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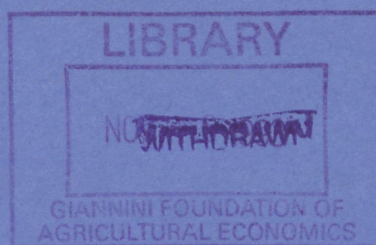
## **Financial Links around the Pacific Rim: 1982-1992**

Menzie David Chinn and Jeffrey A. Frankel

Economics, University of California at Santa Cruz and  
Economics, University of California at Berkeley

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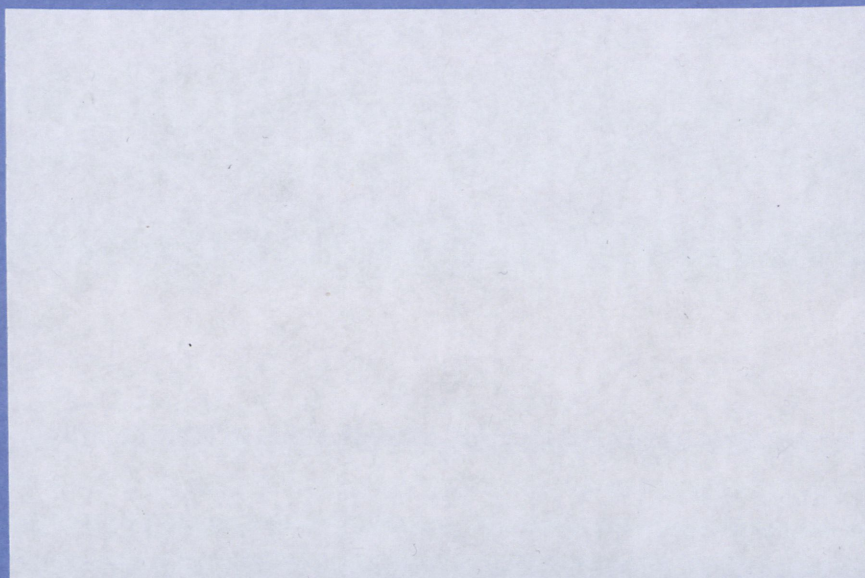
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**Financial Links around the Pacific Rim: 1982-1992**

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Key words: financial integration, interest rate parity, international capital mobility, exchange risk premium, Pacific, yen bloc

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## Abstract

Interest rate links strengthened among some Pacific Rim countries over the period 1982-1992, even though substantial country barriers and currency barriers remain. The covered interest differential narrowed for Australia and New Zealand, as their programs of financial liberalization admitted them to the club whose members already included Hong Kong, Singapore, Japan, and Canada. The exchange risk premium also narrowed significantly for Australia during the period 1988-92 (for which survey data are available). Overall, world influences on local interest rates increased in Australia, Korea, Malaysia, and New Zealand. In the cases of Australia, New Zealand, and Canada, there appears to have been a shift of influence from Tokyo interest rates to New York interest rates. In the cases of Indonesia and (somewhat less significantly) Korea and Singapore, there are signs of influence shifting from New York to Tokyo.



## 1 INTRODUCTION

The rapid steps Europe has taken toward economic integration, and their many effects, have been extensively studied. There exists a belief that economic links among Pacific countries are also increasing rapidly, and a suspicion that Japan is at the root of it, but these issues have been less extensively studied. Some recent tests regarding bilateral trade suggest that there is not in fact an increasing bias toward intra-regional trade within East Asia, and that the Pacific-wide grouping, which includes North America, is the strongest "trade bloc" of any.<sup>1</sup> But there are signs that Japanese financial influence is increasing in East Asia. Capital flows within the region, particularly foreign direct investment by Japan in Southeast Asia, are growing. The yen is playing a greater role in the region, as reflected in trade invoicing, loan-denomination, reserve holdings, and exchange rate policies. The role of the dollar is still dominant however.

This paper seeks to investigate the extent to which Pacific financial markets are becoming more tightly linked, by analyzing the comovements of 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 these issues in the Pacific context include Glick (1987), Glick and Hutchison (1990), and the papers in Cheng (1988).

Here we focus on three basic questions. (1) As the result of financial liberalization and innovation, particularly the removal of capital controls and other barriers to international capital mobility, are interest rates in Pacific countries becoming increasingly linked to the core world financial market? (2) To the extent that barriers remain and interest rates continue to be set independently, what is the nature of these barriers? Do they tend to be associated with country boundaries (such as capital controls, differential tax treatment, default risk, imperfect information, risk of future capital controls, etc.) or with currencies (expectations of exchange rate changes and an exchange risk premium)? (3) 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 shall use the term "financial links" to refer to the ease with which capital moves from one country to another, the extent to which capital controls and the other country barriers have been broken down. We shall use the term "currency links" to refer to the perceived stability of the exchange rate between two countries. Arbitrage will not equate interest rates internationally unless both financial links and currency links are very strong. One or the other alone will not do it. Either country barriers such as capital controls or the perceived possibility of exchange rate changes will be sufficient to drive a wedge between two countries' interest rates.

Convergence of Pacific Rim interest rates <sup>2</sup> is not as widespread a trend as one might think. Both the mean of onshore - offshore interest rates, as well as the standard deviation of those rate differentials, show no sign of a declining trend. As already noted, there is no reason to believe that interest rates should converge with integration unless one believes that both country barriers and the perceived likelihood of exchange rate changes were tending towards zero. To see this, notice that the differential for interest rates of common maturities can always be decomposed as follows:

$$(1) \quad i - i^{US} \equiv (i - i^{US} - fd) + (fd - \Delta s^e) + \Delta s^e$$

Where:

$fd$  is the forward discount for a consistent maturity

$\Delta s^e$  is the expected depreciation over a consistent horizon

This identity merely breaks the nominal interest differential into its constituent parts: country factors (including capital controls, differential tax treatment, default risk, localized information, risk of future capital controls) which give rise to the covered interest differential ( $i - i^{US} - fd$ ), and currency factors [an exchange risk premium ( $fd - \Delta s^e$ ) and expected depreciation ( $\Delta s^e$ )].

While exchange risk and expected depreciation are difficult to assess, one can examine capital controls and country risk directly by looking at the country premium – otherwise known as the covered interest differential. (What we are here calling the country premium is sometimes called political risk.<sup>3</sup>)

We can only examine covered interest differentials for a subset of countries, those with relatively



well-developed forward markets: Australia, Canada, Hong Kong, Japan, Malaysia, New Zealand and Singapore. Figure 1 illustrates one finding of this paper: that capital mobility, defined as the absence of barriers to the movement of short-term capital across national boundaries has indeed increased over the 1982-92 period for this subset of countries (measured by a 3 month moving average series for the covered interest differential). The mean covered interest differential has moved from minus one percent to roughly zero on an annualized basis, while the standard deviation of interest differentials shrinks to near zero.<sup>4</sup> Domestic financial liberalization in these countries is as much a part of the convergence process as international financial liberalization, as only market-determined interest rates are free to adjust to world levels in response to arbitrage.

This graph is merely suggestive, and summary statistics can be misleading. This paper examines more carefully each of these linkages in a variety of ways. In Section 2, we turn our attention first to the left-hand side of equation (1), discussing how the total interest differential has evolved over time for the Pacific Rim countries. Then, we assess individual components on the right-hand-side: the covered interest differential and the exchange risk premium.

In Section 3 we move to an investigation of whether local interest rates are becoming increasingly influenced by US interest rates. We examine correlations between the US Eurodollar rate and local onshore rates. The data on covered interest rates is relatively firm, and we pursue further ways of assessing influence over time, including recursive and rolling regression analysis (Section 4). Section 5 investigates whether uncovered interest parity is becoming a better characterization of Pacific Rim linkages, which brings in the exchange risk premium. These tests use survey data from Currency Forecasters' Digest on exchange rate expectations for several Pacific countries. Finally, Section 6 seeks to evaluate the relative importance of US and Japan as financial influences on interest rates in the region.

Our key findings are as follows: Pacific Rim interest rates appear to be increasingly influenced by foreign interest rates (either the US or Japanese), as measured by co-movements. Some of these interest rates also appear to be increasingly influenced by covered interest rates, indicating increasing financial integration for some countries (Australia and New Zealand, most evidently). For certain other countries,



the level of financial integration was high at both the beginning and end of the sample period, so that no trends were discernable (e.g., Hong Kong and Singapore). The statistical evidence for currency integration is much less strong, although for three out of the four countries studied (Australia, Canada and Japan) the exchange risk premium is decreasing. There is also some evidence that covariation of Pacific Rim interest rates with Japan is increasing -- though not for the English-speaking countries, Australia, Canada and New Zealand. Most of the conclusions are limited in scope, as the results pertain to subsets of the overall group of Pacific Rim countries. Many East Asian countries are not far enough along on the path of financial liberalization to show clear signs of arbitrage activity vis-a-vis overseas financial markets.

## 2 INTEREST RATE DIFFERENTIALS AND RISK PREMIA

### 2.1 Interest Differentials

The first item we examine is the left-hand side of equation (1). We regress the absolute value of the interest differential on a constant and a linear time trend. Absolute values are used because this prevents positive and negative differentials canceling out and making such countries appear open. While a regression of the absolute differential on a time trend is somewhat restrictive in form, it has the virtue of easy interpretation: the coefficient on the time trend is the average rate at which the differential shrinks in percentage points.<sup>5</sup> Table 1 shows the results for the period 1982:09 to 1992:03 (with the trend coefficient expressed in annualized terms). There are few clear cases of shrinking absolute interest differentials. When appropriately adjusted standard errors are used, to account for what is obviously a high degree of serial correlation, only one country appears with statistically significant downward trend (Japan).<sup>6</sup> The conclusion, based on this measure, is that important barriers remain keeping countries' interest rates largely independent. The question is whether the barriers to integration are associated with the countries themselves (capital controls, information costs, etc.) or with the respective currencies (anticipations of exchange rate changes).

## 2.2 Covered Interest Differential

The covered interest differential is our means of measuring the country premium. Frankel (1991) found that covered interest differentials, vis-a-vis the Eurodollar rate during the period September 1982 to January 1988, on average were as small for Hong Kong, Singapore, Japan and Canada as for the financially most open European countries. The differentials were bigger and more variable for Malaysia, Australia and New Zealand.

We now turn to the question how the covered interest rate behavior has changed over the period 1982-1992. Table 2 shows the results of regressing the absolute covered interest differential against a constant and a linear time trend, using the same ten-year sample period previously defined. As already noted, there are only seven currencies covered, since forward markets do not exist for other Pacific countries.

Australia and New Zealand show covered interest differentials that have diminished at a statistically significant rate, as one would expect from their programs of financial liberalization in the 1980s. Only one other country shows a downward trend, however, and it is not statistically significant. A significant positive trend appears for the case of Japan, an unexpected result in light of past findings by Otani (1983), Frankel (1984) and others that the large differentials of the 1970s fell to zero in the early 1980s.<sup>7</sup> The Australian results appear to be dominated by a spike in early 1983 (due to a large forward discount of the Australian dollar).

In the cases where the absolute covered interest differential is increasing, the constant is quite small, indicating integration has already occurred. Moreover, the rate of increase is also fairly small, 30 basis points per year at the most. We will examine the covered interest differentials more closely below.

## 2.3 The Exchange Risk Premium

The exchange risk premium is defined as  $f - s^e$ . We cannot observe investors' expectations,  $s^e$ , directly. The most standard method for measuring expected returns and examining the exchange risk premium is to invoke rational expectations and to infer investors' ex ante expectations from the ex post



behavior of the spot rate. This methodology usually leads to the finding that all or most of the observed variation in the forward discount is attributable to a time-varying exchange risk premium. But it has been argued that survey data offer a measure of expectations that, though far from perfect, may be more informative than ex post movements of the spot rate (Froot and Frankel, 1989). Survey data results for the five major currencies have showed a tendency for expected depreciation, as measured by the survey data, to move one-for-one with the forward discount, in contrast to the findings of the standard rational expectations approach.

Recently it has become possible to extend such tests to a variety of smaller currencies, by means of data from Currency Forecasters' Digest, which reports forecasts of market participants (actually the harmonic mean of the responses) on a monthly basis. We will denote the survey data measure by  $\hat{s}^e$ . Analysis of such data for 17 currencies has turned up more evidence of a time-varying risk premium than there was for the five major currencies.<sup>8</sup> Four of the currencies were Pacific. (Australia, Canada, Japan, and Singapore are the only countries for which we have both expectations and forward rate data.<sup>9</sup>) Only the Singapore dollar showed a tendency for expected depreciation to move one-for-one with the forward discount. For Australia and Canada there was evidence that some part of the variation in the forward discount is attributable to a time-varying risk premium. For Japan, the test at the three-month horizon supports the varying risk-premium while the 12-month horizon does the opposite.

Here we see how the exchange risk premium has changed in recent years, among the Pacific countries for which the data are available. The results are reported in Table 3 for the 1988:02-92:04 period.<sup>10</sup> It appears that over this period, the exchange risk premium at the three and 12 month horizons fell for the Australian and Canadian dollars, as well as the Yen, although the trend term is only statistically significant in the first case. The risk premium for Singapore is increasing.

### 3 INTEGRATION: INTEREST RATE CO-MOVEMENTS

One way to assess the strength of financial linkages is to measure the impact of foreign interest rates on local rates. To discern whether US financial influence is increasing or decreasing, we ran the

following regression:

$$(2) \quad i_t = \alpha_0 + \alpha_1 i^{US}_t + \alpha_2 (i^{US}_t \times \text{TIME}) + u_{2t}$$

Where:

$i$  is the local onshore rate

$i^{US}$  is the US Eurodollar deposit rate

TIME is a linear trend term

Equation 2 is admittedly a rather blunt instrument by which to measure the effect of increasing integration, since it restricts the time variation in the slope coefficient to be a linear trend. ( $\alpha_2$  can be interpreted as the rate at which  $\alpha_1$  increases each period.) Moreover, the regression only makes sense under certain restrictive assumptions. To begin with, it must be assumed that the local country is small enough that it can take the U.S. interest rate as exogenous. The local rate<sup>11</sup> is related to the US rate in a clear manner under the null hypothesis of complete integration, i.e., capital controls are non-existent and investors do not expect the exchange rate to change.<sup>12</sup> In that specific case (assuming debt instruments of similar attributes),  $\alpha_0 = \alpha_2 = 0$  and  $\alpha_1 = 1$ . More loosely, one might plausibly interpret a parameter estimate for  $\alpha_2 > 0$  as an indication of increasing impact over time.

The results of implementing regression equation (2) are presented in Table 4.<sup>13</sup> (We report results for two Korean series because of the difficulty in finding an adequate market-determined rate.) The key coefficient, on the interaction term, is "annualized" so that it indicates how much the coefficient on the US interest rate increases each year, on average.

The estimated trend in the effect is upward in three-quarters of the countries. Given the crude nature of the test, it is surprising how much of the total variation the interaction term picks up. For about two-thirds of the countries in the sample, this coefficient is positive, and statistically significant using asymptotic standard errors. Using more appropriate standard errors that assume  $N/3$  independent observations to account for the serial correlation (see note 6), one finds evidence of an increasing US effect in only three cases, Canada, Malaysia, and Korea (under either of the two Korean market-determined



interest rates). Negative coefficients on the interaction term appear in three instances – Japan, New Zealand, and Singapore.<sup>14</sup> The New Zealand result is suspect because of the extreme serial correlation. Estimating this equation in first differences eliminates the statistical significance of the interaction term.

For most of these countries the history of liberalization and structural change over the last ten years is more complicated than a simple linear time trend. Korea, for example, made a first start at liberalization in the early 1980s, backtracked in the mid-1980s, and has more recently started forward again. Two econometric approaches that are more sophisticated than the inclusion of a simple time trend are to use recursive or rolling regression techniques, which are non-restrictive means of allowing for time variation in the slope coefficient.

We run the regression:

$$(3) \quad i_t = \alpha_{0,t} + \alpha_{1,t} i^{US}_t + u_{3,t}$$

Where:

$\alpha_{i,t}$  is the coefficient at time  $t$

The recursive regression procedure increases the sample size as it recursively updates the parameter estimates, and is more appropriate if one is seeking to replicate the updating of investors' knowledge of an existing structure. The rolling regression maintains the sample size ( $k = 24$  periods is used here) as it updates, and is more appropriate if one is seeking to discover how the structure has evolved over time. In either case, most of the recursive slope coefficients ( $\alpha_i$ ) trace out an inverted U-shape. Rather than blinding the reader with graphs of the coefficients for all the countries, we will merely observe that the results are in accord with the earlier ones: for Australia, the coefficient is continuously rising beginning in 1986, while for Hong Kong and Singapore, the coefficients are close to unity and relatively constant. The Hong Kong and Singapore findings are consistent with the regimes of pegged exchange rates and open financial markets that each maintained during this period.

#### 4 FINANCIAL LINKS TO THE U.S.: COVERED INTEREST RATE CO-MOVEMENTS

Some countries, like Australia, are known to have undertaken sweeping financial liberalization in the 1980s, and yet did not show [in Table 1] a downward trend in their interest differential that was statistically significant. A likely explanation is that, even while capital controls were removed and financial links with offshore markets were growing, exchange rate variability continues to drive a large wedge between local and dollar interest rates. We now bring the forward rate data into the regressions of the preceding section, in order to remove the currency factors from the calculation and zero in on other financial factors.

We consider the following regression:

$$(4) \quad i_t = \beta_{0,t} + \beta_{1,t} (i^{US} - fd)_t + u_{4,t}$$

Where:

$fd$  is the forward discount, in US\$ / foreign currency unit.

Table 5 reports the results of simple OLS regressions for six currencies. (Recall that there are only six currencies, besides the Yen, for which data are available: Australian, Canadian, Hong Kong, Malaysian, New Zealand and Singapore dollars.) The  $\beta_1$  coefficients are all of the correct positive sign and at a high degree of statistical significance. The three that have coefficients close to one are the three that are known to have had open financial markets throughout the sample period: Canada, Hong Kong, and Singapore.<sup>15</sup>

How have these relationships changed over the sample period? We ran these equations through recursive and rolling regression procedures to obtain time-varying parameter estimates. Recursive regressions increment the sample size recursively. Rolling regressions hold the sample size constant. The slope coefficients at the end of August 1984,<sup>16</sup> and at the end of the sample, March 1992, are reported in the right-most columns of Table 5. The pattern of changes substantiates one's priors of increasing or high liberalization. In five out of six cases the coefficient is higher at the end of the period than the beginning. Australia and New Zealand, countries that undertook extensive programs of financial liberalization in the 1980s, are the two where the increase is substantial. In the cases of Canada, Hong Kong, and Singapore



the coefficients were already high at the beginning of the sample period, so it is not surprising that the increase is small.

Several tests can use recursive techniques to assess structural breaks. We used the 1-step ahead forecast F-test to find possible break points. The break in 1984 for New Zealand fits nicely with the devaluation of the New Zealand dollar, and the breaks in 1985, with the abolition of exchange controls in Dec. 1984, and floating in March 1985 (Coats, 1988: 91). Hong Kong's end-of-1983 break matches the beginning of the pegged exchange rate for the Hong Kong dollar.<sup>17</sup>

## 5 OVERALL INTEGRATION: DOES UNCOVERED INTEREST RATE PARITY HOLD?

We examine one final measure of the strength of financial links: the degree to which domestic interest rates move with foreign interest rates adjusted for expectations of exchange rate changes, i.e., the degree to which investors treat the domestic country's assets as perfect substitutes for U.S. assets. Perfect substitutability implies that uncovered interest rate parity holds: expected returns are equalized across currencies. It requires two conditions, both of which we have already tested individually: that covered interest parity hold and that there be no exchange risk premium.

To examine whether UIP holds for the Pacific Rim countries we run the regression:

$$(5) \quad i_t = \mu_0 + \mu_1 (i^{US} - \Delta \hat{s}^e)_t + u_{5,t}$$

Where:

$\Delta \hat{s}^e$  is the expected depreciation using the median survey response.

Equation 5 is exactly analogous to the regression equation in (4).

There is at least one econometric problem with implementing this test: the slope coefficient will be estimated with a downward bias due to measurement error in the right-hand-side variable. The ideal regression would include the true market expectation of depreciation ( $\Delta s^e$ ); this is observed only with error. We hope in future work to account for this errors-in-variables problem with an instrumental variables approach.

Table 6 reports the results of the OLS regressions over the 1988:02-1992:03 period for six countries. (We are able to add Korea and Taiwan to the list of countries tested in Table 3, because we are no longer using the forward rate.) The coefficient is significantly greater than zero in the cases of Korea and Singapore, and borderline in the case of Australia. These findings hold even when more conservative standard errors (indicated in square [.] brackets) are used in conducting t-tests to take into account what is obviously high serial correlation. In every case, the null hypothesis of  $\mu_1 = 1$  is always rejected, suggesting that uncovered interest parity does not hold. This is not very surprising, since each country has shown evidence of non-zero covered interest differentials, exchange risk premium or both. Again, it is also likely that the coefficients are biased downward by measurement error.

It may be more interesting to see how the coefficients change over time. The right-most columns of Table 6 report the slope coefficients at the end of January 1989, and at the end of March 1992. While for the cases of Australia, Japan and Korea, the estimated coefficient ends the sample period at a higher level than it started, it would be foolhardy to attempt to give much interpretation to the results because the estimates are so imprecise. Hence no firm conclusions can yet be drawn on this count.

## 6 IS TOKYO GAINING INFLUENCE AT THE EXPENSE OF NEW YORK?

Our data and equation design can be used to shed light on a topical question, whether Japan is establishing a yen bloc.<sup>18</sup> Many signs report to increased Japanese financial and monetary influence in East Asia and the Pacific. The (quite imperfect) data available from Japan and the United States on their direct investment in Pacific Asia have been extensively discussed. The (equally imperfect) data on portfolio flows have been much less widely noted. Japanese statistics show flows of long-term capital to Asia, particularly the four Newly Industrialized Economies, in 1988, the first year that the statistics are broken down into such geographical regions.<sup>19</sup> Subsequently, however, the figures on increases in liabilities to the region dwarf the figures on increases in assets, a reflection of loans from subsidiaries of Japanese banks in the NIEs back to Japan. (The figures for Australia show net flows of Japanese long-term capital throughout 1988-91.) Focusing just on securities, Japan on net purchased \$725 million worth of foreign

securities from the NIEs and \$5,995 million from Australia, cumulatively during 1988-91. During this period, the United States on net cashed in foreign securities in both places, continuing its ten-year pattern of net capital inflows.<sup>20</sup> In theory, the influence of Japanese versus American residents over financial conditions in Pacific Asia should depend on the respective magnitudes of their portfolio holdings. The US authorities have not conducted a survey of portfolio investment abroad more recently than World War II (Stekler and Truman, 1992: 5), and apparently no statistics on accumulated stocks are available for Japanese investors. Nevertheless, it appears likely that Japanese investors have acquired more securities in Pacific Asia than American investors.

Several measures show an increase in the use of the yen in the region. The share of the yen in external debt in five major Asian debtors almost doubled in the 1980s (Indonesia, Korea, Malaysia, the Philippines and Thailand). The percentage of Southeast Asian imports denominated in yen increased from a mere 2.0 per cent in 1983 to 19.4 per cent in 1990 (though the percentage of exports denominated in yen showed little trend.)<sup>21</sup> There was also some increase in the role of the yen in the exchange rate policies of a few East Asian countries, though it turns out to have been less than one might expect.<sup>22</sup>

Our regressions of local interest rates in East Asia and the Pacific against world interest rates can be extended to test the relative influence of Tokyo and New York financial markets. We implement three tests, corresponding to the earlier 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 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, as we have seen.<sup>23</sup> Even capital mobility between the US 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.

The results of the first test are reported in Table 7. 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.

It would be interesting to try to distinguish whether the links to Tokyo and New York are attributable to country-specific factors, such as information advantages that might be afforded by common languages, cultures or tax and legal systems, or to currency factors, 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, the two currency terms in equation 1 should disappear. Although Hong Kong remains pegged to the dollar, and the Philippines also remains (more loosely) tied to the dollar alone, there is evidence that some other East Asian currencies at times during the 1980s began to give some weight to the yen in the determination of their currencies.

Out of nine currencies, in 1979-80 there were signs of significant weight on the yen for only one, the Singapore dollar. Starting in 1981-82, the Malaysian ringgit also began to put significant weight on the yen. By 1985 more than half of the currencies studied did so. The role of the yen was particularly clear for the Indonesian rupiah during 1985-90. Toward the end of the sample period (January 1979-May 1992),

the influence of the yen in the implicit baskets of the nine East Asian countries appears to diminish again. There is very little evidence that a campaign by the US Treasury to push Taiwan and Korea away from a strict peg with the dollar, beginning in 1987, produced a de facto break that persisted to 1989-92. Overall, the dollar remains still far more dominant than the yen, and the relative role of the yen even in the baskets where it is significant is still far less than the relative share of Japan in bilateral trade. Nevertheless it is possible that, for a country like Indonesia, the highly significant increase in the influence of Japanese interest rates during the course of the ten-year sample period that appears in Table 7 can be attributed to the new role assigned to the yen in the determination of the value of the Indonesian ringgit in the second half of the 1980s.<sup>24</sup>

We now try to remove the currency factors from the interest rate regressions, in order to see what remains. (Unfortunately, one of the countries for which the data are not available is Indonesia.) Table 8 reports the results of regressing the local interest rate on both the covered US and Japanese interest rates, 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.<sup>25</sup> Indeed the correlation between the respective trend-interaction terms always exceeds 0.98. Thus it should not be very surprising that none of the interaction parameter estimates is statistically significant. The two that are closest to significant, Malaysia and Singapore, continue to indicate that influence is shifting from New York to Tokyo.

Table 9 reports the uncovered interest rate results. There is some evidence of declining New York influence in Australia and Canada, and increasing influence in Korea. The sign on the Tokyo term suggests an increasing effect for five out of six countries, but is not statistically significant. Here the imprecision is probably due more to measurement error in the survey data than to multicollinearity.

## 7 CONCLUSIONS

A series of criteria have been forwarded to evaluate the extent of financial and currency linkages among the Pacific Rim countries for which we have reasonable market-determined interest rates, and how

the links have evolved over the period 1982-1992. Briefly our findings can be summarized as follows.

The region is still far from interest rate convergence. However, US and local interest rates do appear to be increasingly correlated as time passes. Moreover, for countries with relatively well-developed forward markets, there is substantial evidence of declining covered interest differentials, indicating a greater degree of financial integration. The evolution of the exchange risk premium and the uncovered interest rate parity criterion indicate little evidence of (statistically significant) change in the degree of currency integration. With respect to the relative importance of the United States and Japan in the region, for a few countries like Indonesia there is some evidence of a shift during 1982-92 of influence from US interest rates to Japanese interest rates, which may be attributable to a greater role for the yen in the region. Overall, however, the evidence for a "Yen Bloc" is much less than one would imagine from popular accounts.

## DATA APPENDIX

### Interest rates

Eurocurrency deposit rates: The US, UK and Japanese 3 month Eurocurrency deposit rates are the arithmetic average of the bid and offer rates in London at close of market, as reported by Bank of America up to October 6, 1986, and Reuter's Information Service thereafter, and recorded by DRI in the DRIFACS database.

Local Market Rates: Where both WFM and DRI are indicated under "Source," WFM is the source until 1989:10, at which time DRIFACS becomes the source.

Country	Source	DRI Code	Description
-----			
US	DRI	FIP90Y	Financial Paper, industrial firms, 90 days
US	DRI	USD03	3 month Eurodollar rate
Australia	WFM,DRI	ADBBL90Q	90 day bank bill, quote
Canada	WFM,DRI	CACP90B,A	3 month prime finance company paper
Hong Kong	WFM,DRI	HKM03B,A	3 month interbank dep. rate
Indonesia	WFMr		1 month interbank dep. rate
Japan	WFM,DRI	JABGDS90Y	3 month Gensaki bond rate
Japan	DRI	JAD03	3 month EuroYen rate
Korea2	WFMr		Monetary Stabilization bond
Korea3	alternate		Avg. 1,3,5 yr.corp.bond, avg. of daily
Malaysia	WFMr		3 month interbank dep. rate



New Zealand	WFM,WFMr		3 month commercial bills to Dec. 1987., 3 month bank bills thereafter.
Singapore	WFMr		3 mo. banker's acceptances to Aug.87; 3 month commercial bills thereafter
Taiwan	WFMr		90 day bankers acceptances
Thailand	WFMr		call money rate
UK	DRI	UKM03B,A	3 month interbank dep. rate
UK	DRI	UKD03	3 month EuroPound rate

-----  
Notes: DRI indicates DRIFACS; WFM indicates World Financial Markets; WFMr indicates Morgan Guaranty's database, as provided by Carlton Strong.

#### Exchange rates

All exchange rates (except those indicated below) are London 3 PM, arithmetic average of bid and offer rates as reported by Barclay's until end of March 1990, at which time the series is no longer recorded by DRIFACS. Thereafter, the London close rate is used, as reported by Reuter's Information Services. A consistent series is not used (i.e., the London close all the way) because the London close series only begin in 1986.

The exchange rates for Indonesia, Korea and Thailand were obtained from the International Monetary Fund's International Financial Statistics database, and are London midday rates.

#### Actual Regression Specifications

The interest rate regressions are actually run in the following specifications:

$$(A1) \quad \ln(1 + i) = \alpha_0 + \alpha_1 \ln(1 + i^{US}) + \alpha_2 [\ln(1 + i^{US}) \times \text{TIME}]$$

The covered interest rate regressions were run analogously:

$$(A2) \quad \ln(1 + i) = \beta_0 + \beta_1 [\ln(1 + i^{US}) - (\ln F - \ln S)]$$

Where:

F is the forward exchange rate US\$/foreign currency unit

S is the spot exchange rate US\$/foreign currency unit

## Endnotes

<sup>1</sup> Frankel (1993), and other papers to be published in the same volume.

<sup>2</sup> The Pacific Rim countries examined in this study are Australia, Canada, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, Singapore, Taiwan, Thailand and the United States.

<sup>3</sup> Aliber (1973), Dooley and Isard (1980), Frankel and MacArthur (1988), among others, make this distinction between political and exchange risk. Sometimes political turmoil is associated with the country premium; this seems to be the case for Canada, where the covered interest differential widened in the immediate aftermath of the failure of the Meech Lake accords.

<sup>4</sup> Malaysia drops out of the sample at 1990:04, which tends to reduce both the mean and standard deviation.

<sup>5</sup> The interest rates examined are mostly end-of-month money market rates (e.g., interbank), of a three month maturity. Three exceptions are the Korean series KO3, which is a monthly average of daily observations, the Indonesian 1 month interbank rate, and the Thai overnight call money rate. Greater detail on sources and definitions can be found in the Data Appendix.

<sup>6</sup> One is tempted in this age of robust estimators to use the GMM Newey-West standard errors to conduct tests of statistical significance. This procedure is not appropriate in this case, as the observed serial correlation appears to be of an autoregressive nature (usually AR(1)) rather than of a moving average type. The N/3 adjustment to the standard errors is consistent with a first order autocorrelation coefficient of approximately 0.82, which is close to the average of the estimated autoregressive coefficients. Running the regressions in first differences results in little change in the point estimates, but such large standard errors that nothing comes out significant.

<sup>7</sup> In these data the covered interest differential is as high as 0.92 percentage points in September 1990. Similarly, the Gensaki-EuroYen differential peaks at 1.02 percentage points in February 1990, before declining back to zero at the end of 1991. The most likely explanation for these results is that the Gensaki was a better

"representative rate" earlier in the 1980s, and it has since decreased in importance (Feldman, 1986: 42); CDs are thought now to be far more representative. While some have argued that there still exist frictions in Japanese financial markets that prevent perfect international arbitrage, such as Ministry of Finance administrative guidance over institutional investors to buy dollar assets during 1987-89, the sign of the observed differential does not support this interpretation. We also tried the regression using the Japanese EuroYen interest rate in place of the Gensaki rate. The EuroYen rate seems to obey covered interest parity better, as one would expect. But there is a rise in the differential to as high as 0.60% in mid-1989 even in the covered Euromarket differential (of the opposite sign from the onshore-offshore differential).

<sup>8</sup> Frankel and Chinn (1991). These data are proprietary with Currency Forecasters' Digest of White Plains, NY, obtained by subscription by the Institute for International Economics. Frankel and Phillips (1991) (updated in Frankel, Phillips and Chinn, 1992) apply the data to the question of European integration.

<sup>9</sup> Data for Hong Kong are also available on an alternate-month basis. The data indicate zero variation in the risk premium, since reported expectations of (non-zero) change in the exchange rate are constant over time.

<sup>10</sup> Unfortunately, we do not have expectations data spanning a period consistent with the interest and forward rate data. These data are timed somewhat differently from the other data used in this paper. The CFD forecasts are usually compiled on the third Thursday of each month.

<sup>11</sup> Ideally, the local rate in these tests should be determined freely in financial markets. We tried to get as close to a market-determined interest rates if possible. It was not always possible, since many East Asian countries maintain repressed or highly regulated financial systems. South Korea is an instance of a country which has only begun to liberalize (which is why we do not use the highly regulated interbank rate). The Monetary Stabilization Bond rate (KO2) is the closest to an active market rate, the curb market no longer being as active as it was in the early 1980s. See Tseng and Corker (1991), Emery (1992) and Frankel (1992) for details. A government that sets domestic interest rates artificially will have to use capital controls to prevent international arbitrage; our tests will reject interest rate parity for such countries, just as they should.



<sup>12</sup> The assumption that the exchange rate follows a random walk, so that the rationally-expected depreciation is zero, has been made in a recent study by Faruquee (1992), for the Pacific Basin countries of Korea, Malaysia, Singapore and Thailand. The data are ambiguous on this point. Unit root behavior is rejected only for Hong Kong, which is to be expected given the pegged exchange rate regime. However, there is almost borderline rejection of a unit root in favor of trend stationarity for Australia, Indonesia, Malaysia, New Zealand and Thailand (according to ADF tests using four lags and a constant).

<sup>13</sup> Almost all the interest rate series appear nonstationary [i.e.,  $I(1)$ ], but fail to exhibit cointegrated behavior. This result is to be expected given the high-frequency of the data and the short time span. Rather than imposing a first-differencing specification, we impose our prior that none of these countries would allow its interest rates to diverge without bound from the US rate, and so we run the regressions in levels.

<sup>14</sup> The regression for Japan is suspect, since the US rate is less likely to be weakly exogenous with respect to the Japanese rate.

<sup>15</sup> Even the coefficients on these three are statistically significantly less than one. (The standard errors are very small.) A small amount of fluctuation in the covered interest differential within a narrow range dictated by the bid-ask spread or other transactions costs could give this result. Notice that the proper test for efficiency in a technical, statistical sense is for  $\beta_1 = 1$ , not the joint null of  $\beta_0 = 0$  and  $\beta_1 = 1$ , since the series appear integrated of order one. See Brenner and Kroner (1992).

<sup>16</sup> The coefficient series start in 1982:11, but it takes a while for the series to settle down to reasonable estimates with some degrees of freedom. At 1984:08, the d.f. is still only 22.

<sup>17</sup> Another measure of how much international interest rates (appropriately covered) influence domestic interest rates can be obtained by segmenting the sample into early (1982:09-87:06) and late (1987:07-92:03) subsamples, and comparing the relationships implied by the results of vector autoregression (VAR) techniques. These results can be found in Chinn and Frankel (1992).

<sup>18</sup> Tests of monthly changes in the value of East Asian currencies in Frankel (1993) confirm the strong influence of monthly changes in the value of the dollar, most completely in Hong Kong, but also show that during some sub-periods the yen has had a significant influence on the Singapore dollar, the Thai baht, and the Korean won. Other aspects of the Yen Bloc question, in particular quantification of the trade links and foreign direct investment within this region, are examined there as well, and in other papers to be published in the same volume.

<sup>19</sup> Balance of Payments Monthly, Bank of Japan.

<sup>20</sup> U.S. Treasury Bulletin, Table CM-V-5, June issues.

<sup>21</sup> Japanese Ministry of Finance, Annual Report, as reported in Tavlas and Ozeki (1992, p.33).

<sup>22</sup> The yen share in official reserve holdings of Asian countries rose from 1980 to 1987, and then declined rather sharply in the last three years of the decade. The weight of the yen also rose in the implicit baskets of a few East Asian exchange rates, particularly from 1985, as discussed further below (Frankel and Wei, 1992).

<sup>23</sup> The major exception has already been noted: Hong Kong, which is pegged to the U.S. dollar, and has open financial markets.

<sup>24</sup> The results on the implicit currency weights are reported in Frankel and Wei (1992: 8). The case of Korea is discussed in Frankel (1992).

<sup>25</sup> Multicollinearity does not, of course, bias the coefficient estimates or their reported standard errors. It just makes it unlikely that there will be enough information in the data to answer the question at hand.

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TABLE 2.1

Regressions of Absolute Interest Differential with US on Time Trend

1982:09-1992:03

Currency	Constant	Trend	$R^2$	DW	N	Sample
-----	-----	-----	---	--	---	-----
Australia	4.088** (0.467) [1.401]	0.212 (0.085) [0.147]	.04	0.149	115	
Canada	0.306 (0.143) [0.428]	0.326** (0.026) [0.045]	.58	0.324	115	
Hong Kong	1.532** (0.189) [0.566]	-0.094 (0.034) [0.059]	.05	0.873	115	
Indonesia	6.082** (0.494) [1.482]	0.667** (0.090) [0.156]	.32	0.497	114	
Japan	3.405** (0.241)	-0.175** (0.044)	.12	0.118	115	

	[0.722]	[0.076]				
Korea2	-1.315	1.206**	.56	0.257	63	87:01-92:03
	(0.951)	(0.134)				
	[2.853]	[0.233]				
Korea3	2.834**	0.649**	.54	0.134	111	82:09-91:11
	(0.304)	(0.057)				
	[0.913]	[0.099]				
Malaysia	1.556	0.162	.08	0.706	111	82:09-92:03
	(0.269)	(0.049)				
	[0.807]	[0.084]				
New	8.229**	-0.305	.03	0.138	115	
Zealand	(0.743)	(0.135)				
	[2.229]	[0.234]				
Singapore	2.561**	-0.049	.01	0.330	112	82:09-91:12
	(0.176)	(0.033)				
	[0.529]	[0.057]				

Currency	Constant	Trend	$R^2$	DW	N	Sample
-----	-----	-----	---	--	---	-----
Taiwan	2.367**	0.031	-.01	0.602	110	83:01-92:02
	(0.273)	(0.049)				
	[0.819]	[0.085]				
Thailand	1.303	0.405**	.18	0.176	103	82:09-91:11
	(0.433)	(0.084)				
	[1.299]	[0.145]				

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Notes: All parameter estimates in percent terms (annualized).  
Figures in parentheses (.) are asymptotic standard errors;  
figures in brackets [.] are standard errors assuming N/3  
independent observations. \*(\*\*) indicates significance at 5%(1%)  
level using the adjusted standard errors.

TABLE 2.2

## Regressions of Absolute Covered Interest Differential

with US on Time Trend

1982:09-1992:03

Currency	Constant	Trend	$R^2$	DW	N	Sample
-----	-----	-----	---	--	---	-----
Australia	1.572*	-0.190*	.12	1.306	115	
	(0.243)	(0.046)				
	[0.759]	[0.080]				
Canada	0.121	0.020	.06	1.021	115	
	(0.038)	(0.007)				
	[0.113]	[0.012]				
Hong Kong	0.100	0.028	.05	1.331	115	
	(0.058)	(0.011)				
	[0.174]	[0.018]				
Japan	0.142	0.027*	.14	0.761	115	
	(0.034)	(0.006)				
	[0.103]	[0.011]				
Malaysia	1.460*	-0.040	-.01	0.621	87	82:09-90:03



	(0.240)	(0.056)				
	[0.720]	[0.096]				
New	3.165**	-0.388**	.35	1.920	115	
Zealand	(0.272)	(0.050)				
	[0.816]	[0.086]				
Singapore	0.269	0.028	.05	1.082	112	82:09-91:12
	(0.055)	(0.010)				
	[0.164]	[0.018]				

---

Notes: All parameter estimates in percent terms (annualized).  
 Figures in parentheses (.) are asymptotic standard errors;  
 figures in brackets [.] are standard errors assuming N/3  
 independent observations. \*(\*\*) indicates significance at 5%(1%)  
 level using the adjusted standard errors.

TABLE 2.3

## Regressions of Absolute Exchange Risk Premium with US on Time Trend

1988:02-1992:04

Currency	k	Constant	Trend	— DW		Het.	N
				R <sup>2</sup>	Q		
-----	-	-----	-----	---	--	----	---
Australia	3	7.307** (0.243)	-1.451* (0.046)	.09	2.154 10.86	0.989	51
	12	1.777** (0.356) <sup>a/</sup>	-0.278* (0.122) <sup>a/</sup>	.08	2.171 12.92	5.662 <sup>b/</sup>	51
Canada	3	3.826** (0.789)	-0.480 (0.319)	.11	na <sup>c/</sup> 16.23	1.592	50
	12	2.005** (0.737)	-0.239 (0.276)	.25	na <sup>d/</sup> 17.45	2.723	49
Japan	3	7.578** (2.082)	-0.173 (0.839)	.09	na <sup>e/</sup> 12.24	1.930	50
	12	5.062* (2.290)	-0.071 (0.886)	.41	na <sup>f/</sup> 10.36	4.329*	50

Sing. <sup>e/</sup>	3	1.130	1.283*	.23	na	3.764*	24
		(0.829) <sup>a/</sup>	(0.575) <sup>a/</sup>		8.62 <sup>f/</sup>		
	12	2.424**	0.668**	.25	na	2.622	24
		(0.522)	(0.227)		14.37 <sup>f/</sup>		

-----

Notes: All parameter estimates in percent terms (annualized). k is the forecast horizon/maturity. Figures in parentheses (.) are asymptotic standard errors. Q is the Ljung-Box Q-statistic for serial correlation of lag order 13. Het. is the F-statistic for heteroskedasticity. \*(\*\*) indicates significance at 5%(1%) level using the adjusted standard errors.

a/ White heteroskedasticity-robust standard errors.

b/ Significant at 10%.

c/ AR 1 correction.

d/ AR 1, AR 2 correction.

e/ Data reported on alternating months, only.

f/ Q statistic is the Godfrey-Breusch LM test for 13 lags of residuals.

TABLE 2.4

## Regressions of Local Rate on US Interest Rate

and a Trend Interaction Term

1982:09-1992:03

Currency	Interest			R <sup>2</sup>	DW	N
	Constant	Rate	Interact			
-----	-----	-----	-----	---	--	---
Australia	8.305** (1.364) [4.092]	0.466 (0.148) [0.257]	0.027 (0.012) [0.021]	.08	0.155	115
Canada	1.754 (0.439) [1.317]	0.802** (0.048) [0.083]	0.046** (0.004) [0.007]	.74	0.342	115
Hong Kong	2.797 (0.794) [2.382]	1.276** (0.086) [0.149]	0.012 (0.007) [0.013]	.66	0.342	115
Indonesia	15.389** (1.492) [4.476]	0.037 (0.162) [0.281]	0.041 (0.014) [0.023]	.06	0.512	114
Japan	4.401* (1.492) [4.476]	0.157 (0.162) [0.281]	-0.004 (0.014) [0.023]	.04	0.037	115

	(0.663)	(0.072)	(0.006)			
	[1.989]	[0.125]	[0.010]			
Korea	15.237**	-0.989**	0.126**	.63	0.599	63
(K02)	(0.690)	(0.110)	(0.014)			
	[2.070]	[0.191]	[0.023]			
Korea	12.971**	-0.066	0.039**	.22	0.069	111
(K03)	(0.887)	(0.097)	(0.007)			
	[2.661]	[0.169]	[0.012]			
Malaysia	9.177**	-0.013	0.061**	.25	0.346	111
	(1.132)	(0.123)	(0.010)			
	[3.396]	[0.213]	[0.018]			
New	16.585**	0.059	0.071*	.10	0.165	115
Zealand	(2.112)	(0.229)	(0.019)			
	[6.336]	[0.397]	[0.033]			
Singapore	-0.615	0.809	-0.006	.65	0.303	112
	(0.555)	(0.605)	(0.005)			
	[1.665]	[1.048]	[0.008]			
Taiwan	0.496**	0.594*	0.032	.14	0.271	110
	(1.304)	(0.143)	(0.012)			
	[3.913]	[0.248]	[0.021]			

Thailand	1.312	0.997**	0.046	.18	0.128	103
	(1.915)	(0.205)	(0.016)			
	[5.745]	[0.355]	[0.028]			

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Notes: All parameter estimates in percent terms. Figures in parentheses (.) are asymptotic standard errors; figures in brackets [.] are standard errors assuming N/3 independent observations. Sample periods correspond to those indicated in Table 1. \*(\*\*) indicates significance at 5%(1%) level using the adjusted standard errors.

TABLE 2.5

## Covered Interest Parity Regressions

$$i = \beta_0 + \beta_1(i^{US} - fd) + u$$

Currency	$\beta_0$	$\beta_1$ <sup>a/</sup>	$R^2$	DW	Q-stat. ARMA Spec	Breaks	Proc.	$\hat{\beta}_1$ st	$\hat{\beta}_1$ end
-----	-----	-----	---	---	-----	-----	-----	-----	-----
Australia	3.396*	0.707**	.77	0.825	119.56**	1985	recurs	0.287	0.707
	(0.499)	(0.036)			AR1		roll	0.287	0.965
	[1.497]	[0.062]							
Canada	0.399	0.943*	.98	0.851	223.70**	1987,	recurs	0.916	0.943
	(0.137)	(0.014)			AR2	1990	roll	0.916	0.887
	[0.411]	[0.024]							
Hong Kong	0.376	0.968*	.99	1.957	14.87	1983:	recurs	0.974	0.968
	(0.065)	(0.008)				08-11	roll	0.974	1.011
	[0.195]	[0.014]							
Malay. <sup>b/</sup>	0.860	0.742**	.88	0.862	71**/14.8	1984:09	recurs	0.707	0.742
	(0.258)	(0.029)			AR1/ --	1985:04	roll	0.707	0.550
	[0.774]	[0.050]							
New Zealand	2.997*	0.741**	.85	1.269	67.49**	1983:07	recurs	0.305	0.741
	(0.477)	(0.029)			AR3	1984:08	roll	0.305	0.939
	[1.431]	[0.050]							
Singapore	0.023	0.935*	.96	0.911	186.63**	1987:02	recurs	0.730	0.935 <sup>d/</sup>
	(0.117)	(0.019)			AR3	1990:04	roll	0.923	0.865
	[0.351]	[0.033]							



Notes: All parameter estimates in percent terms. Figures in parentheses (.) are asymptotic standard errors; figures in brackets [.] are standard errors assuming  $N/3$  independent observations. Q-statistic indicates the Ljung-Box Q-statistic for lag order 13. "ARMA Spec." indicates the apparent ARMA specification for the residuals. "Break(s)" indicates likely breaks as indicated by a 1-step ahead recursive residuals test. Proc. is procedure, either "recurs" (recursive) or "roll" (rolling regression).  $\hat{\beta}_1$  st is the  $\beta_{1,t}$  coefficient at 1984:08.  $\hat{\beta}_1$  end is the  $\beta_{1,t}$  coefficient at 1992:03. \*(\*\*) indicates significance at 5%(1%) level using the adjusted standard errors.

a/ The significance levels for the slope coefficient is for  $H_0: \beta_1=1$ . Note that all the slope parameter estimates are statistically different from zero.

b/ There are missing data for the period 1987:07-87:10. The figures to the left(right) of the / are for the first(second) subperiods.

c/ Sample ends at 1991:12.

TABLE 2.6

## Uncovered Interest Parity Regressions

$$i = \mu_0 + \mu_1(i^{US} - \Delta s^c) + u$$

Currency	$\hat{\mu}_0$	$\hat{\mu}_1$	$R^2$	DW	ARMA Spec	Sample	Proc.	$\hat{\mu}_1$ st	$\hat{\mu}_1$ end
-----	-----	-----	---	---	-----	-----	-----	-----	-----
Australia	8.641*	0.271***	.17	0.299	153.74**	1988:02	recurs	-0.031	0.271
	(1.238)	(0.080)			AR1	-92:03	roll	-0.031	0.226
	[3.714]	[0.139]							
Canada	10.240**	-0.016**	-.02	0.038	204.31**	1988:02	recurs	0.235	-0.016
	(0.968)	(0.106)			AR1	-92:03	roll	0.235	-0.082
	[2.904]	[0.184]							
Japan	5.975**	0.009**	-.02	0.040	253.48**	1988:02	recurs	-0.013	0.009
	(0.208)	(0.024)			AR1	-92:03	roll	-0.013	0.081
	[0.624]	[0.042]							
Korea	14.306**	0.132****	.31	0.508	43.99**	1988:03	recurs	0.083	0.132
(K02)	(0.194)	(0.028)			AR1	-91:12	roll	0.083	0.131
	[0.582]	[0.048]							
Korea	14.327**	0.204****	.57	0.502	48.06**	1988:03	recurs	-0.112	0.204
(K03)	(0.181)	(0.026)			AR1	-91:11	roll	-0.112	0.105
	[0.543]	[0.045]							
Singapore	3.472**	0.213****	.53	na	20.29 <sup>2</sup>	1988:02	recurs	0.262	0.213
	(0.399)	(0.043)				-91:09a	roll	na	na
	[1.197]	[0.074]							
Taiwan	7.247**	-0.006**	-.02	0.348	61.69**	1988:04	recurs	-0.027	-0.006
	(0.456)	(0.046)				91:12	roll	-0.027	-0.183
	[1.368]	[0.080]							

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Notes: All parameter estimates in percent terms. Figures in parentheses (.) are asymptotic standard errors; figures in brackets [.] are standard errors assuming N/3 independent observations. Q-statistic indicates the Ljung-Box Q-statistic for lag order 13. "ARMA Spec." indicates the apparent ARMA specification for the residuals. Proc. is procedure, either "recurs" (recursive) or "roll" (rolling regression).  $\hat{\mu}_1$  st is the  $\hat{\mu}_{1,t}$  coefficient at 1989:01 and  $\hat{\mu}_1$  end is the  $\hat{\mu}_{1,t}$  coefficient at 1992:03 (unless otherwise constrained by the sample). \*(\*\*) indicates significance at 5%(1%) level using the adjusted standard errors.

a/ The \*(\*\*) significance levels for the slope coefficient are for  $H_0: \mu_1=1$ ; \*(\*\*) are for  $H_0: \mu_1=0$ .

b/ Q-stat reported is the Godfrey-Breusch LM test for serial correlation of lag order 13, instead of the Box-Ljung Q-statistic, since there is missing data.

TABLE 2.7

## Trends in the Influence of NY vs. Tokyo Interest Rates

1982:09-92:03

	Constant	New York	New York Interaction	Tokyo	Tokyo Interaction	$R^2$	DW	Q
AU	8.473* (1.143) [3.428]	-1.992** (0.277) [0.479]	0.429** (0.041) [0.071]	3.470** (0.411) [0.712]	-0.539** (0.054) [0.094]	.52	0.409	141.47**
CN	0.535 (0.458) [1.375]	0.487* (0.111) [0.192]	0.086** (0.016) [0.028]	0.670* (0.165) [0.285]	-0.057 (0.022) [0.038]	.79	0.477	158.12**
HK	-4.115 (0.857) [2.570]	1.691** (0.208) [0.360]	-0.068 (0.031) [0.053]	-0.353 (0.308) [0.533]	0.104 (0.041) [0.071]	.71	1.047	41.35**
IN	14.010** (1.483) [4.449]	1.852** (0.356) [0.616]	-0.267** (0.053) [0.091]	-2.337* (0.529) [0.916]	0.410** (0.070) [0.121]	.33	0.700	na
K02	16.294** (1.087) [3.262]	-0.754 (0.527) [0.913]	0.097 (0.077) [0.133]	-0.929 (0.704) [1.219]	0.086 (0.091) [0.158]	.64	0.671	57.01**
K03	10.079** (0.690) [2.070]	0.320 (0.143) [0.248]	-0.061 (0.026) [0.045]	-0.019 (0.231) [0.400]	0.124* (0.031) [0.053]	.69	0.204	194.35**

MA	5.520	-0.057	-0.072	0.700	0.016	.41	0.463	na
	(1.262)	(0.286)	(0.049)	(0.453)	(0.059)			
	[3.785]	[0.496]	[0.086]	[0.784]	[0.102]			
NZ	18.573**	-2.584**	0.379**	3.405**	-0.599**	.37	0.327	204.22**
	(2.063)	(0.500)	(0.074)	(0.742)	(0.098)			
	[6.291]	[0.866]	[0.129]	[1.285]	[0.169]			
SI	-2.768*	0.960**	-0.052*	0.174	0.056	.86	0.842	103.64**
	(0.413)	(0.093)	(0.014)	(0.142)	(0.019)			
	[1.239]	[0.161]	[0.025]	[0.246]	[0.032]			
TI	-4.144	0.635	0.017	0.811	0.049	.45	0.422	109.01**
	(1.217)	(0.292)	(0.043)	(0.437)	(0.057)			
	[3.651]	[0.505]	[0.075]	[0.757]	[0.099]			
TH	-3.846	0.780	-0.069	1.363*	0.097	.78	0.461	na
	(1.114)	(0.232)	(0.039)	(0.363)	(0.049)			
	[3.341]	[0.402]	[0.068]	[0.628]	[0.085]			

Notes: Figures in parentheses (.) are asymptotic standard errors; figures in brackets [.] are standard errors assuming N/3 independent observations. Q-statistic indicates the Ljung-Box Q-statistic for lag order 13. \*(\*\*) indicates significance at the 5(1)% using the adjusted standard errors.

TABLE 2.8

## Trends in the Influence of NY vs. Tokyo Covered Interest Rates

1982:09-92:03

	Constant	New York	New York Interaction	Tokyo	Tokyo Interaction	R <sup>2</sup>	DW	Q
AU	2.865 (0.645) [1.936]	-0.663 (1.807) [3.129]	-0.131 (0.324) [0.561]	1.320 (1.807) [3.129]	0.145 (0.319) [0.553]	.81	0.960	705.34**
CN	0.395 (0.129) [0.386]	0.416 (0.365) [0.632]	0.010 (0.054) [0.094]	0.525 (0.356) [0.617]	-0.011 (0.054) [0.092]	.98	1.137	103.67**
HK <sup>2/</sup>	0.361** (0.073) [0.218]	0.882* (0.403) [0.698]	0.032 (0.062) [0.108]	0.085 (0.394) [0.682]	0.031 (0.061) [0.106]	.99	1.965	16.71
MA	1.078 (0.297) [0.891]	1.296 (1.574) [2.726]	-0.343 (0.343) [0.594]	-0.473 (1.521) [2.651]	0.304 (0.332) [0.576]	.91	1.115	33.96**  7.24
NZ	2.166 (0.688) [2.064]	1.076 (2.419) [4.190]	-0.276 (0.412) [0.713]	-0.338 (2.406) [4.167]	0.288 (0.406) [0.703]	.86	1.464	32.35**
SI	0.102 (0.118) [0.354]	1.040 (0.529) [0.916]	-0.120 (0.083) [0.143]	-0.090 (0.510) [0.883]	0.110 (0.080) [0.139]	.97	1.169	66.91**

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Notes: Figures in parentheses (.) are asymptotic standard errors; figures in brackets [.] are standard errors assuming N/3 independent observations. Q-statistic indicates the Ljung-Box Q-statistic for lag order 13. \*(\*\*) indicates significance at the 5(1)% using the adjusted standard errors.

a/ t-statistics calculated using asymptotic standard errors since there is no apparent serial correlation.



TABLE 2.9

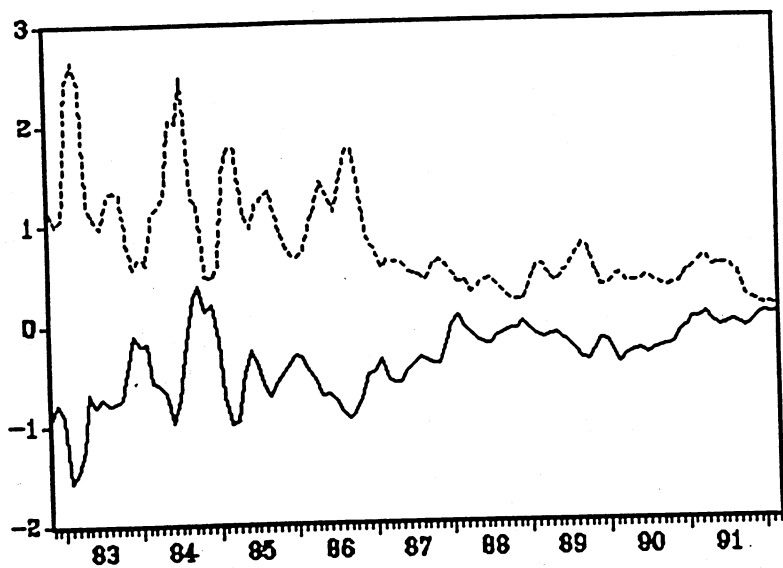
## Trends in the Influence of NY vs. Tokyo Uncovered Interest Rates

1988:02-92:03

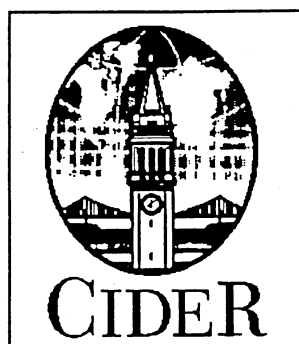
	Constant	New York	New York Interaction	Tokyo	Tokyo Interaction	$R^2$	DW	Q
AU	11.143** (1.162) [3.486]	0.710 (0.317) [0.549]	-0.106* (0.043) [0.075]	-0.209 (0.280) [0.485]	0.048 (0.037) [0.064]	.44	0.362	86.98**
CN	9.726** (0.807) [2.422]	0.631 (0.220) [0.381]	-0.094* (0.028) [0.048]	-0.319 (0.181) [0.313]	0.056* (0.024) [0.041]	.42	0.340	89.44**
K02	13.964** (0.227) [0.680]	-0.760 (0.248) [0.429]	0.118* (0.031) [0.054]	0.035 (0.116) [0.200]	0.009 (0.016) [0.027]	.58	0.806	46.80**
K03	13.695** (0.194) [0.582]	-0.760 (0.211) [0.365]	0.016** (0.026) [0.046]	-0.138 (0.101) [0.176]	0.021 (0.014) [0.024]	.78	0.657	51.85**
SI	3.433** (0.445) [1.334]	0.595 (0.246) [0.426]	-0.050 (0.030) [0.052]	-0.201 (0.156) [0.270]	0.027 (0.021) [0.036]	.53	0.243	21.68**
TI	7.332** (0.601) [1.803]	0.177 (0.596) [1.032]	-0.018 (0.074) [0.128]	0.387 (0.401) [0.695]	-0.052 (0.054) [0.094]	-.06	0.343	62.73**

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Notes: Figures in parentheses (.) are asymptotic standard errors; figures in brackets [.] are standard errors assuming N/3 independent observations. Q-statistic indicates the Ljung-Box Q-statistic for lag order 13. \*(\*\*) indicates significance at the 5(1)% using the adjusted standard errors.

Figure 2.1: Mean and Standard Deviation of the  
3 month Covered Interest Differential



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