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Stock Market Integration: Evidence from Pacific-Basin Country Funds

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This study analyzes the extent of stock market integration between the U.S. and the four emerging Pacific-Basin countries of Korea, Malaysia, Thailand, and Taiwan by examining the relationships between returns on closed-end country funds trading on U.S. exchanges, returns on these funds' net asset values, and returns on U.S. equities. Based on cointegration tests and variance decomposition analysis applied to vector autoregression models, we conclude that despite the changes in capital controls these Pacific-basin countries implemented from the mid-1980s to the end of 1996, they are still largely segmented from the U.S. stock market. Because there still exists substantial potential for these four Pacific-basin countries to become more integrated with the U.S. market, the reforms implemented during the post-crisis period of 1997-1998 in Asia may have an important impact on how these markets function.

I. INTRODUCTION

Over the years, European stocks have generally been the primary taget of U.S. investors' foreign portfolio acquisitions. The 1980s, though, witnessed the rising appeal of the stock markets of many emerging economies, particularly those of the Pacific-Basin.[1] Among the methods allowing foreign investors access to these markets has been the use of a country fund.[2] During the years 1980-1990, for example, more than 30 closed-end country funds representing various countries were formed in the U.S.

For closed-end country funds which invest in a portfolio of financial instruments from a foreign country, two separate market prices can emerge: the U.S.-based (quoted on U.S. exchanges) share price (SP) and the fund's net asset value (NAV) reflecting the prices of its component shares traded on the foreign market. A number of prior studies show that significant divergence (premium or discount) exists, across time, between the SP and the per share NAV.[3] Explanations partly focus on the existence of various forms of friction that cause market segmentation, including regulatory restrictions imposed on foreign investors, non-overlapping trading hours, and high information-transfer costs.

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Capital flows to and from many countries, both advanced and emerging, continue to be subjected to controls. A study published by the IMF [16] concludes that a rather small number of nations – about 10 industrial and 20 emerging, from a total of more than 175 members – maintain a fully open capital "account" in their international financial dealings. Among the more widely-practiced forms of capital control are limits placed on foreign investors' ownership of stocks issued by domestic firms and constraints on foreign currency transactions by domestic residents.[4] These and other types of restrictions have been common in some of the emerging markets of the Pacific-Basin. The existence of barriers to capital flows, along with high information-transfer costs, can be expected to impede the transmission of innovations between the domestic and foreign markets, thus obstructing the process of price adjustments leading to long-run equilibrium characteristic of competitive markets. All else equal, we would expect that the additional imposition (removal) of capital restrictions by a foreign country will lead to greater divergence (convergence) between the patterns of stock prices trading in that country and the price of a country fund comprised of those respective stocks.

The main focus of this study is on the extent of stock market integration of a selected group of emerging Pacific-Basin countries – Malaysia, Taiwan, Thailand, and South Korea – with the U.S. market. This analysis is particularly important in light of the 1997-1998 economic adjustments being made by Korea and Thailand as part of their recovery plans following the Asian financial markets crisis. To gain IMF assistance, Korea has agreed to (1) raise the ceiling on foreign ownership from 7 percent to 50 percent by year-end 1997, (2) raise the ceiling on aggregate foreign ownership of listed Korean stocks from 26 percent to 55 percent by year-end 1998, (3) relax restrictions on foreigners' access to domestic money market instruments and corporate bond markets, and (4) reduce restrictions on foreign direct investment (IMF [18]). The crisis in Asian markets will hasten the elimination of, or significantly reduce, restrictions on investment and equity ownership by foreigners. If the financial markets of these emerging countries were already highly integrated with those of the developed world prior to the 1997 crisis, then the changes implemented in the post-crisis period are unlikely to further enhance integration. Conversely, if any of these four financial markets are still segmented from those of the industrialized world, then the changes that are now being implemented are far more likely to have an impact on how the markets function. On a related issue, our analysis also has implications for U.S. investors. The extent to which foreign markets are integrated with those of developed countries affects the ability of U.S. investors to find diversification opportunities in these markets.

This study is organized as follows. Section II reviews the prior research on international capital controls and factors affecting country fund price

movements. Section III presents our methodology and data, followed by a discussion of the results in Section IV. Section V contains some concluding remarks.

II. PRIOR STUDIES ON MARKET SEGMENTATION

The topic of market integration/segmentation has received ample coverage in the literature. One approach has been to test for market integration using stock index data. To investigate market interdependence, Eun and Shim [14] use a nine-market VAR system of daily rates of return on the stock market indices of developed countries to model the transmission of innovations in one of the nine markets to the other eight. Their results support the notion of informationally-efficient international stock markets. Meanwhile, Jorion and Schwartz [21], in examining the issue from a Canadian perspective, rely on the international CAPM approach and reject integration in favor of segmentation. Bae [1], using a bivariate GARCH-M model, finds that while the Korean equity market has higher risk premiums than the world market, those premiums have fallen with the relaxation of international investment controls and the consequent greater market integration. Overall, though, market segmentation still exists.

A number of other researchers also employ country fund data to test for market integration. One key attraction of this approach is that it avoids the need to specify an asset-pricing model. Bosner-Neal et al. [7] focus on country-fund premiums for France, Japan, Korea, Mexico, and Taiwan, concluding that changes in premiums and discounts are related to announcements of changes in capital restrictions for all countries except Taiwan. This result supports the market segmentation hypothesis. In a broader study encompassing 21 closed-end country funds, Choi and Lee [11] arrive at a similar conclusion that market segmentation does raise net fund premia, with the exchange rate also being an important factor. In research that also supports the segmentation hypothesis, Choe and Shin [10] find that changes in fund premia are more strongly correlated with the returns on the Korea Fund than with returns on the Fund's net asset value, that the NAV is significantly correlated with only the Korea stock index, and that slow information transmission between the U.S. and Korean markets is not a source of segmentation. Medewitz et al.'s [24] study, which examines the market valuation process of 32 country funds, concludes that for advanced economies, the share prices and NAVs are primarily driven by the performance of equities in the "foreign" markets, whereas for a group of emerging countries the S&P 500 index plays the critical role.

Several recent articles employ cointegration techniques to test for long-run relationships between the returns of assets trading in different markets. Ben-Zion et al. [5] do not find that Germany, Japan, and UK country funds are

cointegrated with their respective stock indices, concluding that the connection between a country fund and the market it purports to replicate is far from tight in the long run. Meanwhile, in a study covering stock indices for 18 nations over a period of 32 years (ending in 1992), Chan et al. [8] find that only a small number show evidence of cointegration with others. Their results support the view of continued existence of market segmentation and suggest that international diversification among the markets may be effective. Finally, Chang et al. [9] reject the hypothesis that returns on country funds representing Brazil, India, Korea, Malaysia, Spain, Taiwan, and Thailand are cointegrated with their NAVs, concluding that these foreign markets are segmented from the U.S. market. However, in modeling the dynamic interactions of these markets with a VAR system, they find that innovations in NAVs do affect fund share values.

Our review of the studies cited above suggests that while various capital markets are informationally linked together, capital controls continue to prevail in many countries, including Pacific-Basin nations, and can cause price distortions to exist across interdependent markets.[5]

III. METHODOLOGY AND DATA

A. Methodology

Our analysis consists of two general approaches. The first group of tests are designed to determine if any long-run relationships exists between a country fund's share price, its NAV, and the U.S. stock market. We begin with bi-variate tests that attempt to ascertain whether a country fund is cointegrated with its NAV or with a U.S. stock index. These are followed by cointegration tests involving all three variables. Our second analytical approach involves using VAR models to examine the short-run dynamics between these three variables. Our study is closest in method to Chang, et al. [9]. We differ, though, in two major ways. First, we employ 3-variable models that incorporate a U.S. equity index in addition to the country fund's price and NAV. Second, their sample ended with 1990 while ours includes prices through 1996.

In a global financial system characterized by open and competitive markets, arbitrage will ensure that the market value of a country fund trading on a U.S. exchange is closely linked to the sum of the market values of the individual stocks trading on the foreign markets. Cointegration tests allow us to determine if such a long-run equilibrium relationship exists. Consider the simple linear model relating a country fund's share price to its NAV:

$$SP_t = a + b\ NAV_t + e_t. \qquad (1)$$

If the equity market in the emerging country is fully integrated with the U.S. market, the country fund share price and its NAV should move perfectly in sync; thus b=1. Furthermore, the cointegrating vector describing this relationship exists and is equal to (1, -1). We conduct this analysis by testing whether the difference between the two measure of value, Y_t where Y_t = SP-NAV, is stationary using the augmented Dickey-Fuller [13] test. The procedure involves estimating the equation:

$$\Delta Y_t = b_1 Y_{t-1} + b_2 \Delta Y_{t-1} + b_3 \Delta Y_{t-2} + b_4. \quad (2)$$

The hypothesis that Y_t is non-stationary is rejected, and cointegration is supported, if b_1 is significantly different from zero.

We also test for cointegration between the country fund's share price and the U.S. market using the Johansen [19, 20] procedure. Consider a model, arranged as an unrestricted error-correction system, of the form:

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + ... + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi X_{t-k} + \mu + e_t , \quad (3)$$

where $E(e_t)=0$ and $E(e_t, e_t')=\Omega$. The (p x p) parameter matrix, Π, characterizes the long-run relationships between the (p x 1) vector of the X variables. The rank of Π equals the number of cointegrating relationships. If the rank of Π is zero, then all elements of X_t have unit roots and the equation reduces to a standard VAR. If Π has full rank then all series are stationary in levels. Cointegration is indicated if $0 < \text{rank}(\Pi) = r < p$, where the number of cointegrating vectors equals r.

Failing to find evidence of cointegration between a country fund's price and U.S. equity prices has two implications. First, it would suggest that the country fund's share price does not follow the same long-run pattern as the underlying securities trading on foreign exchanges. Second, it suggests that U.S. investors with long-term horizons might be able to diversify by including this country fund or its underlying stocks in their portfolio. Testing for cointegration is also a necessary step for our next group of tests.

The second group of tests focuses on the short-run price patterns of the three variables. The value of the country fund will quickly reflect innovations in the prices of the underlying stocks when they and the country fund trade in open and competitive markets. VAR or, when cointegration exists, vector-error-correction (VEC) models are employed to estimate the dynamic interaction between the market value of a country fund, its net asset value, and the U.S. stock market. The forecast error variances generated by the VAR systems are examined to evaluate the extent of financial integration.[6] Innovations in the

foreign stock market should be quickly reflected in the country fund when no restrictions impede capital flows and information is readily available. Little or no response suggests binding restrictions on capital flows or that accurate information is costly to obtain, resulting in a lack of international financial integration. Moreover, if the steps taken by emerging-country governments to liberalize capital inflows and outflows have been meaningful, then innovations in the NAV should have become more responsible for the forecast error variance of the country fund's return over time.

The observation period varies by country fund but ranges from its IPO date in the 1980s to December 1996. To allow for the possibility of structural changes and to investigate the impact of liberalization, shorter time periods are also examined. These regimes are based on changes in capital controls, identified in IMF publications (IMF [17]) and by other authors, that might impact financial integration. The announcements of changes in capital control, described in Table 1, include sixteen announcements for Korea, three announcements for Taiwan, nine announcements for Malaysia, and three announcements for Thailand. Clearly some of these announcements are too close together to use each as regime endpoints. For these cases, periods were consolidated to the extent necessary to have a sufficient number of observations to estimate the VAR model. The sub-periods are listed in Tables 2 and 3.

B. Data and Preliminary Tests

For Korea Fund, Taiwan Fund, Malaysia Fund, and Thai Fund we collected share prices and their NAVs from *Barrons*. The S&P 500 index is used to measure U.S. stock returns. The NAVs are based on either Thursday's or Friday's closing prices on the foreign exchanges, converted into U.S. dollars.

Before cointegration tests can be employed, it must be demonstrated that the variables have certain time-series properties. A group of variables is said to be cointegrated if each is I(1) but a linear combination is stationary. Augmented-Dickey-Fuller tests were first conducted on the logarithm of each variable, using a model with two lagged values of the variable and a trend term. Next, the tests were conducted using first-differences of the variable (i.e., returns) with two lagged values. For every variable and for every time period, the tests lead to the conclusion that the variables are stationary in first-differences. That is, returns but not prices are stationary. This also implies that cointegration tests using asset prices is a valid procedure.

Table 1
Country Funds: Capital Control Changes

Country Fund / Date	Event
Korea	
12/28/84	Foreign investment will be permitted in 19 additional industries; Loosening, Capital Inflows
6/6/85	Government plans to allow foreign direct investment in 230 more business areas by 1988; Loosening, Capital Inflows
10/15/85	The Finance Ministry announces that it will open an additional 102 business areas to foreign investment; Loosening, Capital Inflows
11/13/85	Qualifying Korean firms will be permitted to offer foreign investors convertible bonds; Loosening, Capital Inflows
12/3/87	Government will allow foreigners to exchange Korean convertible bonds for stock; Loosening, Capital Inflows
3/28/88	Government is likely to allow Korean securities, insurance, and investment trust companies to buy foreign stocks; Loosening,
12/6/88	Capital Outflows
1/1/92	Government announces plans to open Seoul's securities markets to direct foreign investment; Loosening, Capital Outflows.
7/1/92	Foreign investors permitted to invest in the domestic stock market (subject to limitations); Loosening; Capital Inflows
9/1/92	Liberalizations of investments in stocks by resident foreign financial institutions; Loosening; Capital Inflows
10/1/93	Liberalizations of foreign exchange transactions and on direct investments abroad; Loosening; Capital Inflows and Outflows
2/25/94	A series of liberalizations of foreign exchange transactions and on overseas issuance of stocks and bonds; Loosening; Capital Inflows and Outflows
7/1/94	Liberalizations on portfolio investments abroad; Loosening; Capital Outflows
12/1/94	Liberalizations on direct investments abroad; Loosening; Capital Outflows
2/13/95	Liberalizations on portfolio investments from abroad; Loosening; Capital Inflows
10/1/95	A series of liberalizations of foreign exchange transactions and on portfolio investments from abroad; Loosening; Capital Inflows and Outflows
	Liberalizations on direct investments abroad; Loosening; Capital Outflows

Table 1 (Continued)

Country Fund / Date	Event
Taiwan	
6/14/87	The Government approves the lifting of controls on outward foreign exchange movements; Loosening, Capital Outflows
5/5/88	Foreigners will be allowed to invest in local securities houses, and the government plans to increase foreign direct investment in the country; Loosening, Capital Inflows
12/28/95	Liberalizations on fund transfers; Loosening; Capital Inflows and Outflows
Malaysia	
7/19/88	Foreign stock brokerage firms are allowed to increase their equity share in local brokerage firms from 30 percent to 49 percent; Loosening, Capital Inflows
3/21/89	Non-residents and non-resident-controlled companies are permitted to use domestic credit facilities for financing up to 50 percent of the purchase value of immovable property; Loosening, Capital Inflows
12/5/89	The limit on new foreign capital equity participation in firms manufacturing impressed/ imprinted products was reduced to 60 percent from 100 percent; Tightening, Capital Inflows
11/9/90	Applications from non-residents and non-resident-controlled companies to obtain any domestic financing solely for property acquisition and development purposes would not be approved by the government; Tightening, Capital Inflows. Applications from non-resident-controlled companies for domestic financing to acquire or develop immovable property for productive purposes (such as manufacturing) or for promoting tourism will be treated liberally; Loosening, Capital Inflows
11/1/92	Liberalizations on portfolio investments abroad; Loosening; Capital Outflows
1/24/94	Restrictions imposed on equity sales to foreigners; Tightening; Capital Inflows
2/7/94	Restrictions imposed on equity sales to foreigners; Tightening; Capital Inflows
8/12/94	The lifting of the two previous restrictions; Loosening, Capital Inflows
6/27/95	Liberalizations on capital investments abroad; Loosening; Capital Outflows

Table 1 (Continued)

Country Fund / Date	Event
Thailand	
5/22/90	Government increases the limits on commercial banks' transfer of funds related to sales of securities; Loosening, Capital Outflows
4/1/91	Government allows unlimited purchases of foreign currency from authorized banks; Loosening, Capital Outflows
2/2/94	Liberalizations on fund transfers and on direct investments abroad; Loosening; Capital Outflows

Sources: Bae [1]; Bosner-Neal et al. [7]; IMF [17]; Taiwan [25].

Table 2
Cointegration Tests between Returns on Country Funds, NAVs, and the S&P500

	ADF Unit Root Test (t statistic)	Johansen Test (# of cointegrating vectors)	
	SP and NAV	SP and S&P500	NAV, S&P500 and SP
Korea Fund			
09/03/84 - 12/30/96 (n=520)	-2.69	0	0
09/03/84 - 12/31/86 (n=83)	-2.59	0	0
01/01/87 - 12/31/88 (n=79)	-2.23	0	0
01/01/89 - 12/31/90 (n=86)	0.13	0	0
01/01/91 - 12/31/92 (n=94)	-1.65	0	1
01/01/93 - 12/31/94 (n=95)	-2.25	0	0
01/01/95 - 12/31/96 (n=87)	-3.88***	0	0
Malaysia Fund			
06/01/87 - 12/31/96 (n=439)	-4.26***	0	0
06/01/87 - 07/18/88 (n=51)	-2.28	2	1
07/19/88 - 12/04/89 (n=73)	-0.26	0	0
12/05/89 - 10/31/92 (n=137)	-1.51	0	0
11/01/92 - 01/23/94 (n=60)	-2.69	1	1
01/24/94 - 06/26/95 (n=52)	-1.93	0	0
06/27/95 - 12/31/96 (n=70)	-2.04	0	0

Table 2 (Continued)

	ADF Unit Root Test (t statistic)	Johansen Test (# of cointegrating vectors)	
	SP and NAV	SP and S&P500	NAV, S&P500 and SP
Thai Fund			
03/14/88 - 12/31/96 (n=406)	-2.92	0	0
03/14/88 - 05/21/90 (n=111)	-2.63	0	0
05/22/90 - 02/01/94 (n=174)	-2.75	0	0
04/01/91 - 02/01/94 (n=129)	-1.95	0	0
02/02/94 - 12/31/96 (n=123)	-1.36	0	0
Taiwan Fund			
01/05/87 - 12/31/96 (n=324)	-4.31***	0	0
05/05/88 - 12/31/96 (n=294)	-4.06***	0	0
01/01/95 - 12/31/96 (n=96)	-2.03	0	1

Notes. All three columns present test results of cointegration between a country fund's share prices (SP), its net asset value (NAV), and/or the S&P 500 index. The augmented DICKEY-FULLER test (ADF) is used to test if the difference between a country's SP and NAV is stationary. The t statistics for this test are presented in the first column. Critical values for these tests are from MacKinnon (1991). The Johansen test is used to test for cointegration between a country's SP and the U.S. index, and between all three variables. The numbers of cointegrating vectors indicated by this procedure are presented in the last two columns. The time periods are roughly defined by changes in capital controls announced by the government.

*** denotes significant at the 1% level.

IV. EMPIRICAL RESULTS

A. Results of Cointegration tests

The results of three groups of cointegration tests are reported in Table 2. The bi-variate tests using the country fund share price and its NAV, presented in the first column, generally fail to support the conclusion of cointegration. In only four cases is cointegration supported – the entire time period for Malaysia, the entire time period for Taiwan, the 1995-96 period for Korea, and the 1988-96 period for Taiwan. The cointegration test results using the Johansen procedure are shown in the second and third columns of Table 2. Only for Malaysia is

there support for the conclusion that the return on the country fund is cointegrated with U.S. equities – but only for the periods covering 1987-1988 and 1992-1994.[7] Finally, there is little evidence of cointegration when the analysis is conducted using all three variables. Only in four sub-periods – one period for Korea, two periods for Malaysia, and one period for Thailand – is evidence of cointegration found. It is important to note the lack of robustness between the bi-variate and three-variable systems. The periods in which the tests suggest the presence of cointegration in the three-variable systems do not always coincide with the finding of cointegration from the bi-variate tests. Only for Malaysia in the periods 6/1/87-7/18/88 and 11/1/92-1/23/94 is cointegration supported by both testing approaches. But even here, cointegration is not supported for the most current time periods. Thus, the lack of consistent support leads to the conclusion that long-run relationships do not, in general, exist between these groups of variables. This conclusion is consistent with that of Chang et al. [9] who also fail to find evidence of cointegration between country fund prices and their NAVs for these four emerging countries. Our analysis suggests that the pattern of these long-run relationships they found for the 1980s has not changed in the 1990s. If the changes in capital restrictions over time had lead to significantly greater integration with the U.S., progressively stronger evidence of cointegration should have been found as the analysis shifted to observation periods closer to the present. Our results do not support this view for the four emerging markets and implies that the changes implemented through 1996 have not had an important impact.

B. VAR Analysis

The VAR models, estimated for each of the four emerging countries for the entire time period and for the various sub-periods, consist of three-equation systems where the returns on the country-fund, returns on its NAV, and returns on the U.S. equity index are each represented as functions of two lags of the returns of all three variables. For those cases that the Johansen test indicated the existence of a cointegrating vector, an error-correction term was added to the model. From these estimates, an analysis of the forecast error variance was conducted and is reported in Table 3.

Table 3
Forecast Error Variance Decomposition for Country Fund Returns

	Percent of country fund return's forecast error variance explained by innovations in:		
	NAV	S&P500	Country Fund
Korea Fund			
09/03/84 - 12/30/96 (n=543)	44	4	52
09/03/84 - 12/31/86 (n=90)	1	11	88
01/01/87 - 12/31/88 (n=85)	74	5	21
01/01/89 - 12/31/90 (n=90)	26	6	69
01/01/91 - 12/31/92 (n=96)	20	3	77
01/01/93 - 12/31/94 (n=97)	15	3	82
01/01/95 - 12/31/96 (n=90)	24	2	74
Malaysia Fund			
06/01/87 - 12/31/96 (n=451)	20	10	70
06/01/87 - 07/18/88 (n=53)	7	32	61
07/19/88 - 12/04/89 (n=73)	18	7	75
12/05/89 - 10/31/92 (n=140)	17	12	70
11/01/92 - 01/23/94 (n=61)	24	4	73
01/24/94 - 06/26/95 (n=56)	33	14	53
06/27/95 - 12/31/96 (n=72)	41	2	57
Thai Fund			
03/14/88 - 12/31/96 (n=417)	49	3	48
03/14/88 - 05/21/90 (n=112)	5	6	89
05/22/90 - 02/01/94 (n=178)	69	2	29
04/01/91 - 02/01/94 (n=133)	29	1	70
02/02/94 - 12/31/96 (n=129)	47	4	49
Taiwan Fund			
01/05/87 - 12/31/96 (n=353)	46	5	49
05/05/88 - 12/31/96 (n=318)	54	2	45
01/01/95 - 12/31/96 (n=97)	17	2	81

Notes. The values presented in this table are based on a three-variable VAR system that consists of the country fund's return, the return on its NAV, and the return on the S&P 500 index. An error-correction term was added to the model for those cases where evidence of cointegration was found. The values in the table are the percent of the forecast error variance of the country fund's return accounted for by innovations in the sources identified in the column headings over a 5-week forecast period. The time periods are roughly defined by changes in capital controls announced by the government.

Under the hypothesis that each of the emerging equity markets has become more integrated with the U.S. market, the percent of the forecast error variance of the country fund explained by NAV should rise over time as fewer restrictions impede the capital flows between these markets. Our results indicate that innovations in a country fund's NAV explains an important percent of the associated fund's forecast error variance.[8] Based on the entire time period, these innovations explain 44% (Korea), 20% (Malaysia), 49% (Thailand), or 46% (Taiwan) of this variation. However, the pattern of these responses does not offer much support to the hypothesis that country fund returns have become more closely associated with their underlying stocks over time. In the most recent sub-periods, generally 1995-1996, innovations in NAV explain 24% (Korea), 41% (Malaysia), 47% (Thailand), or 17% (Taiwan) of the variation in the associated country fund's returns. Malaysia is the only country with a pattern that is consistent with improved integration. The percent of forecast error variance of the Malaysian country fund shares explained by innovations in NAV rises steadily from 18% in the 1988-1989 period to 41% in the final period.

Another result that is striking is the low level of impact U.S. market innovations have on country-funds' returns. With few exceptions, innovations in the U.S. index explain a smaller percent of the forecast error variance in the country-fund price than innovations in its NAV or innovations in the country-fund returns itself. This is in contrast to Medewitz et al. [24] who conclude that country funds behave more like U.S. securities than equities in their home market. Generally, innovations in country fund returns themselves explain the largest percent of the forecast error variance.

V. SUMMARY AND CONCLUSIONS

This study analyzes the extent of stock market integration between the U.S. and the four emerging Pacific-Basin countries of Korea, Malaysia, Thailand, and Taiwan. Our conclusions are based on tests for relationships between the returns on closed-end country funds trading on U.S. exchanges, their net asset values, and returns on U.S. equities. Cointegration tests are employed to determine if long-run relationships exist between these variables. The forecast-error variance of country fund returns arising from innovations in NAVs and a U.S. stock index are estimated to understand the short-run dynamics within this system.

We find little evidence that country fund returns are cointegrated with their NAV or with the U.S. stock index. That is, a long-run equilibrium relationship does not appear to exist between these variables and therefore whatever changes in capital controls were implemented during the mid-1980s

to the end of 1996 have not resulted in financial integration with the U.S. stock market. This implies that investors in U.S. equities with long-term horizons might have achieved diversification gains by adding these country fund shares or the underlying stocks to their portfolios. Additionally, we find that innovations in the foreign equity markets have an important effect on country fund returns while shocks in the U.S. stock market have a relatively unimportant effect. However, the patterns in these estimates, except for Malaysia, are not consistent with the hypothesis that capital control changes in the past decade lowered market segmentation.

Taken in total, our results suggest that there still exists substantial potential for these four Pacific-Basin countries to become more integrated with the U.S. market. The reforms implemented during 1998 following the economic/currency crisis in Asia may therefore have an important impact on how the markets function. Specifically, the economic adjustment programs developed by the Korean and Thai governments in consultation with the IMF during 1997-1998 call for the adoption, among other changes, of a much more open policy towards foreign ownership of stocks, bonds, and financial institutions, with potentially significant impacts on integration. Future research can empirically investigate not only such impacts, but also a related issue, namely the extent to which stock markets in Korea and Thailand (as well as those in other economies undertaking liberalizations) would realize major changes in their respective volatility as substantially larger sums of foreign portfolio capital flow into and out of these markets.

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NOTES

1. For a review, see Bailey and Stulz [3] and Bailey, Stulz, and Yen [4].
2. According to Bailey and Lim [2], investing in country funds seems to lead to inferior returns as compared with the direct purchase of overseas stocks. A closed-end country fund issues a fixed number of shares which trade on a stock market. Liquidating a holding in such a fund, unlike an open-end fund, requires investors to sell their shares to other investors instead of redeeming them with the funds for the net asset value per share. However, as Chang et al. [9] demonstrate, while such funds do

exhibit significant exposure to the U.S. market factor (i.e., they act more like U.S. securities than do their underlying assets), the funds provide U.S. investors with substantial diversification benefits.

3. Over the time period of our analysis, the median premium was 31% for Korea, -6% for Malaysia, 12% for Taiwan, and 2% for Thailand.
4. For example, as of November, 1993, foreigners were permitted to own only 4%, 6%, and 17%, respectively, of the stock markets in Taiwan, South Korea, and Thailand (as reported in *The Economist*, December 11, 1993, p. 92). While these and other Pacific-Basin countries have since promised to further liberalize their respective economies, the financial/currency crises of 1997-1998 clearly provide evidence showing a lack of adequate progress in the region.
5. A number of studies examine the issue of investor sentiments and how it relates to country fund premiums/discounts. De Long et al. [12] argue that investors, rational and irrational (noise traders), coexist. Following their work, Lee et al. [22] focus on the existence of unpredictable fluctuations in "noise trader sentiment", defined as the component of expectations about asset returns not warranted by fundamentals. In another study, Hardouvelis et al. [15] track the behavior of more than 30 country funds. Results indicate that discounts tend to prevail in the long run even for those economies allowing free cross-border capital movements. Finally, Bodurtha et al. [6] examine 33 country funds and conclude that while market segmentation does influence fund premiums, evidence is found in favor of the existence of a country-specific risk factor which they interpret as U.S. market sentiment.
6. These calculations are based on errors orthogonalized by a Choleski decomposition. Changing the order of the variables in the VAR system did not qualitatively change our conclusions for a subset of models used to test the sensitivity of the results to the order in which the variables entered the system.
7. However, caution in accepting this result is warranted. The conclusion that there exists two cointegrating vectors between SP and the S&P500 in the earlier period conflicts with the ADF tests that suggest both series are I(1).
8. This result is consistent with that obtained by Chang et al. [9] who conclude that country fund returns are affected by innovations in their NAVs. The percent of forecast error variance explained by innovations in NAV from their study are not comparable to ours since they do not include a U.S. stock index in their model.

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