volatility since 1970. As is easily observed, there is essentially no visible relationship between the two lines. While the overall level of currency volatility has varied considerably over time (almost tripling in magnitude until the end of the 1980s and then trending down again), world trade has increased rather steadily at a fairly smooth pace over the sample period. Clark, Tamirisa and Wei (2004) provide an excellent survey of the literature on exchange rate variability and trade.

In a now classic paper, however, Andrew Rose (2000) has revolutionized economic thinking about this issue. Examining the trade patterns of countries inside and outside of currency unions, he finds that *full* monetary integration is very strongly associated with bilateral trade intensity. In particular, Rose finds that countries sharing a common currency trade significantly more with each other than countries using separate currencies, an effect that would go far beyond simply eliminating bilateral exchange rate volatility (although the estimated magnitude of the effect appears to be highly sensitive to the exact econometric specification of the estimation equation). Since these results are of large policy relevance and are in stark contrast to the existing literature, Jeffrey Frankel (2005, p. 1) considers Rose's work "to be the most influential international economics paper of the last ten years".

In this short paper, I briefly review the recent literature on the link between monetary integration and trade. Given the two strongly contradictory findings in the literature, I will particularly focus on potential shortcomings and pitfalls in the analysis and propose some – in my view promising – lines for future research. I will also discuss the applicability and relevance of Rose's results for monetary integration in Europe.

II. Easy

Any estimate of the effects of monetary integration on trade requires a benchmark for the amount of trade expected without monetary integration. In the empirical trade literature, this "expected" bilateral trade is typically obtained using a gravity model. More specifically,

trade is expected to increase with the (economic) size of the partners and is likely to fall with the distance between them. Since this approach is basically a simple analogy from the gravity equation in physics, the gravity equation for trade was widely thought to be an empirical regularity that lacks economic foundations. In recent years, however, it has been shown that a standard gravity equation can be derived from a variety of different structural assumptions. As a result, the gravity model has both an excellent empirical fit and firm theoretical foundations.

To provide some background, the gravity equation can be written, in very general form, as:

(1) $$T_{ij} = G\, X_i\, M_j\, \phi_{ij}$$

where T_{ij} denotes exports from country i to country j; X_i and M_j capture all exporter-specific and importer-specific characteristics, respectively; ϕ_{ij} represents bilateral trade costs; and G is a constant (that might vary over time). Borrowing from the gravity analogy, then, country-specific attributes are typically proxied by a country's GDP (i.e., $X_i = Y_i^{\beta 1}$ and $X_j = Y_j^{\beta 2}$). Similarly, geographic distance (D_{ij}) is broadly construed to include all factors that might create trade resistance. Finally, the framework is extended to account for other factors. For instance, exporter-specific and importer-specific fixed effects, s_i and s_j, are frequently added to control for multilateral resistance, as suggested by Anderson and van Wincoop (2003). More importantly (for our purposes), the gravity equation is easily augmented to account for the resistance created by exchange rate variability, ERV_{ij}, so that (1) becomes:

(2) $$T_{ij} = \alpha Y_i^{\beta 1} Y_j^{\beta 2} D_{ij}^{\beta 3} \exp(\beta_4 s_i + \beta_5 s_j + \gamma\, ERV_{ij})$$

where α, the β's and γ are parameters to be estimated. Finally, taking logs yields a regression equation that is linear in the parameters:

(3) $$\ln(T_{ij}) = \ln(\alpha) + \beta_1 \ln(Y_i) + \beta_2 \ln(Y_j) + \beta_3 \ln(D_{ij}) + \beta_4 s_i + \beta_5 s_j + \gamma\, ERV_{ij} + \varepsilon_{ij}.$$

The parameter of interest is γ; this coefficient captures the extent to which fluctuations in exchange rates affect the volume of bilateral trade. Interestingly, estimates of γ differ strongly according to the measure of exchange rate variability that is used. On the one hand, for risk measures based on the standard deviation of the level (or the percentage change) of the exchange rate, the point estimate of γ is typically insignificantly different from zero. Not surprisingly, there is some variation in the results, given the wide range of analyzed country samples, time periods, and estimation techniques. For instance, studies at sectoral level appear to be somewhat more supportive for the hypothesis that exchange rate variability reduces trade. Also, analyses of bilateral trade (instead of a pooled panel framework) tend to produce stronger results. Still, the overall evidence is weak that exchange rate fluctuations are

associated with lower trade volumes. A recent example is Tenreyro (2007); Coté (1994) and Clark, Tamirisa and Wei (2004) provide comprehensive surveys.

On the other hand, estimates of γ are positive, economically large and statistically significant when risk measures based on (bivariate) indicators of a fixed exchange rate are used. That is, in contrast to the previous finding, eliminating exchange rate variability *completely* appears to strongly benefit trade. Since Rose's (2000) initial finding of this effect was based on a dummy variable for common membership in a currency union, it was possible to rationalize this result by arguing that sharing a common currency is a particularly strong form of monetary integration. Typically, if two (or more) monies circulate in the union, there is a 1:1 exchange rate. Also, a currency union linkage cannot be easily dissolved so that the exchange rate risk is zero over a longer period of time. Recently, however, Klein and Shambaugh (2006) have changed this view, reporting coefficient estimates of similar magnitudes for less restrictive exchange rate regimes. In particular, they find that reducing exchange rate volatility to (almost) zero significantly increases bilateral trade, especially for countries that have linked their currency to a base country (while effects are smaller for indirect pegs).[1]

In sum, there is strong evidence of a non-linear effect of exchange rate volatility on trade. While exchange rate variability has generally little effect on trade, fixed exchange rates are convincingly associated with greater bilateral trade intensity.

III. Econometrics

Rose's empirical findings have (not surprisingly) generated a huge response. Critics were especially unconvinced by Rose's initial estimates that a common currency might even triple trade between member countries and listed a number of potential econometric problems in the estimation. Many of these points are nicely summarized and discussed in Baldwin (2006).

While there are certainly various qualifications on Rose's estimates of importance, I would like to emphasize two conceptual issues which I view as particularly relevant for countries which consider closer monetary integration. A first issue deals with causality. While it may be worthwhile to analyze the general association between currency regimes and

[1] Klein and Shambaugh (2006) note: "A particular country is judged to have a direct peg with a certain base country in a given year if their bilateral exchange rate stays within a +/- 2 percent band. In addition, if a country maintains a perfectly flat peg to the currency of a base country for 11 out of 12 months within a year, but then has a single change in its bilateral exchange rate, this "single change" observation is also coded as a direct peg."

international trade, the main point of interest is the direction of causality between the two. Does money follow trade, as the literature on optimum currency areas suggests? Or does trade follow money, as Rose and also Frankel and Rose (1997, 2002) appear to imply? Unfortunately, Rose's empirical approach can provide only limited insights on this issue.

The main empirical strategy that is used in Rose (2000) is to estimate variants of (3) in cross-section fashion using ordinary least-squares (OLS). However, since it seems reasonable to assume that the formation of a currency union is endogenous to trade (with highly integrated countries being more likely to form a currency union), OLS estimates of γ possibly reflect reverse causality.[2] As a solution to this identification problem in (3), Glick and Rose (2002) apply a fixed effects estimator in a panel setting. The idea is that a full set of country pair fixed effects then captures all (potentially unobserved) country pair characteristics that affect bilateral values of trade. As a result, the estimate of γ no longer shows the correlation between currency union membership and trade, but measures the effect of a change in currency union membership on trade.

This identification strategy, however, is not without problems. For one thing, the fixed effects fully exhaust the time-invariant characteristics of a bilateral trade relationship, including joint membership in a currency union; that is, γ is exclusively determined by episodes in which currency union membership has changed over the sample period. These events, however, are rare over the post-war period. They are almost always currency union dissolutions; and these currency union exits were often accompanied by other disturbances which have possibly (negatively) affected bilateral trade. Another difficulty of the fixed effects approach is that (time-invariant) fixed effects simply average out the bilateral value of trade for a country pair over the sample period, thereby providing an incomplete description of panel dynamics.

Berger and Nitsch (2008) illustrate the importance of these issues in a European context. They show that there has been a considerable degree of trade integration between the twelve countries that are now members of the Economic and Monetary Union (EMU) in Europe already before the formation of EMU. Performing yearly cross-section regressions of (3) since 1948, they find that the estimated γ coefficient becomes significantly different from zero already in the early 1980s, even if the sample is restricted to include only European countries. Further, the time-invariant country pair fixed effects estimator can only partly take account of this above-average trade intensity (at the end of the sample period). In particular, it

[2] For example, Ritschl and Wolf (2003) find that existing trade linkages had a strong effect on the sorting of countries into different currency blocs in the inter-war period.

is shown that simply conditioning for the average intensity of bilateral trade over the sample period misses important changes in bilateral trade patterns over time. Specifically, it turns out that trade intensity among EMU member countries has continuously increased since the end of World War II. As a result, they argue that the further increase in trade intensity that is observed after the introduction of the euro is perhaps best viewed as a continuation of the trend in integration in the pre-euro period instead of an independent euro effect on trade.[3]

A second issue that might be of relevance for a discussion of the trade effects of regional monetary integration is heterogeneity. For a given econometric approach, the estimates of γ appear to differ enormously across regions and currencies. For instance, Levy-Yeyati (2003) finds a much stronger link between a common currency and bilateral trade for unilaterally dollarized countries than for members of a multilateral currency union.[4] But even among the group of dollarized countries, there appear to be sizable differences in bilateral trade intensities. For instance, Klein (2005) finds relatively small effects for Western Hemisphere countries that have adopted the US dollar, while Nitsch (2002) reports particularly large estimates for South Pacific islands using the Australian dollar as national currency. Reporting on these findings, Frankel (2005) argues that the variation in the estimated coefficients is of generally little interest; he dismisses the decomposition approach by noting that Rose's finding only managed to come up significantly when the data were pooled. Still, heterogeneity appears to be an interesting feature of the data that is clearly of importance when the potential effects of monetary integration on a regional level are discussed.

IV. Europe

Given these general uncertainties about the trade effects of monetary integration, then, what trade effects can be reasonably expected for monetary integration in Europe? Are there any features that possibly distinguish Europe from other regions in the world? In the following, I will argue that there are good reasons to assume that the trade effects of monetary integration should be, if anything, particularly strong in Europe.

A good starting point appears to be an analysis of existing trade patterns. Alesina and Barro (2002) develop a model in which the adoption of a common currency represents a reduction of "iceberg" transaction costs between two countries. Accordingly, they argue that countries that trade more with each other also benefit more from adopting the same currency.

[3] Nitsch (2006) shows that there is no euro effect identifiable when the regression includes time-variant country specific fixed effects.
[4] Levy Yeyati's (2003) sample of multilateral currency unions does not include EMU.

Simply, the larger the share of a country's external trade that is freed from the risk of exchange rate fluctuations, the larger will be the savings in trading costs.

To make this argument operational, Alesina, Barro, and Tenreyro (2003) compute for each country in the world (with a population of more than 500,000) the average trade-to-GDP ratio of the country's trade with three potential anchors: the US, the euro area and Japan. The aim is to identify countries that might benefit most strongly from adopting another country's currency as well as the preferred anchor currency. Reviewing their results, Mauritania is on top of the list, trading about 34.8 percent of its GDP with the euro area, followed by Trinidad and Tobago with an average share of its US trade in GDP of 29.6 percent. The strongest trade linkages to Japan are reported for Oman (16.0 percent) and the United Arab Emirates (15.7 percent), followed interestingly by Panama (14.1 percent), which is a dollarized country.

For our purposes, however, a simple listing of countries whose trade is least diversified geographically appears to be insufficient. The main shortcoming of this approach is probably its one-directional view; some countries may be heavily dependent on trade with a particular partner, while this bilateral trade relationship is of little importance for the partner country. Thus, even though Alesina, Barro, and Tenreyro's approach may provide a useful indication for the benefits of unilateral dollarization, it is of little help when assessing the potential gains from multilateral monetary integration.

Therefore, a more fruitful approach may be to examine regional intensities of trade. To illustrate the regional patterns of trade, Table 1 reports the current values and shares of intra- and interregional merchandise trade. As it turns out, Europe is not only the region with the (by far) largest value of intra-regional cross-border trade, European countries also do the largest share (almost three-fourth) of their external trade with regional neighbors. Since intra-regional trade is of such exceptional importance in Europe, European countries appear to benefit most strongly from regional monetary integration.

There are, however, (at least) two qualifications to this reasoning. First, the argument heavily depends on the Rose hypothesis that the adoption of a common currency has much larger effects (on trade) than just eliminating exchange rate volatility. For instance, it could be argued that European countries already trade much with each other because of relatively low exchange rate volatility. As a result, not much would be gained in terms of additional trade by adopting a common currency.[5] So, an important issue is whether there is indeed a difference between a fixed exchange rate and membership in a currency union in their effect on trade.

[5] This has been apparently the position of the European Commission when calculating the potential benefits of EMU.

Interestingly, Klein and Shambaugh (forthcoming) find for the two exchange rate regimes trade effects of similar magnitude. Still, there appear to be good arguments to assume that currency unions exhibit some particular features that go beyond fixing the exchange rate, including that there is no longer a need to exchange currencies (and thus full capital mobility), there is an easy cross-country comparison of prices (given the 1:1 fix) and a high credibility of the exchange rate link.

Second, the saving on trading costs argument may be correct on average but not necessarily on the margin. If trade between two countries is low, a possible reason is that bilateral trade costs are particularly high. A fall in transaction costs (e.g., induced by the formation of a currency union) may therefore have a sizable positive marginal effect on trade. Generally, however, it seems rather unlikely that a change in the exchange rate regime (alone) will induce a change in transaction costs that is large enough to affect a country's overall pattern of trade (so that previous non-suppliers would suddenly emerge as major trading partners).

Nonetheless, to partly deal with these (potential) issues, it may be useful to examine other factors that are not directly based on trade, but affect the extent to which European countries can be reasonably expected to trade with each other. For instance, Alesina, Barro, and Tenreyro (2003) note that "some geographical variables may have an effect on the attractiveness of currency unions beyond those operating through the trade channel"; they focus on factors such as locational proximity and weather patterns which may influence the co-movements of output and prices. Here, I am interested in a geography-related measure that captures the potential importance of regional trade for a country's overall trade. A useful proxy in this respect appears to be a country's remoteness. This measure gives a country's average trade distance to the rest of the world; it is typically defined as the (log) distance-weighted (log) GDP of the rest of the world (that is, $\Sigma_j(Y_j/D_{ij})$) and has been recently used widely in the literature.

Table 2 reports the 25 territories with the lowest and the highest values of remoteness (of 223 countries and territories for which data is available). As shown, the least remote countries in the world are all European; the first non-European country on the list is Tunisia which is ranked 30th.[6] On the other end of the table, the most remote countries are, not

[6] The data are taken from Rose and Spiegel (2006) and are gratefully made available by Andrew Rose at his website. It seems somewhat surprising that it is not one of the small central European countries, located in the triangle between France, Germany and the UK (e.g., Luxembourg), that is on top of the list. However, I suppose that the exact result is quite sensitive to the definition of the center of a country and the resulting distance calculation.

surprisingly, all located in the southern hemisphere, most notably in the South Pacific. So, what are the implications of this for the effects of monetary integration? In the gravity literature, remoteness is often introduced to control for the fact that remote countries tend to trade a disproportionately large amount with each other, simply because they are far away from other markets. In fact, some of the most remote territories on the list do very little trade with countries outside the region and therefore have adopted the currency of the dominant power in the region, the Australian dollar. On the other hand, remoteness measures a country's average trade distance and therefore proxies for the average trade costs faced by this country with the rest of the world. As a result, less remote countries should be inclined to share substantial amounts of trade with each other, thereby potentially gaining strongly from the use of a common currency.

Indirect evidence for this hypothesis is provided by Bravo-Ortega and di Giovanni (2005). They argue that remote countries will have a greater range of nontradable goods (because of high external trading costs), thereby resulting in higher real exchange rate volatility. Figure 2 illustrates the positive relationship between remoteness and real exchange rate variability.

Finally, it seems worth emphasizing another channel that might be of relevance when assessing the potential trade effects of monetary integration in Europe. A rapidly growing literature has recently documented the importance of cross-border trade in intermediate goods. Hummels, Ishii, and Yi (2001), for instance, estimate that today growth in vertical specialization accounts for about 30 percent of the growth in industrialized countries' exports. An implication of this finding is, however, that even small changes in transaction costs may then generate large trade effects. As firms split up the production chain geographically and move goods-in-process back and forth across international borders, the effect of border barriers magnifies. As a result, some further production sequencing may only become profitable (and cross-border trade may increase) after a further moderation of (perhaps already low) trading costs.

Kei-Mu Yi (2005) applies this idea to explain the surprisingly large magnitude of observed border effects (i.e., the finding that even for highly integrated economies such as the US and Canada domestic trade appears to exceed international trade by a substantial amount, holding constant for the standard determinants of trade). In fact, there is evidence that vertical specialization is (not surprisingly) more prevalent within countries than between countries. Frankel (2005) refers to the border effects literature to put the magnitude of Rose's empirical estimates into perspective.

If national borders matter and the use of different currencies are indeed part of the story, however, monetary integration can be expected to have particularly strong effects on trade in Europe. Hummels, Ishii and Yi (2001) show that European countries (along with Canada) display a relatively high degree of vertical specialization; that is, the production structure of these countries obviously allows fragmentation.[7] The results also indicate that a large share of European trade in components is with other industrialized (that is, most likely European) countries. Hence, even a moderate fall in trading costs may have large aggregate effects.

V. EMU[8]

Having argued that regional monetary integration should be, if anything, particularly beneficial for European countries, it may be worth examining (preliminary) evidence on the trade effects of EMU. That is, did the introduction of the euro measurably affect intra-European trade patterns? Given the (by know) well-known problems of parametric estimation using the gravity approach, I briefly discuss some non-parametric results.

As a first crude check to identify a possible redirection in EU trade, I analyze the relative importance of trade with EMU member countries over time. If EMU has lowered trade costs, shipments towards EMU member countries should have become relatively easier, especially for the members themselves. Figure 3 plots for each of the 15 EU member countries (before the latest round of EU enlargement) the evolution of the share of exports to EMU in total exports, scaled to be 1 in 1999. Apparently, there is no evidence that the introduction of the euro has measurably changed the pattern of European trade. Most notably, for countries outside the euro the relative importance of exports to the EMU is basically unchanged over the sample period; non-EMU countries are at the center of this fan chart.

Other suggestive evidence is provided by an analysis of the evolution of the number of products that are traded between different groups of countries. If trade costs have fallen with the adoption of a common currency, EMU member countries can be expected to trade in a greater variety of products. To analyze this issue, I examine trade data at the most detailed level of disaggregation, the 8-digit Combined Nomenclature (CN) level with 13,882 product categories.

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[7] According to Hummels, Ishii and Yi's estimates, the share of vertical specialization exports in total merchandise exports ranges for European countries from about 20 percent for Germany to 37 percent for the Netherlands, compared to about 10 to 12 percent for Australia, Japan and the US.

[8] This section draws on Nitsch (2007).

Figure 4 plots the number of positive trade observations as a fraction of the total number of possible trade observations for four different types of pair-wise trade relationships within the European Union: intra-EMU shipments; shipments from EMU countries to non-EMU countries; shipments from non-EMU countries to EMU countries; and shipments from non-EMU countries to non-EMU countries. Four observations appear particularly noteworthy. First, there seems to be only a small set of products (if any) that are traded between all European countries. Within the European Union, about two-third to three-fourth of the possible trade relations at the 8-digits level are zero. Second, EMU countries trade on average in more varieties than non-EMU countries. This finding, however, is not surprising, given the (economic) size of these countries. Third, there is a gradual increase in the extensive margin over time. The share of zero observations is decreasing for all country groups in the sample. Finally, and most importantly, there is no visible evidence that the euro has affected the extensive margin of European trade. There is neither a sizable increase in the extensive margin over time for EMU countries (that goes beyond the linear yearly change) nor an increase in the extensive margin relative to trade among non-EMU countries, as shown in the lower graph of Figure 4.

In sum, I find little conclusive evidence that the introduction of the euro has measurably affected patterns of trade in Europe. In view of the above reasoning that trade effects can be expected to be particularly strong in Europe, this finding is not particularly encouraging concerning potential trade effects of regional monetary integration.

V. End

In this essay, I discuss the potential effects of monetary integration on trade from a European perspective. I briefly review the recent literature on the trade effects of monetary unions and then discuss reasons why the trade effects of monetary integration might differ across regions. In particular, I outline three arguments in favour of potentially large trade effects in Europe: the large importance of regional trade; low trade costs; and the already existing extent of geographic fragmentation of production. Finally, I present some new evidence on the trade effects of the euro. Since a rough exploration of the pattern and dynamics of European trade provides little evidence that the introduction of the euro has measurably affected trade, it is argued that the (isolated) trade effects of monetary integration appear to be small.

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Table 1: Intra- and interregional merchandise trade, 2004

Origin \ Destination	North America	South and Central America	**Europe**	C'wealth of Indep't St's (CIS)	Africa	Middle East	Asia	World
Value								
North America	742	71	216	5	15	25	249	1324
South and Central America	93	64	59	3	7	5	39	276
Europe	367	51	**2973**	88	98	105	308	4031
Commonwealth of Independ't States (CIS)	18	6	129	55	4	10	35	266
Africa	43	7	99	1	23	3	39	232
Middle East	55	4	64	1	13	22	193	390
Asia	533	39	417	25	45	75	1201	2388
World	1852	242	3957	179	205	245	2065	8907
Share of inter-regional trade flows in each region's total merchandise exports								
North America	56.0	5.4	16.3	0.4	1.1	1.9	18.8	100.0
South and Central America	33.7	23.2	21.4	1.1	2.5	1.8	14.1	100.0
Europe	9.1	1.3	**73.8**	2.2	2.4	2.6	7.6	100.0
Commonwealth of Independ't States (CIS)	6.8	2.3	48.5	20.7	1.5	3.8	13.2	100.0
Africa	18.5	3.0	42.7	0.4	9.9	1.3	16.8	100.0
Middle East	14.1	1.0	16.4	0.3	3.3	5.6	49.5	100.0
Asia	22.3	1.6	17.5	1.0	1.9	3.1	50.3	100.0
World	20.8	2.7	44.4	2.0	2.3	2.8	23.2	100.0
Share of regional trade flows in world merchandise exports								
North America	8.3	0.8	2.4	0.1	0.2	0.3	2.8	14.9
South and Central America	1.0	0.7	0.7	0.0	0.1	0.1	0.4	3.1
Europe	4.1	0.6	**33.4**	1.0	1.1	1.2	3.5	45.3
Commonwealth of Independ't States (CIS)	0.2	0.1	1.4	0.6	0.0	0.1	0.4	3.0
Africa	0.5	0.1	1.1	0.0	0.3	0.0	0.4	2.6
Middle East	0.6	0.0	0.7	0.0	0.1	0.2	2.2	4.4
Asia	6.0	0.4	4.7	0.3	0.5	0.8	13.5	26.8
World	20.8	2.7	44.4	2.0	2.3	2.8	23.2	100.0

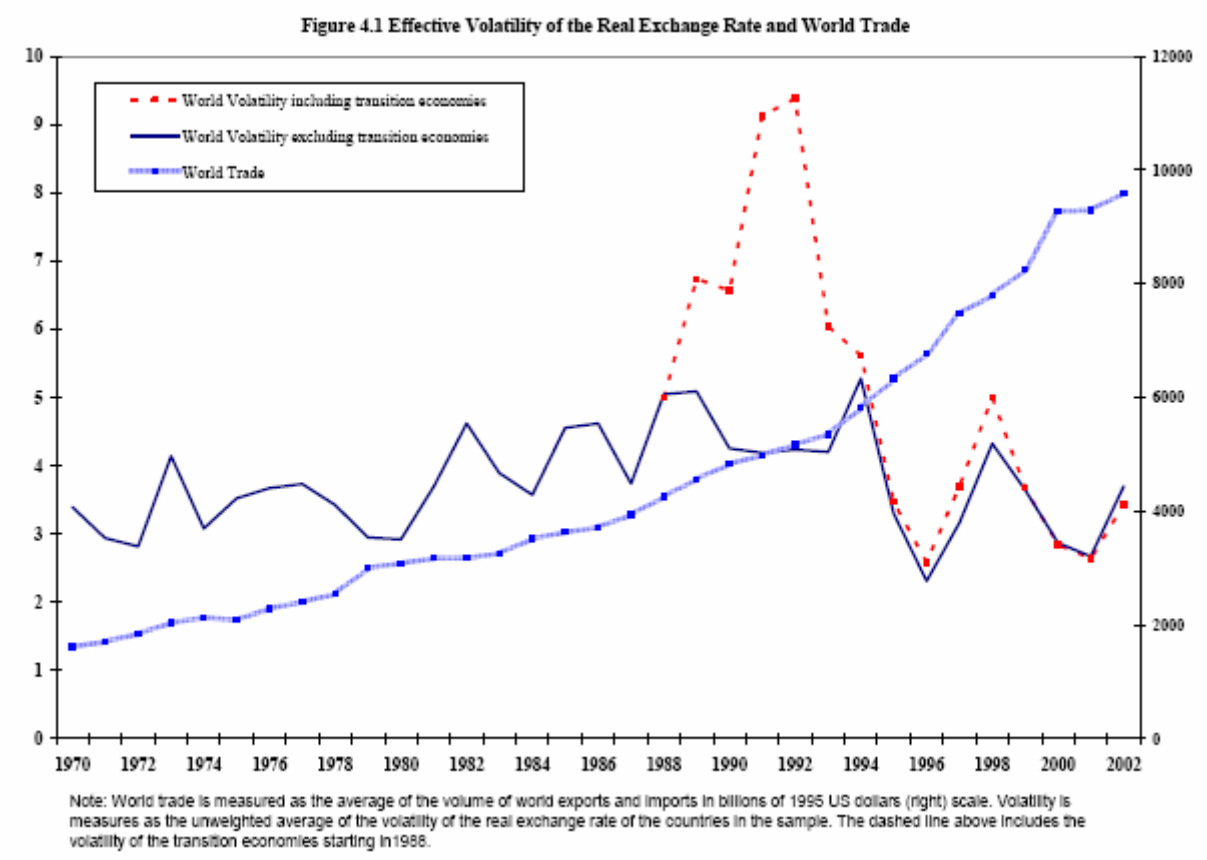
Source: http://www.wto.org/english/res_e/statis_e/its2005_e/section3_e/iii03.xls

Table 2: Average trade distances

Least remote countries		Most remote countries	
1	Croatia	199	Argentina
2	Slovenia	200	Chile
3	Italy	201	Indonesia
4	Austria	202	Guam
5	Bosnia and Herzegovina	203	Palau
6	Hungary	204	Northern Mariana Islands
7	Serbia/Ex-Yugoslavia	205	Tuvalu
8	Switzerland	206	Falkland Islands
9	Czech Rep	207	Papua New Guinea
10	Slovakia	208	Micronesia
11	Macedonia (FYR)	209	Australia
12	San Marino	210	Marshall Islands
13	Germany, West	211	Solomon Islands
14	Albania	212	Nauru
15	Romania	213	Kiribati
16	Bulgaria	214	Vanuatu
17	Liechtenstein	215	New Caledonia
18	Greece	216	Fiji
19	Luxembourg	217	Western Samoa
20	Poland	218	American Samoa
21	France	219	Tonga
22	Belgium	220	French Polynesia
23	Monaco	221	Niue
24	Netherlands	222	New Zealand
25	Moldova	223	Cook Islands

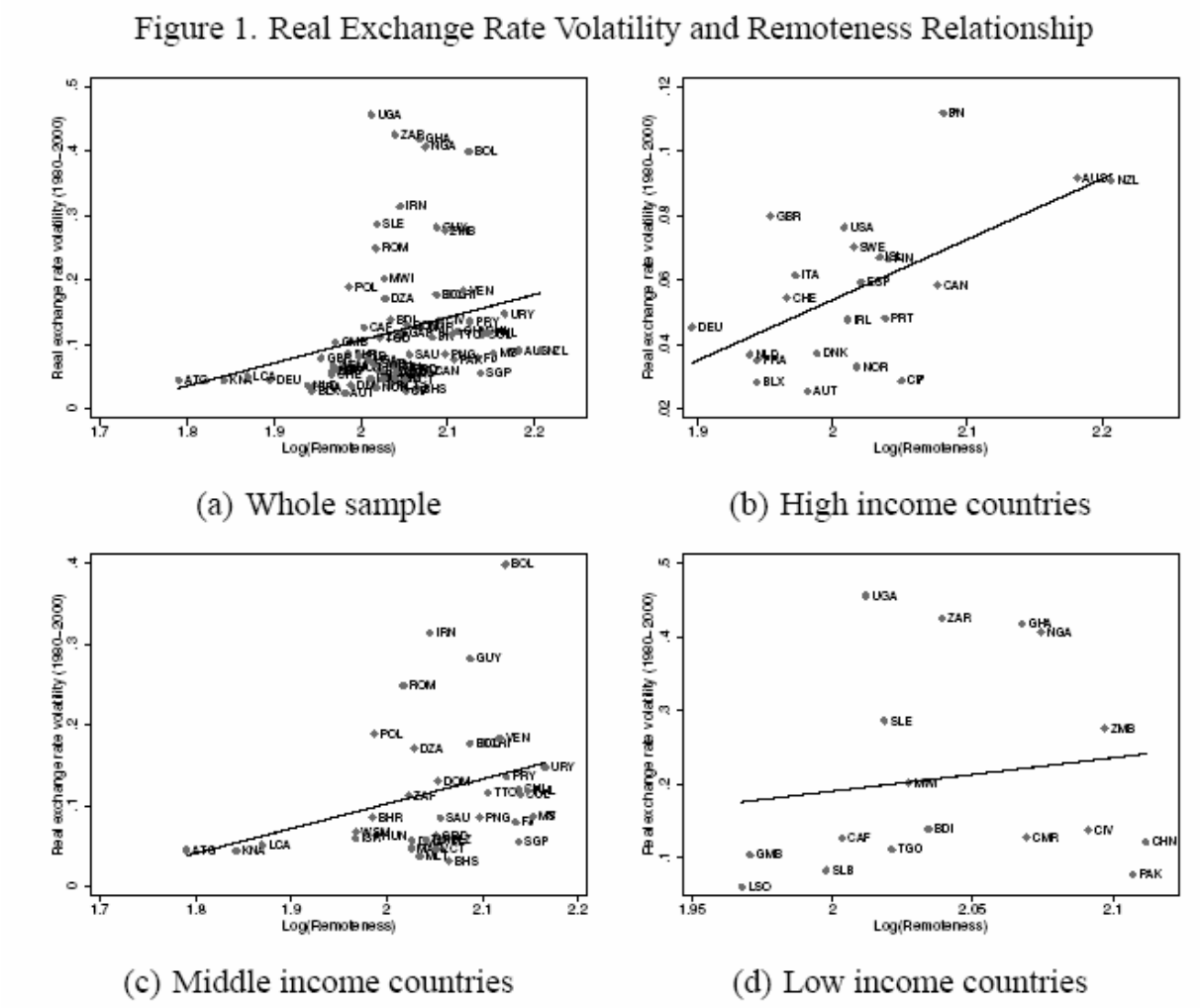
Source: Rose and Spiegel (2006)

Figure 1: Exchange rate volatility and trade



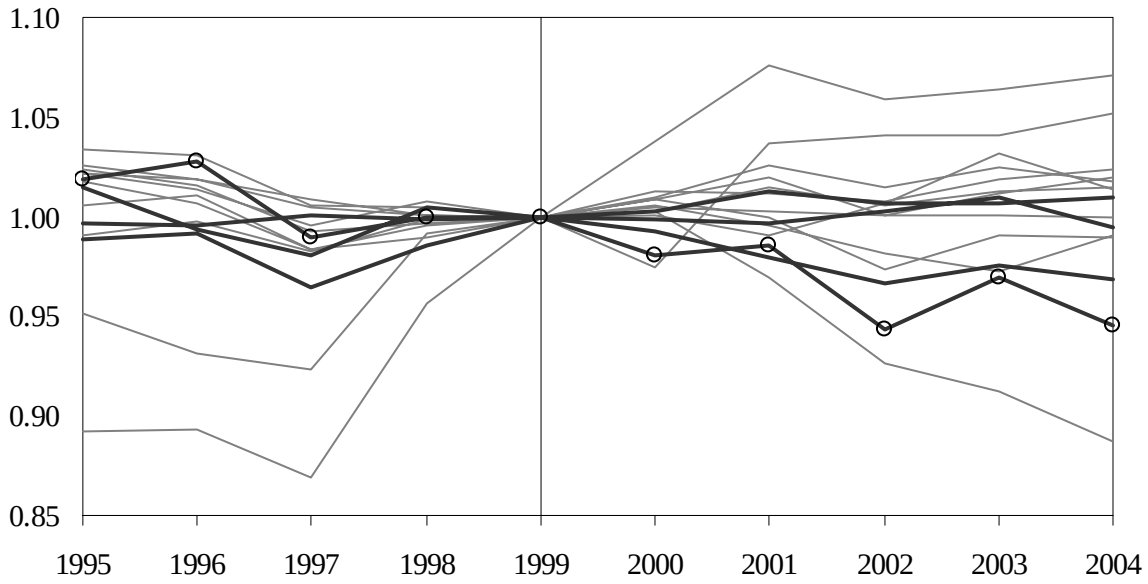
Source: Clark, Tamirisa and Wei (2004)

Figure 2: Remoteness and real exchange rate volatility



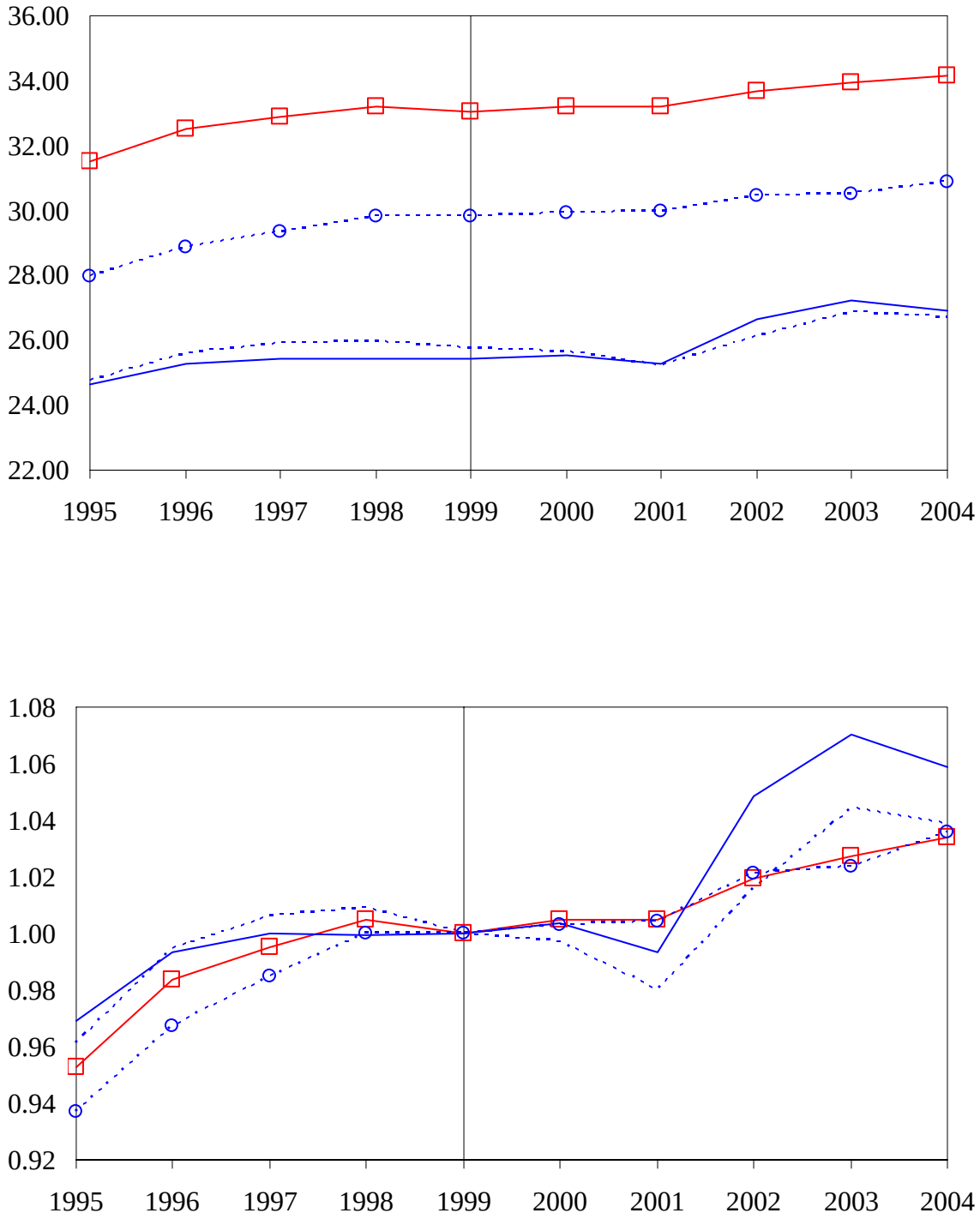
Source: Bravo-Ortega and di Giovanni (2005)

Figure 3: Share of trade with EMU11 countries in total EU trade by country (1999=100)



Notes: Non-EMU member countries are plotted as thick line. Greece is the circled line.

Figure 4: Non-zero trade observations at 8-digits CN level



Notes: The figures show the number of trade observations with positive trade as a share of all possible trade observations. The upper figure plots the shares in percent. The lower figure plots shares normalized to 1 in 1999. Solid lines show shipments originating from EMU11 countries; marked lines show shipments destined to EMU11 countries. The sample is adjusted for the fact that there is no trade data available for Luxembourg before 1999.