July 26, 1994

IS A YEN BLOC EMERGING?

Jeffrey A. Frankel* and Shang-Jin Wei

* Department of Economics, 549 Evans Hall # 3880
University of California
Berkeley, CA 94720-3880 USA
and Institute for International Economics
11 Dupont Circle, NE
Washington, DC 20036-1207

Presented at the *Fifth U.S.-Korea Academic Symposium: "Economic Cooperation and Challenges in the Pacific: Japan, Korea, China, the United States and the Economies of East Asia,"* September 7-9, 1994, at the University of California, Berkeley; sponsored by the Center for International and Development Research of the Institute of International Studies and the Center for Korean Studies of the Institute of East Asian Studies, both of U.C. Berkeley, and the Korea Economic Institute of America.

Parts of this paper draw on parts of "Is There a Currency Bloc in the Pacific?" in Exchange Rates, International Trade and Monetary Policy, edited by Adrian Blundell-Wignall, Reserve Bank of Australia, Sydney, 1993. The authors thank Benjamin Chui, Xiong Bai Fan and Menzie Chinn for research assistance, Tamim Bayoumi, Richard Portes, and Joe Gagnon for comments on an earlier draft, the discussants Ross Garnaut and Zenta Nakajima and other conference participants for comments, Warwick McKibbin for help in obtaining data, and the Center for International and Development Economics Research (funded at U.C. Berkeley by the Ford Foundation) and the Japan-United States Friendship Commission (a U.S. Government agency) for research support. Some of the work was carried out while the authors were visitors at the Research Department of the International Monetary Fund and the Center for Pacific Basin Monetary and Economic Studies at the Federal Reserve Bank of San Francisco; but the views expressed are not those of any institution.

IS A YEN BLOC EMERGING?

Outline

IS A YEN BLOC EMERGING?

1. Introduction

There has been much discussion in the 1990s over the advantages and disadvantages of a global trend toward three economic blocs -- the Western Hemisphere, centered on the United States; Europe, centered on the European Community; and East Asia, centered on Japan. Krugman (1991a), Bhagwati (1990, 1992), and Bergsten (1991), argue that the trend is, on balance, bad. Krugman (1991b) and Lawrence (1991) argue that it is, on balance, good.[1] Most appear to agree, however, that a trend toward three blocs is indeed underway.[2]

There is no standardly agreed definition of an "economic bloc." A useful definition might be a group of countries who are concentrating their trade and financial relationships with each other, in preference to the rest of the world. One might wish to add to the definition the criterion that this concentration is the outcome of government policy, either explicit or implicit.

After examining some of the relevant statistics, this paper argues that the evidence of an evolving East Asian trade bloc centered on Japan is not as clear as many believe. Trade between Japan and other Asian countries increased substantially in the late 1980s. But *intra-regional trade bias did not increase,* as it did, for example, within the European Community.

1.1 Possible regional groupings

Formal regional economic arrangements have progressed the furthest in Europe. Within the European Community (EC), the Single European Act of 1986 resulted in the elimination of most trade barriers in 1992. Most members removed capital controls by 1990, and the European Monetary System (EMS) had succeeded in stabilizing exchange rates well enough by December 1991 that the members agreed on ambitious plans for European Monetary Union (EMU). Those plans were soon proved overly ambitious, but the long-run trend toward integration is nevertheless clear. The next successful project of the EC will most likely be enlargement to include those of the other Western European countries (members of EFTA -- European Free Trade Association) who wish to join. There is also talk of eventually including countries from Central and even Eastern Europe.

In the Western Hemisphere, the Canadian-U.S. Free Trade Agreement took effect in 1989, the countries of the eastern half of South America agreed on plans for a free trade area under the name MERCOSUR in 1990, the moribund Andean Pact removed regional trade barriers in 1991, and the North American Free Trade Agreement (NAFTA) was negotiated in 1992. NAFTA has provisions for other countries to join, consistent with the Enterprise for the Americas Initiative proposed by the Bush Administration, with Chile considered first in line. There are no formal monetary or financial arrangements in the Western Hemisphere, analogous to the EMS or prospective EMU. Nevertheless, when a Latin American country like Argentina decides to peg its currency, the dollar is the currency to which it pegs. Many countries are heavily dollarized *de facto*.

In East Asia and the Pacific, formal regional arrangements are almost

altogether absent. The Australia - New Zealand Closer Economic Relationship, agreed in 1983, is a potentially useful model in that it includes some important measures such as harmonization of competition policy that other countries have been profoundly reluctant to consider. Beyond the bilateral level, the only major plans for a Preferential Trading Arrangement (PTA) exist among the Association of SouthEast Asian Nations (ASEAN), which was slow to get off the ground but which in 1991 endorsed the idea of an ASEAN Free Trade Association (AFTA). But when Americans worry, as they are wont to do, about a trading bloc forming in Asia, it is generally not ASEAN that concerns them. Rather it is the possibility of an East Asia- or Pacific-wide bloc dominated by Japan.

Japan is in fact unusual among major countries in <u>not</u> having preferential trading arrangements with smaller neighboring countries, as has been noted by others.[3] But the hypothesis that has been put forward is that Japan is forming an economic bloc in the same way that it runs its economy: by means of policies that are implicit, indirect, and invisible.[4] Specifically, the hypothesis is that Japan operates, by means of such instruments as flows of aid, foreign direct investment, and other forms of finance, to influence its neighbors' trade toward itself.[5] This is a hypothesis that should not be accepted uncritically, but rather needs to be examined empirically.

Another view is that South China, including Hong Kong and Taiwan, is becoming an independent "growth pole" deriving its dynamism from the entrepreneurial talents of the Chinese diaspora. Other loose groupings have been proposed for the region as well. Malaysian Prime Minister Mahatir

suggested an East Asian Economic Group (EAEG) in 1990, later the East Asian Economic Caucus (EAEC). The suggested boundaries of membership were drawn to include Japan, but exclude Caucasian countries. Australia had earlier proposed the Asian Pacific Economic Cooperation forum (APEC), which includes Australia, New Zealand, Canada and the United States. APEC gained steam, in part as an alternative to the EAEG, especially when U.S. President Bill Clinton decided to upgrade the November 1993 meeting in Seattle to include national leaders. (Mexico was added to the APEC membership at this meeting.) Some wish to draw the boundaries even wider than APEC, to include all countries on the Pacific Rim.

1.2 Trade links, interest rate links, and currency links,

The array of acronyms is impressive. What effect have these formal and informal regional arrangements had on actual patterns of trade and finance? Until recently, empirical research on this question was relatively rudimentary. Many studies of regional trading arrangements reported simply statistics on shares of intra-regional trade. It is pointed out, for example, that the fraction of East Asian countries' trade that is conducted with other East Asian countries rose from 23 per cent in 1980 to 29 per cent in 1990.[6] But, as we will see, these statistics can be misleading. One wants to hold constant for natural economic determinants of bilateral trade, such as proximity and GNP, before attributing any level or increase in intra-regional trade to deliberate policy measures such as Preferential Trading Arrangements, or even to the less deliberate influences of linguistic or cultural links.

Empirical research on intra-regional financial and monetary links is even less well-developed than on trade. Most studies of financial and monetary integration examine the extent to which a particular country has become integrated with "the world," for example the extent to which unrestricted arbitrage equates its interest rate to "the world" interest rate or the extent to which its monetary authorities have stabilized "the" exchange rate. Less attention is paid to the question whether the financial and monetary links are stronger with some parts of the world than others.

The remainder of this paper tries to address these issues, for the case of East Asia. It is organized in three parts. Part II examines whether a trade bloc is forming in the region and, if so, what are its geographical boundaries (ASEAN? EAEC? the Western Pacific? APEC? the entire Pacific Rim?). It extends earlier research using the gravity model by including a variable that reflects when two trading partners share a common language, such as Chinese.

Part III looks for evidence of a financial bloc. Specifically it tests whether interest rates in various Pacific countries appear to be influenced more strongly by Japanese interest rates or American interest rates.

Exchange rate arrangements, considered in Part IV of the paper, can have an important effect on the trade and financial links that are considered in Parts II and III respectively. If a country chooses to stabilize its exchange rate vis-a-vis one major trading partner instead of another, this can be expected to help promote trade with the first rather than the second, assuming that exchange rate uncertainty has a negative effect on trade. Promoting intra-EC trade, for example, is one major

motivation underlying the EMS and EMU. Therefore bilateral exchange rate variability is one more factor that we would like to control for in our econometric model of bilateral trade. Similarly if a country chooses to stabilize its exchange rate vis-a-vis one major monetary power instead of another, this can be expected to promote financial links with the first rather than the second, and to be reflected in the interest rate correlations.

2. Is there a trade bloc in the Pacific?

Frankel (1992) applied to the trading bloc question the natural framework for studying bilateral trade, the gravity model. The gravity model is so-called because it says that trade between two countries is proportional to the product of their sizes and inversely related to the distance between them.[7] It has a fairly long history, but there are not many recent applications to a large cross-section of countries throughout the world. Frankel (1992) and Frankel and Wei (1994) found that: (1) there are indeed intra-regional trade biases in the EC and the Western Hemisphere, and perhaps in East Asia; but (2) the greatest intra-regional bias was in none of these three, but in the APEC grouping, which includes the U.S. and Canada with the Pacific countries; and (3) the bias in the East Asia and Pacific groupings did not increase in the 1980s.

This paper extends those results in a number of directions. Among various extensions of the original gravity model estimation, it tests the

effect when two trading partners share common linguistic or historical links, with particular focus on the effect when both countries are Chinese-speaking.

2.1 The gravity model of bilateral trade

One cannot meaningfully investigate the extent to which regional policy initiatives are influencing trade patterns without holding constant for natural economic determinants such as size.[8] The gravity model offers a systematic framework for measuring what patterns of bilateral trade are normal around the world. The goal, again, is to see how much of the high level of trade within each region can be explained by simple economic factors common to bilateral trade throughout the world, and how much is left over to be attributed to a special regional effect. A dummy variable is added to the gravity equation to represent when both countries in a given pair belong to the same regional grouping. One can check how the level and time trend in, for example, the EAEC grouping compares with that in other groupings.

The dependent variable is trade (exports plus imports), in log form, between pairs of countries in a given year. We have 63 countries in our data set, so that there are 1,953 data points (=63x62/2) for a given year.[9] Some observations are missing because the trade flow is too small to be recorded.

One would expect the two most important factors in explaining bilateral trade flows to be the geographical distance between the two countries, and

their economic size.

A large part of the apparent bias toward intra-regional trade is certainly due to simple geographical proximity. Indeed Krugman (1991) suggests that most of it may be due to proximity, so that the three trading blocs are welfare-improving "natural" groupings (as distinct from "unnatural" trading arrangements between distant trading partners such as the United Kingdom and a Commonwealth member, or the United States and an East Asian dragon). Despite the obvious importance of distance and transportation costs in determining the volume of trade, empirical studies surprisingly often neglect to measure this factor. Our measure is the log of distance between two major cities (usually the capital) of the respective countries. We also add a dummy "Adjacent" variable to indicate when two countries share a common land border.

Entering GNPs in product form is empirically well-established in bilateral trade regressions. It can be justified by the modern theory of trade under imperfect competition.[10] In addition there is reason to believe that GNP per capita has a positive effect on trade, for a given size: as countries become more developed, they tend to specialize more and to trade more. Equivalently, size as measured by population has a negative effect on openness to trade, defined as a share of GNP.

The equation to be estimated, in its most basic form, is:

(1)

0.

The last four explanatory factors are dummy variables. *EC*, *WH*, and *EASIA*

are three of the dummy variables we use when testing the effects of membership in a common regional grouping, representing the European Community, Western Hemisphere, and East Asian Economic Group, respectively.

Results are reported in Table 1. These differ from the tables in Frankel (1992) and Frankel and Wei (1994) by a doubling of the span of years reported (among other things). All four standard variables are highly significant statistically in every year (> 99% level). The adjacency variable indicates that when two countries share a common border, they trade with each other approximately twice as much as they otherwise would [exp(.7)=2]. The coefficient on the log of distance is about -.5, holding constant for the adjacency variable. This means that when the distance between two non-adjacent countries is higher by 1 per cent, the trade between them falls by about 1/2 per cent. We have tested for possible non-linearity in the log-distance term, as it could conceivably be the cause of any apparent bias toward intra-regional trade that is left after controlling linearly for distance.[11]

The estimated coefficient on GNP per capita is about .30 from 1965 through 1980, indicating that richer countries do indeed trade more, though this term declines during the 1980s, reaching .10 in 1990. The estimated coefficient for the log of the product of the two countries' GNPs is about .75, indicating that, though trade increases with size, it increases less-than-proportionately (holding GNP per capita constant). This presumably reflects the widely-known pattern that small economies tend to be more open to international trade than larger, more diversified, economies. At the same time the equation explains why worldwide trade has historically

increased faster than GNP.[12] If two countries are each experiencing growth in GNP per capita of 1 per cent a year, then trade between them will grow at about 2 per cent a year (1.05 + 1.05 = 2.10). As East Asian developing countries have recently been growing in the vicinity of 8 per cent a year, the equation predicts very rapid growth in trade among them (16 per cent).

We have added a few checks for econometric robustness regarding the sample of countries and their size. We tried running the equation in multiplicative form, instead of log-linear, so as to allow the inclusion of pairs of countries that are reported as undertaking zero trade. (Under the log-linear specification, any pair of countries that shows up with zero trade must necessarily be dropped from the sample.) We find that the inclusion or omission of such countries in the multiplicative specification makes little difference to the results.[13] A correction for heteroscedasticity based on the size of the countries also makes little difference.[14]

2.2 Estimation of trade-bloc effects

If there were nothing to the notion of trading blocs, then the four or five basic variables would soak up most of the explanatory power. There would be little left to attribute to a dummy variable representing whether two trading partners are both located in the same region. In this case the level and trend in intra-regional trade would be due solely to the proximity of the countries, and to their rapid rate of overall economic growth.

But we have found that dummy variables for intra-regional trade are

highly significant statistically. If two countries are both located in East Asia, for example, in 1980 they traded with each other by an estimated 2 and a half times as much as they would have otherwise [exp(.9) = 2.5], after taking into account distance and the other gravity variables.

In earlier results, we tested for a nested sequence of possible trading blocs: ASEAN, East Asia (the membership of the EAEC), the Asian Pacific (including also Australia and New Zealand), APEC (including also the United States and Canada), and the entire Pacific Rim (including also Mexico, Colombia, Ecuador, Peru and Chile). While groupings such as ASEAN or the Asian Pacific can appear to be statistically significant if one does not test for larger groupings at the same time, there appear to be two right places to draw the boundaries: around East Asia and around APEC. The smaller and larger groupings are not statistically significant when these two are included in the equation. [For one year, 1985, the presence of the APEC term reduces or eliminates the significance of the East Asia term.]

To see if the East Asian bloc could be interpreted as Japan-centered, we have included a dummy variable representing Japan's bilateral trade with other East Asian countries. It was not statistically significant (or even greater than zero). We have also tried allowing for a special entrepot effect by including a dummy variable representing all bilateral trade of either Singapore or Hong Kong. The entrepot variable is highly significant, but does little to diminish the East Asian bloc effect.[15] When one allows for the greater average openness of East Asian countries to trade with all partners, the East Asian bloc effect does diminish a bit more, but is still statistically significant.[16]

We have also tried to capture classic Heckscher-Ohlin effects. [Earlier we tried including bilateral absolute differences in GNP/capita figures. The variable did not have the positive effect that one might think if countries traded capital-intensive products for products intensive in unskilled labor. Rather, it had a moderately signficant negative effect, as in the Linder hypothesis that similar countries trade more than dissimilar ones.]

Appendix Table A4 reports gravity estimates that include some direct measures of factor endowments: the two countries' differences in capital/labor ratios, educational attainment levels, and land/labor ratios. The data (for a subset of 656 of our 1,953 pairs of countries) was generously supplied by Gary Saxonhouse (1989). There is a bit of support for these terms, particularly for capital/labor ratios and educational attainment in 1980. The other coefficients are little affected.

As another extension, we have tried disaggregating total trade into three categories: manufactured products, agricultural products, and other raw materials. Perhaps surprisingly, the effect of distance is as high or higher for manufactures as for the other categories. But the findings are in general little affected by the disaggregation.[17]

Although the coefficient for the East Asian grouping in Table 1 is significant, it diminishes in the 1980s, rather than increasing as is often assumed on the basis of simple statistics on intra-regional trade. The explanation is the rapid growth of East Asian economies is in itself sufficient to explain the increase in the intra-regional trade share

mentioned in the introduction. The trend in the intra-regional trade bias has been, if anything, downward rather than upward throughout the period 1965-1990.[18] Also as in earlier results, the strongest grouping in the world in the 1980s was APEC. East Asia is still dependent on the North American market.

Inferences about Europe and the Western Hemisphere, like inferences about East Asia, are overturned with the use of the gravity model in place of intra-regional trade shares. It turns out that the EC was not a statistically significant trade bloc as recently as 1980, but that in the first half of the 1980s it experienced the most rapid intensification of intra-regional trade bias of any region. [The EFTA countries show no trade bloc effect at any time.[19]] The Western Hemisphere countries show the most rapid intensification of intra-regional trade bias in the second half of the 1980s. More detailed analysis reveals that this regionalization took place in particular within MERCOSUR and within the Andean Pact.[20]

2.3 Extension: the role of common language in trade groupings

We extend the results by adding a dummy variable to represent when both countries of a pair speak a common language or had colonial links earlier in the century. We allow for English, Spanish, Chinese, Arabic, French, German, Japanese, Dutch, and Portuguese. The results, reported in Table 1, show a significant coefficient that fluctuates in the range of .33 to .53. In 1990, two countries sharing such linguistic or colonial links tended to trade roughly 42 per cent more than they would otherwise [exp(.35)=1.42]. We tested whether some of the major languages were more important than the

others.[21] Chinese is the one language to qualify, though even here the independent effect is significant only in 1970 and 1990. (We count four countries as primarily Chinese-speaking: Taiwan, China, Hong Kong and Singapore.)[22] As of 1990, two Chinese-speaking countries appear to trade an estimated four and a half times as much [exp(0.35+.1.2=1.5)=4.48] as other similarly-situated countries.

The presence of the language terms reduces the East Asian bloc coefficient only slightly; in most years the latter is still highly significant statistically. The apparent magnitude of the Chinese language term does raise the possibility that the influence of the Chinese diaspora is a more important contributor to the East Asian intra-regional trade than is the influence of Japan, Inc. There is an important possible objection that must be registered however. Taiwan-China trade does not appear in the statistics, because it is officially non-existent. Such trade is in reality thought to be large and rapidly-growing, and heavily to take the form of trade routed indirectly through Hong Kong. If Taiwan-China trade is routed through Hong Kong (or Singapore), then it is counted twice in our data, and thus may be exaggerating the estimate of the influence of the Chinese variable.

We have attempted to correct for this double-counting of Taiwan-China trade. The governments of Taiwan and China each report estimates of their true bilateral trade. To err on the side of caution, we took the larger of the estimates, and treated it as if it were all counted twice in the form of Hong Kong trade. The numbers were $0.047 billion in 1980 and $1.974 billion in 1990. We re-ran the gravity estimates with trade among "the three

Chinas" adjusted in this way.[23] The independent Chinese-language effect is no longer statistically significant. Even the East Asian bloc coefficient is knocked down a bit. The dummy variable for linguistic links in general is as strong as ever, however. Given the small number of observations of Chinese-speaking pairs (4x3/2 = 6), we are left without a clear verdict one way or the other on the importance of the contribution of the Chinese diaspora effect to intra-regional trade.

3. Is there a financial bloc in the Pacific?

Those who believe that Japan is establishing a economic bloc in Asia often describe it as a "yen bloc," which carries a financial/monetary connotation. We turn now from trade to financial effects.

We seek to investigate the extent to which Pacific financial markets are becoming more tightly linked, by analyzing interest rates in a number of countries around the Pacific. [International equalization of interest rates would be an important phenomenon for many reasons. It would imply, for example, that national monetary authorities had lost the ability to affect domestic demand through independent monetary policies, and that countries would be able easily to finance investments despite shortfalls of saving. Earlier studies of interest rate parity issues in the Pacific context include Glick (1987), Glick and Hutchison (1990).] A number of studies have found evidence of financial liberalization in some Pacific countries by observing the ability of international arbitrage to link local interest rates with U.S. rates. Here we focus on the question: To the extent that

interest rates in Pacific countries are now influenced by interest rates in world financial centers, is the power of Tokyo in the region gaining over that of New York?

We have tried three tests of the relative influence of Tokyo and New York financial markets, corresponding to more standard tests of simple interest rate parity, covered interest parity, and uncovered interest parity: (i) regress the local interest rate on the US and Japanese interest rates [and on these interest rates interacted with a linear time trend]; (ii) regress the local rate on the "covered" counterparts of (i); and (iii) regress the local rate on the uncovered counterparts of (i). If the world's financial markets and monetary systems are perfectly integrated, then we should not expect to be able to sort out any bilateral effects, such as from Japan to smaller countries in the region. Rather, countries would simply deposit savings into, or draw funds out of, an undifferentiated pool of world capital. But few countries in the Pacific follow a perfectly pegged exchange rate, and the majority still have serious barriers to capital mobility as well.[24] Even capital mobility between the U.S. and Japan faces minor frictions, and major exchange rate uncertainty. Thus we may be able to pick up some differential effects of New York and Tokyo interest rates in the region.

3.1 The influence of dollar vs. yen interest rates

The results of the first test are reported in Table 2.[25] The coefficients on the interaction terms can be interpreted as the increase per year (on average) of the coefficient relating the local interest rate to the

US or Japanese interest rate. All the regressions exhibit a high degree of serial correlation, so the adjusted standard errors are the appropriate ones to use in conducting inference. One finding is that in almost every case the trend coefficients are of opposite sign, suggesting that one financial center is gaining at the expense of another. However, since the relevant parameter estimates are not always statistically significant, one cannot make too much of this result.

Perhaps the most interesting finding is that over the 1982-92 period New York seems to be gaining influence at the expense of Tokyo in the English-speaking countries of the Pacific Rim (Australia, Canada, and New Zealand), while the reverse is occurring in a number of East Asian countries. The observed shift in influence from New York interest rates to Tokyo interest rates is highly significant in the case of Indonesia and somewhat less so in the case of Korea. It is positive but not significant for Malaysia, Singapore and Hong Kong.

3.2 The influence of U.S. vs. Japanese interest rates, with currency factors removed

It is interesting to try to distinguish whether the links to Tokyo and New York are attributable to country-specific factors on the one hand, such as information advantages that might be afforded by common cultures or tax and legal systems, or to currency factors on the other hand, such as the weights of the yen and dollar in a country's currency basket. To the extent that an Asian currency is linked to the yen or dollar, currency factors such as expectations of depreciation or an exchange risk premium should disappear

from the interest rate equation. (We will be looking at the currency links directly in terms of exchange rates in the next part of the paper.)

We tried in two different ways ("covered" and "uncovered") to remove the currency factors from the interest rate regressions, in order to see what remains. Unfortunately, data are not available for some of the countries in Table 2, including Indonesia. We regressed the local interest rate on both the covered US and covered Japanese interest rates, where the cost of cover is observed in the forward exchange market, with the aim of discerning country-specific links. There is strong a priori reason to expect high multicollinearity, since covered interest parity holds fairly well between dollar and yen interest rates.[26] Thus it should not be very surprising that none of the interaction parameter estimates is statistically significant.[27] The two that are closest to significant, Malaysia and Singapore, continue to indicate that influence is shifting from New York to Tokyo.

We also tested the effect of uncovered U.S. and Japanese interest rate results, using survey data to measure expectations regarding future exchange rates. The survey data are from Currency Forecasters' Digest, which reports forecasts of market participants (actually the harmonic mean of the responses) on a monthly basis.[28] There is evidence of declining New York influence in Canada, and increasing influence in Korea. The sign on the Tokyo term suggests that influence is shifting there for a majority of the six countries, but most are not statistically significant. Here the source of statistical insignificance is probably measurement error in the survey data, rather than the less serious disease of multicollinearity.

4. Currency blocs

As already noted, the phrase "yen bloc" connotes Japanese monetary influence in Pacific Asia. Such a trend would certainly round out the symmetry of the three blocs, as the dollar is dominant in the Western Hemisphere and the mark in Europe. But, as with trade, formal currency links are missing in East Asia. No currency is pegged to the yen, for example. Are informal currency links forming between Japan and other East Asian countries?

4.1 Stabilization of exchange rates within the blocs

Consider bilateral exchange variability, computed in Table 3. Worldwide, monthly exchange rate variability rose in the 1980s, from a standard deviation of .33 per cent in 1980 to .38 per cent in 1990. The latter figure suggests that for a typical pair of countries, approximately 95 per cent of exchange rate changes are smaller than .76 per cent (two standard deviations, under the simplifying assumption of a log-normal distribution).

There is a tendency for exchange rate variability to be lower within each of the groups than across groups, supporting the idea of currency blocs. The lowest variability occurs within Europe. The 1980 statistic is a standard deviation of .04 per cent, and it falls by half during the course of the decade.

The members of APEC also have a relatively low level of intra-regional exchange rate variability, especially in light of the diversity of the

countries involved. It too fell by half in the course of the 1980s. The level of exchange rate variability is a bit higher within East Asia considered alone. As we shall see, this reflects that the international currency of Asia is not the yen, but rather the dollar.

The Western Hemisphere considered alone shows much higher levels of exchange rate variability than any of the other groupings.

4.2 The influence of the dollar, yen, DM and pound on the values of smaller currencies in the Pacific

We now examine the influences which the three most important international currencies have on the determination of the values of currencies of smaller countries in Pacific Asia. One way that countries in a given area could achieve the lower levels of intra-regional bilateral exchange rate variability noted above is to link their currencies to the single most important currency in the region. In a simple version of the currency-bloc hypothesis, one would expect that the dollar has dominant influence in the Western Hemisphere, the yen in East Asia, and the mark (or ECU) in Europe.

The equation to be estimated is

(2) $\Delta(\textit{value of currency } i) =$

$$\alpha_0 + \beta_1\Delta(\textit{value of \$}) + \beta_2\Delta(\textit{value of yen}) + \beta_3\Delta(\textit{value of DM}) + \varepsilon.$$

where the change in the value of each currency is computed logarithmically. The goal is to see whether Pacific Asian countries try to stabilize their

currencies in terms of a particular major currency. Such an equation is exceptionally well-specified under a particular null hypothesis, namely that the value of the local currency is determined as a basket peg (perhaps a crawling peg, since we allow for a constant term). By "exceptionally well-specified", we mean that the coefficients should be highly significant and the β_0 should be close to 1.

In 1988, for example, there were 31 countries that were officially classified by the IMF as following a basket peg of their own design (plus another eight pegged to the SDR). [They included Austria, Finland, Norway, Sweden, Iceland, and Thailand.] Others, such as Korea, claimed to define the value of their currency in terms of a basket, but in fact followed an extremely loose link. Most basket-peggers keep the weights in the basket secret, so that one can only infer the weight statistically from observed exchange rate movements. Previous tests have suggested that countries that are officially classified as basket-peggers in practice often exhibit a sufficiently wide range of variation around the basket index, or else alter the parity or weights sufficiently often, that they are difficult to distinguish from countries classified as managed floaters.[29]

In applying equation (2) to a wide variety of countries, we realize that most do not follow a basket peg. If policy-makers monitor an index that is a weighted average of their trading partners, even though they allow deviations from the index depending on current macroeconomic considerations or speculative sentiments, we can meaningfully estimate the coefficients in the equation under the (restrictive) assumption that these local deviations -- the error term -- are uncorrelated with the values of the major

currencies.

There is a methodological question of what numeraire should be used to measure the value of the currencies. Preliminary results on the determination of exchange rates tried two numeraires: the Swiss franc and purchasing power over local goods.[30] The results, for nine East Asian countries, suggested that all place very heavy weight on the dollar in their implicit baskets. Only Singapore and Indonesia, and at times Malaysia and Thailand, appear to put significant weight on the yen, and the weight is usually less than .1, as against .9 to 1.0 on the dollar.

Here we use the SDR as numeraire. Under the basket-peg null hypothesis, the choice of numeraire makes no difference in the estimation of the weights. But more generally, it will make a difference. We also impose the constraint that the sum of the coefficients add to one (with the pound treated as the residual in the reported results).

In Europe almost all countries give dominant weight to the major currency of the region: the mark.[31] In the Americas, most currencies tested again give dominant weight to the major regional currency.[32] In the results of Table 4, however, we see that this pattern is broken in East Asia. The weight on the dollar is very high in Thailand, Korea, and China. There is no special role for the yen. The Japanese currency is statistically significant in Singapore, and occasionally in some of the others. But the coefficient is low. The same is true of the DM and pound (which are significant, for example, in Singapore). Each of the Asian countries is more properly classed in a dollar bloc than in a yen bloc. It is not a coincidence that many Asian/Pacific countries call their currencies "dollar." Nor, given the economies of scale in the use of an international currency, is it surprising that the dollar is the first choice of Asia when

it comes to such measures as shares of official reserve holdings, invoicing of trade, and denomination of international financial transactions, as it is the first choice of the rest of the world.

We also tried estimates of equation (2) that do not impose the constraint that the weights on the major currencies sum to one (and that also exclude the pound). The results are similar: the DM reigns supreme in Europe, the dollar in the Western Hemisphere, and the dollar -- not the yen -- is also dominant in East Asia. A t-test does not reject the constraint that the sum of the three coefficients is 1 for the Western Hemisphere and Asian countries, but often does reject this constraint for the European countries, perhaps reflecting the absence of the pound and French franc.

4.3. An attempt to estimate the effect of exchange rate variability on trade

One rationale for a country to assign weight to a particular currency in determining its exchange rate is the reasoning that a more stable bilateral exchange rate will help promote bilateral trade with the partner in question. This is a major motivation for exchange rate stabilization in Europe. There have been quite a few time-series studies of the effect of exchange rate uncertainty on trade overall,[33] but fewer cross-section studies of bilateral trade. We will re-examine the question here using our data set, which is more recent as well as broader, covering 63 countries.

Volatility is defined to be the standard deviation of the first difference of the logarithmic exchange rate. We start with the volatility of nominal exchange rates and embed this term in our gravity equation (1) for 1980, 1985 and 1990. The results are reported in Table 5.[34] Most coefficients are similar to those reported in the earlier results without

exchange rate variability (Table 1), though the EC and Western Hemisphere bloc dummy variables appear with lower coefficients, suggesting that a bit of the bloc effect may have been attributable to exchange rate links. In 1980, the coefficient for the volatility term is indeed negative and statistically significant at the 99% level. [The magnitude is moderately large.[35]] In 1985, the volatility parameter is no longer significant (with the point estimate turning positive). In 1990, the volatility coefficient actually appears statistically greater than zero.

Theoretical models of the behavior of the firm often produce the counterintuitive result that, because of convexity in the profit function, exports can be an <u>increasing</u> function of exchange rate variability. Only when the firm is sufficiently risk-averse does the intuitive negative effect on trade emerge. Several empirical studies have taken this possibility seriously.[36] But before we take our econometric findings at face value, we should note that a presumably more relevant measure of exchange rate uncertainty is the volatility of the <u>real</u> exchange rate, which takes into account the differential inflation rates in the two countries in addition to movements in the nominal exchange rate.

Regressions with the volatility of real exchange rates are also presented in Table 5. In 1980, the volatility parameter is still negative and statistically significant. The parameter for 1985 is still insignificant. In contrast to the regression with the volatility of nominal rates, the volatility parameter for 1990 is a statistically significant negative number [-8.04].

By way of illustration, these point estimates can be used for some

sample calculations. Worldwide, the average level of exchange rate variability in 1990 was .376 per cent (table 3). Our estimates suggest that if this variability were eliminated by adopting fixed exchange rates worldwide, the effect on trade would be 3.02 per cent (=8.04x.376). These estimated effects cannot be regarded as large.

These results, while less robust than most of the other gravity equation findings, are generally consistent with the hypothesis that real exchange rate volatility depresses bilateral trade. More specifically, they would appear to be a piece of evidence that the stabilization of exchange rates within Europe has helped to promote intra-European trade, and within the Pacific to promote Pacific trade, even if the effects are small.

One aspect of the OLS estimates in Table 5 might lead one to think that the role played by exchange rate stabilization is not small: the estimated trade bloc coefficients seem to fall sharply when the volatility term is included.[37] There is very likely a problem of simultaneous causality. The apparent negative correlation between exchange rate variability and the volume of bilateral trade could be due to the government's deliberate efforts to stabilize the currency vis-a-vis a valued trading partner, as easily as to the effects of stabilization on trade. Therefore we have also tried the method of instrumental variable estimation to tackle the possible simultaneity bias.[38]

We concentrate on the regressions involving the real exchange rates. In 1980, the volatility parameter is still negative and significant at the 95% level. But the magnitude is much smaller than without using the instrument, suggesting that part of the apparent depressing effect of the

volatility was indeed due to the simultaneity bias. Strong confirmation comes from an examination of the trade bloc coefficients for the EC and the Western Hemisphere: when the simultaneity is corrected, the presence of the volatility variable no longer reduces the trade bloc coefficient.

In 1990, the volatility parameter turns again into a positive number. The results suggest that if exchange rate volatility did depress bilateral trade, its negative effect appears to have diminished or disappeared over the course of the 1980s. [Tests on data going 15 years further back in history show a negative effect of exchange rate volatility (either nominal or real) on trade that is highly significant in 1965, but that declines steadily in the 1970s.] This sharp change is somewhat surprising. One possible explanation is the rapid development of exchange risk hedging instruments. Our estimates of this effect are in any case not sufficiently robust with respect to the functional form, year, or estimation technique to justify strong conclusions. But it seems safe to conclude that the negative effect, if it is still there at all, is very small in magnitude.

5. Conclusions

We have found some evidence of regionalization of the world economy, into three trading blocs: Europe, the Americas and East Asia. But the patterns of trade, finance, and monetary influence are somewhat different than often supposed.

We have used the gravity model of bilateral trade to evaluate the trade bloc hypothesis, holding constant for the sizes of the countries, their GNP/capitas, distance between them, whether they share a common border and

whether they share a common language. We find evidence of a trade bloc on each continent. But the greatest rate of intensification of intra-regional bias has not occurred in East Asia. Rather, in the early 1980s it occurred in the EC, and in the late 1980s in the Western Hemisphere. The strongest level of effect picked up is for none of these three continental groupings, but for APEC.

The lesson that the links across the Pacific are stronger than the links within East Asia is not limited to trade. We perform tests of Japanese vs. U.S. financial influences on interest rates in 10 Pacific countries. Yen interest rates appear to be gaining influence only in Indonesia, and perhaps Korea. Elsewhere there is no clear trend or, in the English-speaking countries, dollar interest rates are the ones gaining influence.

A similar result emerges for currency influences. Although bilateral exchange rates are more stable within East Asia than worldwide, this is not a matter of stabilizing in terms of the most important currency within the region, the yen. While the determination of changes in currency values in Europe is dominated by the DM, and in the Americas is dominated by the dollar, changes in currency values in East Asia, with the partial exceptions on Singapore and Indonesia, are not much influenced by the yen. Rather the dollar is the dominant currency on this side of the Pacific as well as its home side.

Finally, we found some tentative evidence for a small effect of bilateral exchange rate variability in determining bilateral trade, particularly before the proliferation of hedging instruments in the mid-

1980s. But, even if this evidence is thought strong enough to merit being taken seriously, our results do not support the idea that there are strengthening links to the yen in East Asia that have helped to promote intra-regional trade. Rather, if anything, the links to the dollar throughout the Pacific have helped to promote Pacific-wide trade and investment.

References

Anderson, Kym, and Hege Norheim. 1993. "History, Geography and Regional Economic Integration," in Regionalism and the Global Trading System, K.Anderson and R.Blackhurst, eds., London: Harvester Wheatsheaf.

Arase, David. 1991. "U.S. and ASEAN Perceptions of Japan's Role in the Asian-Pacific Region." in Harry Kendall and Clara Joewono, eds., Japan, ASEAN and the United States Berkeley: University of California, Institute for East Asian Studies.

Bergsten, C.Fred. 1991. "Comment on Krugman," in Policy Implications of Trade and Currency Zones, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August: 43-57.

Bhagwati, Jagdish. 1990. "Regional Accords Be-GATT Trouble For Free Trade," Wall Street Journal, Dec. 5.

Bhagwati, Jagdish. 1992. "Regionalism vs. Multilateralism: An Overview," Conference on New Dimensions in Regional Integration, World Bank, Washington, D.C., April 2-3.

Caballero, Ricardo, and Vittorio Corbo, 1989, "The Effect of Real Exchange Rate Uncertainty on Exports: Empirical Evidence," The World Bank Economic Review, 3, no.2, May, 263-278.

Chinn, Menzie, and Jeffrey Frankel. 1994. "Financial Links Around the Pacific Rim: 1982-1992," Chapter 2 in Exchange Rate Policy and Interdependence: Perspectives from the Pacific Basin, edited by R. Glick and M. Hutchison, Cambridge University Press.

Chinn, Menzie, and Jeffrey Frankel. 1994. "Financial Barriers in the Pacific Basin: 1982-1992" Journal of Economic Integration 9, no. 1, 62-80.

Deardorff, Alan. 1984. "Testing Trade Theories and Predicting Trade Flows," in R.Jones and P.Kenen, eds., Handbook of International Economics vol. I. Amsterdam, Elsevier Science Publishers. Ch.10: 467-517.

Dornbusch, Rudiger. 1989. "The Dollar in the 1990s: Competitiveness and the Challenges of New Economic Blocs," in Monetary Policy Issues in the 1990s. Federal Reserve Bank of Kansas City.

Drysdale, Peter, and Ross Garnaut. 1993. "The Pacific: An Application of a General Theory of Economic Integration," *Twentieth Pacific Trade and Development Conference*, September 10-12, 1992; in Pacific Dynamism and the International Economic System, edited by C.Fred Bergsten and Marc Noland, Institute for International Economics, Washington, D.C.

Edison, Hali, and Michael Melvin. 1990 "The Determinants and Implications of the Choice of an Exchange Rate System," in William Haraf and Thomas Willett, Monetary Policy for a Volatile Global Economy, AEI Press, Washington.

Eichengreen, Barry, and Jeffrey Frankel. 1994. "Economic Regionalism: Evidence from Two 20th Century Episodes," conference on *Globalization and its Implications for the Newly Industrialized Economies in East Asia*, East-West Center, Honolulu, Hawaii, 15-17 August.

Eichengreen, Barry and Douglas Irwin. 1994. "Trade Blocs, Currency Blocs and the Reorientation of Trade in the 1930s," Journal of International Economics (forthcoming).

Frankel, Jeffrey. 1993. "Is Japan Creating a Yen Bloc in East Asia and the Pacific?" in Regionalism and Rivalry: Japan and the U.S. in Pacific Asia, edited by Jeffrey Frankel and Miles Kahler, University of Chicago Press, Chicago.

Frankel, Jeffrey, Ernesto Stein and Shang-Jin Wei. 1993. "Trading Blocs: The Natural, the Unnatural, and the Super-Natural", written for the NBER Sixth Inter American Seminar in Economics, held in Caracas, Venezuela, May 29. Forthcoming, Journal of Development Economics.

Frankel, Jeffrey, and Shang-Jin Wei. 1993a. "Trade Blocs and Currency Blocs," NBER Working Paper 4335. Revised as "Emerging Currency Blocs," *International Center for Monetary and Banking Studies*, Geneva, Sept. 2-4. Forthcoming, The Future of the International Monetary System and Its Institutions, edited by Hans Genberg, 1994.

Frankel, Jeffrey, and Shang-Jin Wei. 1993b. "Is There a Currency Bloc in the Pacific?" in Exchange Rates, International Trade and the Balance of Payments, edited by Adrian Blundell-Wignall, Reserve Bank of Australia, Sydney: 275-308.

Frankel, Jeffrey, and Shang-Jin Wei. 1994a. "Yen Bloc or Dollar Bloc: Exchange Rate Policies of the East Asian Economies," in Macroeconomic Linkages: Savings, Exchange Rates, and Capital Flows, *NBER - East Asia Seminar on Economics, Volume 3*, Takatoshi Ito and Anne Krueger, editors, University of Chicago Press, Chicago.

Frankel, Jeffrey, and Shang-Jin Wei. 1994b. "A 'Greater China' Bloc?," January; forthcoming in China Economic Review.

Glick, Reuven. 1987. "Interest Rate Linkages in the Pacific Basin." SF FRB Economic Review. (Summer): 31-42.

Glick, Reuven, and Michael Hutchison. 1990. "Financial Liberalization in the Pacific Basin: Implications for Real Interest Rate Linkages." Journal of the Japanese and International Economies. 4: 36-48.

Helpman, Elhanan. 1987. "Imperfect Competition and International Trade: Evidence from Fourteen Industrial Countries," Journal of the Japanese and International Economies 1: 62-81.

Helpman, Elhanan and Paul Krugman. 1985. Market Structure and Foreign Trade, Cambridge, MA, MIT Press.

Krugman, Paul. 1991a. "Is Bilateralism Bad?" in E.Helpman and A.Razin, eds., International Trade and Trade Policy. Cambridge, MA, MIT Press.

Krugman, Paul. 1991b. "The Move Toward Free Trade Zones," in Policy Implications of Trade and Currency Zones, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, (August): 7-42.

Lawrence, Robert. 1991. "Emerging Regional Arrangements: Building Blocks or Stumbling Blocks?" in Finance and the International Economy, The AMEX Bank Review Prize Essays, edited by R.O'Brien. United Kingdom: Oxford University Press, 24-36.

Linneman, Hans. 1966. An Econometric Study of International Trade Flows, North-Holland, Amsterdam.

Lowell, Julia. 1992. "Do Governments Do What They Say (And Do We Believe Them): Two Essays on National Debt and Exchange Regime Policies," Ph.D. Thesis, Department of Economics, University of California, Berkeley.

Maidment, Paul. 1989. "The Yen Block: A New Balance in Asia?" The Economist 15 July, *Survey*, 5-20.

Petri, Peter. 1991. "Market Structure, Comparative Advantage and Japanese Trade Under the Strong Yen," in Trade With Japan: Has the Door Opened Wider?, Paul Krugman, ed.. Chicago: University of Chicago Press: 51-84.

Petri, Peter. 1992. "One Bloc, Two Blocs or None? Political-Economic Factors in Pacific Trade Policy," in Kaoru Okuzumi, Kent Calder and Gerrit Gong, eds. The U.S.-Japan Economic Relationship in East and Southeast Asia: A Policy Framework for Asia-Pacific Economic Cooperation, Significant Issues Series, Vol. XIV, No.1. Washington, D.C., Center for Strategic and International Studies: 39-70.

Petri, Peter. 1993. "The East Asian Trading Bloc: An Analytical History," in Regionalism and Rivalry: Japan and the U.S. in Pacific Asia, edited by Jeffrey Frankel and Miles Kahler, University of Chicago Press: Chicago.

Rose, Andrew. 1991, "Why Has Trade Grown Faster than Income?" Canadian Journal of Economics.

Saxonhouse, Gary, 1989, "Differentiated Products, Economies of Scale, and Access to the Japanese Market," in R. Feenstra (ed.), Trade Policies for

International Competitiveness, University of Chicago Press: Chicago.

Schott, Jeffrey. 1991. "Trading Blocs and the World Trading System," The World Economy 14, no.1 (March), 1-17.

Summers, Lawrence. 1991. "Regionalism and the World Trading System," in Policy Implications of Trade and Currency Zones, A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, (August): 295-302.

Thurow, Lester. 1992. The Coming Economic Battle among Japan, Europe and America, New York: William Morrow.

Woo, Wing, and Kenjiro Hirayama, 1994, "Capital Flows and Monetary Policy" Singapore, June, *NBER - East Asia Seminar on Economics, Volume 5*, Takatoshi Ito and Anne Krueger, editors.

* * *

Notes

who fear the blocs do so because they think they will tend to be protectionist. Froot and Yoff
this volume pursue this logic, and point out some implications of foreign direct investment. K
rgues in favor of the three blocs on the grounds that they are "natural," in a sense explained b
s (1991c) argument in favor of blocs is that they can cement politically pro-liberalization sent
l countries.

l introductions to the subject of regional trading blocs include Bhagwati (1992), Fieleke (1992), Krugman (1991b), and

Petri (1992).

les include Arase (1991), Dornbusch (1989), Maidment (1989), and Thurow (1992, pp.16,65).

les include Arase (1991), Dornbusch (1989), Maidment (1989), and Thurow (1922, pp.16,65). For va

ves on the hypothesis, see papers in Regionalism and Rivalry: Japan and the U.S. in Pacific Asia

y Frankel and Miles Kahler (University of Chicago Press, Chicago), 1993.

hat smaller increases took place in the intra-regional trade shares of the Americas and Europe,
ely. The greatest increase, from 42 per cent to 53 per cent, took place among the APEC countrie
arlier paper gives references on the gravity model. The most classic reference is Linnemann (196
en and Frankel (1994) and Eichengreen and Irwin (1994) extend the analysis to the interwar perio
sy way to hold constant for size is to scale bilateral trade by GNPs or total trade. Such calcu
imes called "intensity-of-trade indexes." See Anderson and Norheim (1993), Drysdale and Garnaut
(1991)." All find that, once one holds constant for growth in this simple way, the existing in
bias in Asia did not increase in the 1980s.
ist of countries, and regional groupings, is given in an Appendix.
specification implies that trade between two equal-sized countries (say, of size .5) will be gre
e between a large and small country (say, of size .9 and .1). This property of models with impe
on is not a property of the classical Heckscher-Ohlin theory of comparative advantage; Helpman
an and Krugman (1985, section 1.5).
distance, distance squared, and the log of distance are included at the same time, only the las
nt.
, Rose (1991).
e results are reported in an Appendix Table A2-A3 to NBER Working Paper No. 4335. Linnemann (19
ve addressed the problem of trade flows so small as to be recorded as zero in another way: by tr
stituting fractions (like .5) of the minimum recordable unit for the zeros. They too usually fo
of the missing values made little substantive difference to the results.
rted in appendix, ibid., Table A1.
e results are not reported here, but are described in Frankel (1993).
greater openness indicates that trade-diversion is not taking place in East Asia. The openness
ignificant for the EC [where it eliminates the significance of the bloc effect in some years].
re reported in Frankel, Stein and Wei (1993).
kel, Stein, and Wei (1993).
corresponds to findings in Petri (1993), based on somewhat simpler calculations.
kel and Wei (1993b).
kel, Stein and Wei (1993). NAFTA had not experienced any positive bloc effect as of 1990.
coefficient for English is never close to statistically significant, beyond the general coefficie

nguages.
independent effect is reported in Table 2 of Frankel and Wei (1993a).
results are reported in Table 3 of Frankel and Wei (1993a). The issue of a possible China block
in Frankel and Wei (1994)
major exception is Hong Kong, which is pegged to the U.S. dollar, and has open financial markets
e 2 reports results where the dollar and yen interest rates are taken from the New York and Toky
markets respectively. [We have also tried the tests with the interest rates observed in the Lo
t.]
icollinearity does not bias the coefficient estimates or their reported standard errors. It jus
ly that there will be enough information in the data to answer the question at hand.
results are reported in Table 2.8 of Chinn and Frankel (1994a). Econometric extensions, includi
decomposition, appear in Chinn and Frankel (1994b).
results are reported in Table 2.9 in Chinn and Frankel (1994a), along with a data appendix. Rel
performed for Southeast Asian countries by Woo and Hirayama (1994).
do countries keep the weights secret? It allows the governments to devalue their currencies sec
so desire. But secret weights undermine the governments' ability to commit credibly to a low
ary monetary policy. (Lowell, 1992.)
kel and Wei (1994a) and Frankel (1993), respectively.
results for the EC and EFTA countries are reported in Tables 8 and 9, respectively, of Frankel a

e 6 of Frankel and Wei (1993b).
literature is surveyed in Edison and Melvin (1990).
e results extend those in Table 13a of Frankel and Wei (1994) by measuring volatility as the lev
ard deviation rather than its log, thus allowing the experiment of asking how much trade would g
rate variabilities like those reported in Table 3 were reduced to zero.
estimate in Frankel and Wei (1994) suggests that, on average, a doubling of the standard deviati
ilateral trade by an apparent 4.6 percent (= .066 log 2), holding constant all other variables.
example, Caballero and Corbo (1989). They find a negative relationship empirically however.
engreen and Irwin (1994), in gravity estimates for the inter-war period, find that an allowance
bloc terms changes sharply the estimated coefficients for the trade bloc effects.
standard deviation of relative money supply is our instrument for the volatility of exchange rat
re reported in Table 10 of Frankel and Wei (1993a).