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International Investment Restrictions and Closed-End Country Fund Prices

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ABSTRACT

Some closed-end country funds trade at large premiums relative to their net asset values. This paper examines whether international investment restrictions raise country fund price-net asset value ratios by segmenting international capital markets. We test whether a relation exists between announcements of changes in investment restrictions and changes in these ratios using weekly data from May 1981 to January 1989. The results provide evidence that some foreign markets are at least partially segmented from the U.S. capital market.

MANY COUNTRIES IMPOSE RESTRICTIONS on international investment. Often, however, one can circumvent these restrictions. The degree to which international investment restrictions are binding and to which they segment capital markets is largely unresolved but has important implications for several issues in economics and finance. For example, if capital markets are segmented internationally, a project's cost of capital is likely to depend on where the capital is raised. As another example, the predictions of many macroeconomic models depend on the extent to which capital markets are integrated.[1]

This paper uses data on closed-end country funds to provide evidence on the effectiveness of barriers to international investment. A closed-end country fund is an investment company that invests in a portfolio of assets in a foreign country and issues a fixed number of shares domestically.[2] Each fund provides two distinct market-determined prices: the country fund's share price quoted on the domestic market, and its net asset value determined by the prices of the underlying shares traded on the foreign market. International investment restrictions can affect the ratio of a country fund's price to its net asset value if they are binding. All other things constant, binding investment restrictions will raise the price of a fund's shares relative to its net asset value by approximately the amount the marginal domestic investor is willing to pay to avoid these restrictions.

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[1] See, for example, Frenkel and Razin (1987).

[2] Throughout the paper, the domestic country refers to the U.S.

Casual observation of the price-net asset value ratios of closed-end country funds reveals some evidence consistent with the hypothesis that international investment restrictions affect these ratios. For example, on January 13, 1989, the Korea Fund's shares sold at a 65% premium relative to the fund's net asset value. South Korea is a country with tight restrictions on inward and outward investment.[3] In contrast, on the same day the United Kingdom Fund's shares sold at a 16% discount relative to the fund's net asset value. The United Kingdom is a country with few restrictions on international investment. Other evidence, however, appears less supportive of the hypothesis. For example, on January 13, 1989, the Brazil Fund's shares sold at a 35% discount even though Brazil restricts international investment.[4] It is well known that domestic funds trade at prices that differ from their net asset values and that discounts vary both across funds and over time. Testing whether a relation exists between the severity of investment restrictions and price-net asset value ratios requires an explanation for this behavior. No generally accepted explanation, however, is currently available. For this reason, we test whether investment restrictions imposed by some countries are binding by examining whether announcements of *changes* in the restrictions are related to *changes* in the price-net asset value ratios of funds investing in those countries.

Stulz (1981a) defines capital markets to be integrated internationally if assets of equal risk located in different countries yield equal expected returns in some common currency. Previous tests of international capital market integration have used various asset pricing models to measure risk. For example, Brennan and Schwartz (1986), Errunza and Losq (1985), Hietala (1989), Jorion and Schwartz (1986), Solnik (1974), and Stehle (1977) use versions of the mean-variance capital asset pricing model; Cho, Eun, and Senbet (1986) and Gultekin, Gultekin, and Penati (1989) use versions of the arbitrage pricing model; and Wheatley (1988) uses a version of the consumption-based asset pricing model. An important characteristic of these tests is that they are joint tests of the hypothesis that capital markets are integrated internationally and of some asset pricing model. Thus, the tests can reject the hypothesis that markets are integrated when it is true because the asset pricing model chosen does not hold. Also, the tests can fail to reject the hypothesis when it is false because risk is measured with insufficient precision.

This paper's tests do not require the use of an asset pricing model because a closed-end country fund's shares and its underlying assets should have similar risk when capital markets are integrated internationally.[5] On the other hand, the

[3] For example, individuals outside Korea can invest in South Korean equities only through seven mutual funds. Five of the funds are nominally open-end. The total investment of each open-end fund in South Korean equities is restricted, however, making them effectively closed-end. As a result, the funds' shares trade at prices that differ from their net asset values.

[4] In particular, the closed-end Brazil Fund is the only way through which U.S. investors can invest in the Brazilian stock market.

[5] Alexander, Eun, and Janakiramanan (1988) also test whether capital markets are integrated internationally without using an asset pricing model. They examine whether announcements of international stock listings affect expected returns and find evidence against the hypothesis that capital markets are integrated internationally.

tests require that announcements of changes in restrictions be accurately identified. Our tests are able to uncover a significant relation between announcements of changes in foreign investment restrictions in France, Japan, Korea, and Mexico and changes in the price-net asset value ratios of funds investing in those countries. However, we find no significant relation between announcements of changes in Taiwanese investment restrictions and changes in the price-net asset value ratio of the Taiwan Fund. This is surprising because Taiwan is widely viewed as imposing effective barriers to international investment. The results, however, could be due to the events we identify being fully anticipated or unimportant.

The remainder of the paper is organized as follows. Section I discusses the effects of international investment restrictions on closed-end country fund premiums and discounts. Section II describes the data and reports sample statistics for closed-end fund premiums. Section III tests whether announcements of loosenings (tightenings) of international investment restrictions lower (raise) closed-end country fund price-net asset value ratios. Section IV provides conclusions.

I. The Effects of Barriers to International Investment

Barriers to international investment can cause the expected returns on assets of equal risk to differ across countries. If capital markets are integrated internationally, a closed-end country fund's shares and its underlying assets should have similar risk. Tests of the effects of changes in investment restrictions on country fund price-net asset value ratios therefore do not require an asset pricing model. All else equal, binding restrictions will raise a country fund's price-net asset value ratio above the level prevailing in the absence of such restrictions by approximately the amount the marginal domestic investor would pay to avoid the restrictions. Tests of the relation between investment restrictions and the levels of price-net asset value ratios across funds, however, require an asset pricing model. Black (1974), Eun and Janakiramanan (1986), Hietala (1989), and Stulz (1981b) develop asset pricing models that incorporate the effects of investment restrictions. We outline below the implications of these models for the relation between investment restrictions and price-net asset value ratios and discuss some problems associated with testing them.

Black (1974) and Stulz (1981b) study the effects of international investment barriers that take the form of taxes on holding foreign assets. In Black's model, investors are taxed on long positions in foreign assets but are subsidized on short positions, while, in Stulz's model, investors are taxed on both long and short foreign positions. Both models predict that the expected return on a foreign asset held long will exceed the expected return on a domestic asset of equal risk by the rate at which domestic holdings of the asset are taxed. This ensures that the after-tax expected returns on the two assets are equal. Closed-end country funds represent long positions taken indirectly by domestic investors in foreign assets. While the underlying shares of these funds are foreign assets, the fund's shares themselves are domestic assets of approximately equal risk. Thus, these models

imply that barriers that increase the cost for a domestic investor of holding foreign assets will raise the return required on country funds' underlying assets relative to the return required on their shares. The introduction of effective barriers therefore will raise the price-net asset value ratio of the fund investing in the country by an amount related to the tax imposed.

Eun and Janakiramanan (1986) and Hietala (1989) examine the effects of regulations that restrict but do not prohibit domestic ownership of foreign assets. In their models, there are two classes of foreign shares: restricted shares that only foreigners can buy and unrestricted shares that both domestic and foreign investors can buy. The foreign government places limits on the fraction of shares that are unrestricted, and, when these limits are binding, the unrestricted shares sell at a premium relative to the restricted shares. This premium depends on the covariance matrix of returns and investor preferences. The underlying assets of closed-end country funds resemble restricted shares, while the funds' shares themselves resemble unrestricted shares. Thus, these models suggest that binding quantitative restrictions a country imposes will increase the price-net asset value ratio of the fund investing in that country.

One could, in principle, test the restrictions the models of Black, Stulz, Eun and Janakiramanan, and Hietala impose on the relation between investment barriers and price-net asset value ratios across country funds. We do not conduct tests like these, however, for two reasons. First, the tests require measures of the effectiveness of barriers to international investment. Measuring the effectiveness of investment restrictions is difficult because investors often find ways around explicit restrictions. Second, the tests require some auxiliary model to explain the well known tendency of closed-end funds investing in U.S. assets to trade at discounts. Unfortunately, no generally accepted explanation for these discounts currently exists. For example, Thompson (1978, pp. 151–152) states: "it [is] difficult [to provide] a potential explanation for the existence of discounts and premiums which is simultaneously consistent with a competitive market for fund management and a semi-strong form efficient capital market."[6]

This paper tests instead whether announcements of *changes* in investment restrictions affect *changes* in the premiums and discounts on closed-end country funds. These tests do not require an asset pricing model; nor do they require measures of the effectiveness of international investment restrictions. If a country's restrictions are binding, an announcement that they are to be tightened (loosened) should raise (lower) the premium on the country's fund. We test this hypothesis by regressing premium changes on dummy variables that equal one (minus one) when loosenings (tightenings) of international investment restrictions are announced and zero otherwise. All else constant, the regression coefficients should be insignificantly different from zero if asset markets are completely integrated. If, on the other hand, markets are segmented, the coefficients should be significantly negative: an announcement of a loosening of investment restric-

[6] Lee, Shleifer, and Thaler (1989) use a model in which markets are not semi-strong form efficient to explain the average discount on domestic closed-end funds. In their model, irrational noise traders are responsible for a larger fraction of fund share trades than of trades on assets underlying the shares. These noise traders impound additional risk on fund shares relative to their underlying assets; thus, funds trade on average at discounts.

tions should lead to a fall in the premium. The next section describes the data used in testing this hypothesis.[7]

II. Data and Sample Characteristics of Closed-End Country Funds

The data consist of end-of-week closing prices and net asset values for closed-end country funds between May 22, 1981 and January 13, 1989. These data are collected from *Barron's* and *The Wall Street Journal.* Fund prices are reported as of Friday's close of business in New York. Conversations with fund representatives indicate that net asset values are computed almost exclusively on the basis of market values and are generally reported as of Friday's close for the foreign country's major exchange. That is, each fund's net assets are valued in local currency as of Friday's close in the foreign country and are translated to U.S. dollars using the contemporaneously observed exchange rate.[8] Because a difference of up to 15 hours can exist between the foreign country's close and New York's close, reported prices and net asset values are only approximately synchronous. A list of the country funds examined in this study along with the dates on which each fund first appears in the sample is given in Table I. This table illustrates the recent proliferation of closed-end country funds: only four of the sixteen country funds traded during the 1981–1988 period were traded before 1986.[9]

Data on U.S. closed-end funds investing in U.S. assets (domestic funds) are also collected for comparison. Domestic funds are selected using two criteria.

[7] This hypothesis may be confounded in three ways. First, if a change in international investment restrictions alters the fund's investment strategy and hence its expected future cash flows, then the effect on the premium or discount is ambiguous. Second, if investment restrictions take the form of withholding taxes, the closed-end fund premium could fall since the tax would reduce the expected future cash flows from the fund. Third, while unlikely, if changes in restrictions are temporally related to changes in the mechanism causing discounts and premiums in integrated markets, changes in the premiums need not reflect changes in restrictions. Consequently, the changes in investment restrictions examined here are assumed not to significantly alter fund strategies, do not include withholding tax changes, and are assumed to be temporally unrelated to changes in whatever causes discounts and premiums on closed-end funds in integrated markets.

[8] An exception is the ASA Fund, which values assets in rand as of Thursday's close in Johannesburg and translates these to U.S. dollars using the commercial exchange rate quoted as of Thursday's close in New York. Under South Africa's dual exchange rate regime in effect before February 7, 1983 and again after September 2, 1985, the commercial exchange rate is government-controlled, while the financial rate is freely floating. Foreign purchases and sales of South African financial assets must use the financial rate (although dividends are repatriated at the commercial rate). Thus, for a U.S. investor, the dollar cost of buying or receipt from selling the assets underlying the ASA Fund is the rand value of these assets translated at the financial rate. For this reason, we recompute the ASA Fund's net asset value under the dual exchange rate regime to be the rand value of its underlying assets translated at the financial rate. This is done using commercial and financial rand exchange rates quoted as of Thursday's close in London. We collected these rates from September 1985 to December 1986 from the *Financial Times*, while Citibank provided us with rates from 1987 to 1989. Unfortunately, we could find no source for the rates before February 1983.

Mexico also has dual exchange rates: a government-controlled rate and a freely floating rate. The Mexico Fund, however, converts all its assets to dollars using the free rate.

[9] Peavy (1985) investigates the pricing of initial public offerings of closed-end funds from 1986 to mid-1988. While he finds abnormal aftermarket returns for domestic funds, he reports no significant abnormal returns for country funds.

Table I

Closed-End Funds and Initial Sample Observation Dates: May 1981–January 1989

Fund	Initial Observation
(A) Country Funds	
ASA	May 1981
Brazil	April 1988
First Australia	January 1986
France	June 1986
Germany	July 1986
Helvetia (Swiss)	August 1987
India Growth	August 1988
Italy	March 1986
Japan	May 1981
Korea	August 1984
Malaysia	May 1987
Mexico	June 1981
Spain	July 1988
Taiwan	February 1987
Thai	February 1988
U.K.	August 1987
(B) Domestic Funds	
Adams Express	May 1981
Baker Fentress	May 1981
Blue Chip Value	April 1987
Central Securities	May 1981
Claremont Capital	May 1981
Counsellors	February 1987
Cypress	October 1986
Duff & Phelps	January 1987
Emg. Med. Tech.	January 1985
Engex	May 1981
EquityGuard	August 1986
Financial News	October 1987
First Financial	May 1986
Gabelli Equity Trust	September 1986
Gen. Am. Inv.	May 1981
Growth Stock Outlook	March 1986
H. & Q. Health.	May 1987
Lehman	May 1981
Liberty All Star	November 1986
Madison	May 1981
Morgan Gren.	May 1987
Nautilus	May 1981
Niagara Share	May 1981
Nicholas Applegate	May 1987
Petrol. & Resources	May 1981
Pilgrim Regional	January 1986
Precious Metal	May 1981
Reg. Financial Shares	May 1986
Royce Value	November 1986
Schafer Value	November 1986
Tricontinental	May 1981
Zweig Fund	October 1986
Z-Seven	March 1984

First, since foreign funds invest primarily in stocks, domestic funds with less than 50% of their assets in stocks are excluded. Second, dual purpose funds are excluded because the two shares they issue generate income streams that differ significantly from those of other closed-end funds.[10] The domestic funds selected are also listed in Table I.

Tables II and III summarize the sample characteristics of closed-end country funds. Descriptive statistics for each fund premium, computed as the logarithm of the ratio of the fund's price to its net asset value, are given in Table II. Table II contains the sample means, standard deviations, skewness and kurtosis measures, and autocorrelations for the premiums on individual country funds with more than thirty observations. The table also reports statistics for equally weighted portfolios of country funds and domestic funds.

Panel A of Table II reveals considerable variation in the sign and size of the mean premium across funds. Some funds investing in markets which restrict foreign access have traded on average at premiums: the Taiwan, Korea, and Thai funds have traded on average at premiums of 41%, 44%, and 25%. Funds investing in the less restricted markets of Germany and the U.K., on the other hand, have traded on average at discounts of 4% and 21%. While these statistics are consistent with the hypothesis of a positive relation between the level of a fund's premium and the severity of international investment restrictions, the relation is not monotonic. For example, both Brazil and Mexico impose restrictions on foreign investment, yet these funds have traded on average at discounts.[11]

Panel B of Table II reports descriptive statistics for premium changes for individual country funds and for the two portfolios. Because of missing premium data, the number of observations for a fund in Panel B is often less than the corresponding number in Panel A minus one. Panel B shows that the mean premium changes do not differ greatly from zero. The premium changes are on average leptokurtic relative to the normal distribution. The particularly large sample measures of skewness and kurtosis for the France Fund in Panel B reflect the behavior of the fund's premium around the October 1987 crash. During the week of the crash, the France Fund's premium fell by 45%, and this fall was not immediately reversed. Panel B also provides evidence of negative serial correlation in the premium changes for the ASA, Australia, France, Italy, Japan, Mexico, and U.K. funds and for the two portfolios. This serial correlation could arise from nonsynchronous trading or reporting lags in fund prices or net asset values.

Table III reports cross-correlations between price changes and net asset value changes for the individual country funds and for the two portfolios. Some of the noncontemporaneous cross-correlations are significantly positive.[12] For example,

[10] A dual purpose fund issues income shares and capital shares. Income shares receive dividends from the fund's dividend and interest income. Capital shares receive dividends and an eventual liquidation payment from the fund's capital appreciation.

[11] Nonsynchronous reporting cannot account for more than a trivial portion of the mean premiums in Table II. For example, the average weekly return on the Korea Fund's shares is 0.80%. Thus, to produce a reported premium of 44.35% when the true premium is zero requires the fund's net asset value to be reported on average 55 weeks (44.35 ÷ 0.80) after its price.

[12] Brauer and Chang (1989) also find that prices and net asset values do not always move simultaneously.

Table II

Sample Statistics for Premiums and Premium Changes for 14 Closed-End Country Funds and for Portfolios of Closed-End Country Funds and Closed-End Domestic Funds, Computed Using Weekly Data from May 22, 1981 to January 13, 1989

Portfolio or Fund	Number of Observations	Mean	Standard Deviation	Skewness	Kurtosis	Autocorrelations at Lag 1	2	3	4	5	6	Standard Error of Autocorrelation at Lag 1
(A) Percentage Premiums												
ASA[a]	299	6.99	8.04	0.33	0.43	0.83	0.77	0.70	0.65	0.62	0.58	0.06
Australia	150	−16.55	10.04	0.86	0.40	0.81	0.79	0.78	0.78	0.74	0.71	0.08
Brazil	36	−28.82	9.68	−0.37	−0.40	0.92	0.84	0.86	0.80	0.78	0.81	0.18
France	134	−20.18	8.41	−0.22	−0.25	0.75	0.60	0.55	0.51	0.48	0.45	0.09
Germany	128	−4.32	5.90	−0.05	−0.54	0.77	0.59	0.50	0.39	0.25	0.20	0.09
Helvetia[b]	71	−11.68	6.45	−0.15	0.52	0.72	0.55	0.43	0.37	0.22	0.20	0.12
Italy	146	−17.10	13.23	0.48	1.72	0.88	0.82	0.74	0.70	0.63	0.57	0.08
Japan	320	−11.73	10.50	−0.42	−0.68	0.96	0.93	0.90	0.87	0.85	0.83	0.06
Korea	219	44.35	20.86	0.52	−0.62	0.95	0.92	0.87	0.85	0.81	0.78	0.07
Malaysia	86	−7.46	19.75	0.81	0.10	0.93	0.87	0.82	0.77	0.71	0.64	0.11
Mexico	343	−13.78	33.72	1.48	1.59	0.97	0.95	0.93	0.92	0.91	0.91	0.06
Taiwan	91	40.96	36.24	−0.24	−1.02	0.96	0.92	0.89	0.86	0.81	0.72	0.11
Thai	47	25.46	12.45	0.66	−0.25	0.93	0.86	0.83	0.80	0.77	0.72	0.15
U.K.	73	−21.37	6.75	0.51	4.43	0.72	0.57	0.38	0.23	0.26	0.22	0.12
Country funds	399	−4.54	11.88	0.06	−0.42	0.89	0.85	0.82	0.80	0.77	0.75	0.05
Domestic funds	400	−11.22	5.58	−0.18	−0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.05

Table II—*Continued*

Portfolio or Fund	Number of Observations	Mean	Standard Deviation	Skewness	Kurtosis	Autocorrelations at Lag 1	2	3	4	5	6	Standard Error of Autocorrelation at Lag 1
(B) Percentage Premium Changes												
ASA[a]	287	−0.02	4.65	0.24	1.22	−0.32	0.01	0.03	−0.12	0.06	−0.06	0.06
Australia	140	−0.24	5.92	0.75	3.97	−0.45	−0.06	0.00	0.04	0.06	−0.11	0.09
Brazil	31	−1.03	4.00	0.13	−0.49	−0.10	−0.33	0.39	−0.15	−0.21	0.36	0.19
France	132	−0.02	5.94	−3.24	25.29	−0.21	−0.18	−0.04	0.01	0.06	−0.05	0.09
Germany	125	−0.04	3.98	0.19	1.02	−0.12	−0.17	0.04	0.03	−0.18	−0.11	0.09
Helvetia[b]	68	−0.12	4.58	0.93	4.56	−0.12	−0.11	−0.09	0.08	−0.29	0.19	0.12
Italy	142	−0.12	6.19	0.52	4.68	−0.23	0.09	−0.26	0.16	−0.03	0.03	0.08
Japan	315	0.10	3.09	0.32	1.02	−0.13	−0.06	0.00	−0.06	−0.02	0.01	0.06
Korea	208	0.19	6.37	−0.22	4.58	−0.09	0.08	−0.11	0.06	−0.05	0.01	0.07
Malaysia	85	−0.23	7.41	0.24	2.42	−0.04	−0.07	−0.06	0.09	0.00	0.11	0.11
Mexico	314	0.00	8.33	0.87	3.40	−0.16	0.00	−0.15	0.00	0.00	−0.02	0.06
Taiwan	80	−1.15	10.12	0.62	2.44	−0.01	−0.19	−0.08	0.11	0.27	−0.03	0.12
Thai	46	−0.53	4.62	0.38	1.20	0.12	−0.09	−0.11	0.00	0.26	0.20	0.15
U.K.	70	−0.39	4.90	−0.20	3.31	−0.28	0.09	0.04	−0.19	0.08	−0.13	0.12
Country funds	397	0.04	5.44	0.34	3.33	−0.31	−0.03	−0.03	0.02	−0.08	0.08	0.05
Domestic funds	399	0.01	1.27	−0.14	0.83	−0.16	−0.20	0.06	−0.02	−0.03	0.01	0.05

[a] American-South Africa Fund. We calculate the ASA Fund premium using the fund's rand net asset value translated at the financial exchange rate.

[b] The Helvetia Fund invests in Swiss assets.

Table III

Sample Cross-Correlations between Fund Price Changes and Net Asset Value Changes for 14 Closed-End Country Funds and for Portfolios of Closed-End Country Funds and Closed-End Domestic Funds, Computed Using Weekly Data from May 22, 1981 to January 13, 1989

Portfolio or Fund	Cross-Correlation between Change in Price and Change in Net Asset Value at Lag																	Standard Error of Cross-Correlation at Lag 0
	−8	−7	−6	−5	−4	−3	−2	−1	0	1	2	3	4	5	6	7	8	
ASA[a]	−0.02	−0.04	0.03	0.00	−0.02	0.01	0.02	0.34	0.57	0.12	0.03	−0.04	−0.04	−0.03	−0.07	0.01	0.03	0.06
Australia	0.04	−0.04	0.12	−0.14	0.07	0.04	0.26	0.40	0.39	0.36	0.14	0.01	0.12	−0.05	−0.09	−0.12	−0.05	0.08
Brazil	0.11	0.29	−0.16	−0.39	−0.06	0.02	−0.28	−0.02	0.36	0.00	−0.34	0.28	0.51	−0.48	−0.17	0.53	−0.29	0.18
France	−0.05	0.04	0.16	−0.13	−0.01	0.04	−0.03	0.14	0.33	0.30	0.01	0.15	0.01	0.03	0.13	0.00	−0.08	0.09
Germany	−0.06	0.09	0.12	−0.01	0.11	0.14	0.26	0.12	0.49	0.22	0.02	−0.01	0.09	0.02	0.02	0.10	0.03	0.09
Helvetia[b]	−0.12	0.10	0.13	0.04	0.05	−0.16	0.23	0.10	0.37	0.14	0.11	−0.06	0.02	0.02	−0.27	0.12	0.07	0.12
Italy	−0.03	0.04	−0.09	−0.05	0.01	−0.03	0.01	0.00	0.32	0.22	0.10	−0.17	−0.01	−0.01	0.05	−0.14	0.00	0.08
Japan	0.04	0.06	0.03	−0.03	0.03	0.02	−0.02	0.05	0.65	0.12	0.00	0.00	0.05	−0.07	0.07	−0.03	0.05	0.06
Korea	−0.05	0.05	0.08	0.12	−0.09	−0.04	0.01	0.21	0.21	0.02	0.05	0.21	0.00	−0.01	−0.02	0.04	0.07	0.07
Malaysia	−0.06	−0.10	−0.04	0.03	−0.02	0.08	0.13	0.42	0.55	0.32	−0.01	0.02	0.13	0.14	0.18	−0.09	−0.33	0.11
Mexico	−0.12	−0.01	0.05	0.10	0.23	0.18	0.13	0.11	0.37	0.21	0.10	0.08	0.08	0.08	0.11	−0.03	−0.11	0.06
Taiwan	−0.02	0.12	0.01	−0.07	−0.07	0.20	0.13	0.16	0.30	0.02	0.17	−0.23	−0.27	−0.18	0.02	0.06	−0.17	0.11
Thai	−0.30	−0.14	0.13	0.05	−0.05	−0.09	−0.09	0.00	0.39	0.34	−0.11	−0.27	−0.20	−0.11	−0.30	−0.01	0.22	0.15
U.K.	0.04	−0.08	0.19	−0.18	0.09	−0.16	0.09	−0.01	0.68	−0.07	0.17	−0.03	0.04	−0.10	0.00	−0.07	−0.15	0.12
Country funds	−0.04	0.07	0.05	0.08	0.13	0.04	0.20	0.29	0.47	0.24	0.08	0.03	0.05	0.10	0.08	−0.03	−0.05	0.05
Domestic funds	−0.03	0.01	0.09	0.02	0.08	0.01	0.02	0.18	0.86	0.29	0.08	0.00	0.02	−0.01	0.16	0.05	−0.01	0.05

[a] American-South Africa Fund. We calculate the dollar net asset value using the rand net asset value translated at the financial exchange rate.

[b] The Helvetia Fund invests in Swiss assets.

the change in the fund's price over one week predicts the change in the fund's net asset value over the next week for the ASA, Australia, Korea, and Malaysia funds. On the other hand, a change in the net asset value over one week predicts the change in the fund's price over the next week for the ASA, Australia, France, Germany, Italy, Japan, Malaysia, Mexico, and Thai funds. This evidence is consistent with reporting lags or nonsynchronous trading causing recorded prices and net asset values to respond at different times to new information. Suppose, for example, that news about the future prospects for a foreign economy is released. If trading is not continuous in the foreign market, some of the information will not be reflected in the country fund's net asset value until the week following the announcement. Under these conditions, changes in the fund's price over one week will help predict changes in its net asset value over the following week. Section III allows for this behavior when testing the hypothesis that announcements of changes in investment restrictions affect changes in closed-end country fund premiums.[13]

III. Tests of the Effects of Changes in Investment Restrictions

This section examines whether changes in the premiums of closed-end country funds are related to announcements of changes in international investment restrictions. In particular, we test whether an announcement of a liberalization of restrictions is associated with a decline (increase) in the premium (discount) and an announcement of a tightening of restrictions with a rise (decline) in the premium (discount). The criteria for selecting events related to changes in investment restrictions are outlined below.

A. Events

International investment barriers arise in various forms. The International Monetary Fund, in its annual *Exchange Arrangements and Exchange Restrictions*, classifies capital controls into those affecting (i) commercial banks' international transactions, (ii) nonresident accounts and resident foreign exchange accounts, (iii) portfolio investment, and (iv) direct investment.[14] We focus on the effects of barriers that directly affect or signal changes in domestic investors' ability to acquire the shares of foreign companies or in the ability of foreign investors to invest outside their own countries. Thus, this study focuses primarily on restrictions classified under categories (iii) and (iv). However, the impacts of restrictions classified under categories (i) and (ii) which affect the ability of investors to

[13] Bailey and Stulz (1990) also emphasize the importance of allowing for nonsynchronous reporting in empirical work in international finance. They discuss the problems that arise when using daily returns to estimate the benefits from international diversification.

[14] The definitions for direct and portfolio investment are given in the International Monetary Fund's *Balance of Payments Manual*, 4th edition, 1977. In general, direct foreign investment refers to investments which confer a degree of control over the use of the funds invested, while portfolio investment lacks such control. Investments in real estate, foreign subsidiaries, and purchases of 10–25% of voting stock in a foreign entity are examples of direct investment. Bonds and equity holdings which are less than 10–25% of voting stock are examples of portfolio investment.

acquire the currency necessary to purchase domestic or foreign assets are also examined.

For each country in the sample, indications of changes in investment restrictions are collected from *The Wall Street Journal Index* and the International Monetary Fund's *Exchange Arrangements and Exchange Restrictions*. If the announcement dates for changes in investment restrictions are not in the original source, then the announcement dates are collected from *The Wall Street Journal* and the *Financial Times*. The event is dropped if the announcement date could not be found. Events are also dropped from the sample if multiple announcements of changes in investment restrictions occurred within less than six weeks of each other.[15] Events satisfying these criteria are available for France, Japan, South Korea, Mexico, and Taiwan and are described in Appendix A.

Figures 1a to 1e plot each fund's premium against time. The graphs indicate considerable variation in the premiums over time. The tests below examine whether some of this variation can be explained by announcements of changes in international investment restrictions. Country fund premiums, however, can vary even in the absence of changes in investment restrictions. For example, variation in the ratio of the domestic market price of risk to the foreign market

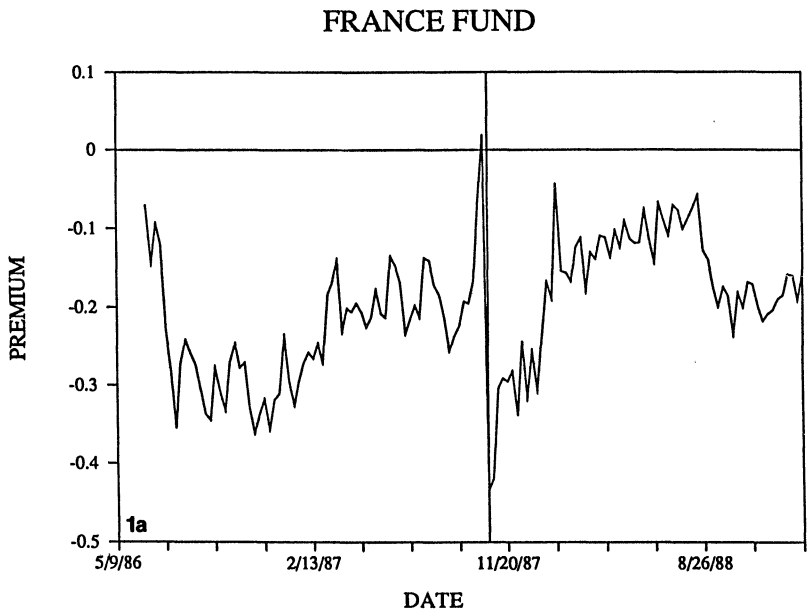

Figure 1a. Closed-end fund premium for the France Fund: June 20, 1986 to January 13, 1989. The premium is measured as the logarithm of the ratio of the fund's price to its net asset value. The vertical bar indicates the week of October 19, 1987. Note that the horizontal and vertical scales are different for each fund.

[15] The announcement of the offering of a closed-end country fund is often an event which represents a loosening of foreign investment restrictions. Hence, other events announced less than six weeks after the announcement of a fund's initial offering are also excluded. This led to the exclusion of one event for Taiwan.

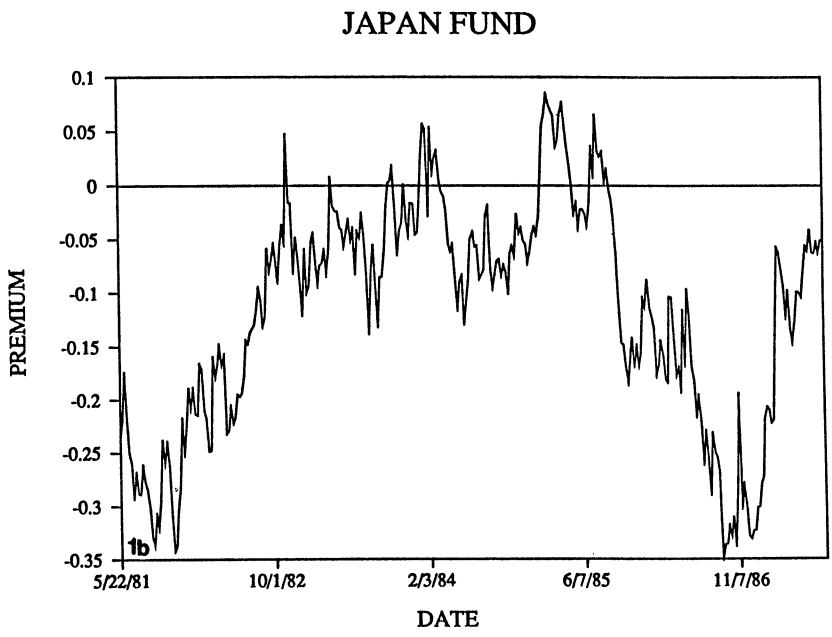

Figure 1b. Closed-end fund premium for the Japan Fund: May 22, 1981 to August 7, 1987. The premium is measured as the logarithm of the ratio of the fund's price to its net asset value. Note that the horizontal and vertical scales are different for each fund.

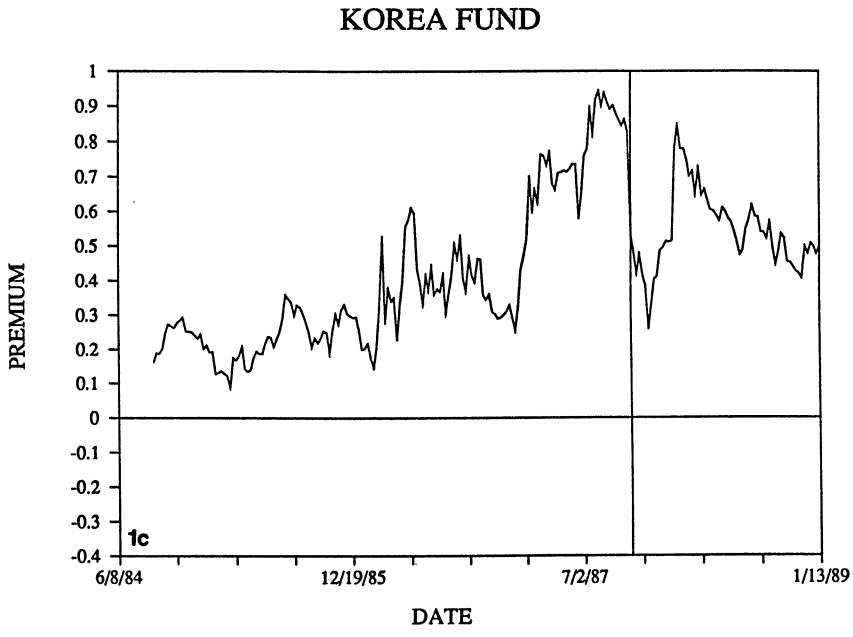

Figure 1c. Closed-end fund premium for the Korea Fund: August 31, 1984 to January 13, 1989. The premium is measured as the logarithm of the ratio of the fund's price to its net asset value. The vertical bar indicates the week of October 19, 1987. Note that the horizontal and vertical scales are different for each fund.

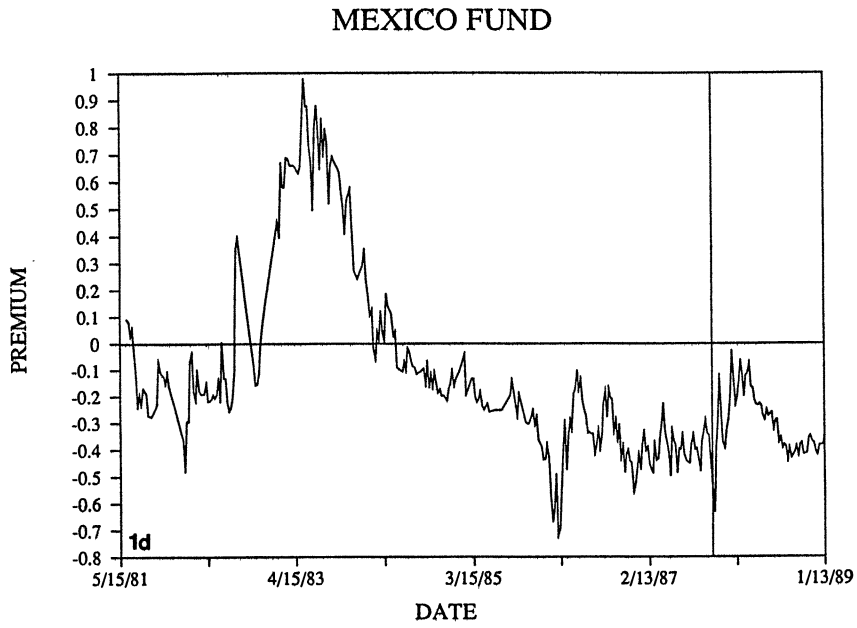

Figure 1d. Closed-end fund premium for the Mexico Fund: June 12, 1981 to January 13, 1989. The premium is measured as the logarithm of the ratio of the fund's price to its net asset value. The vertical bar indicates the week of October 19, 1987. Note that the horizontal and vertical scales are different for each fund.

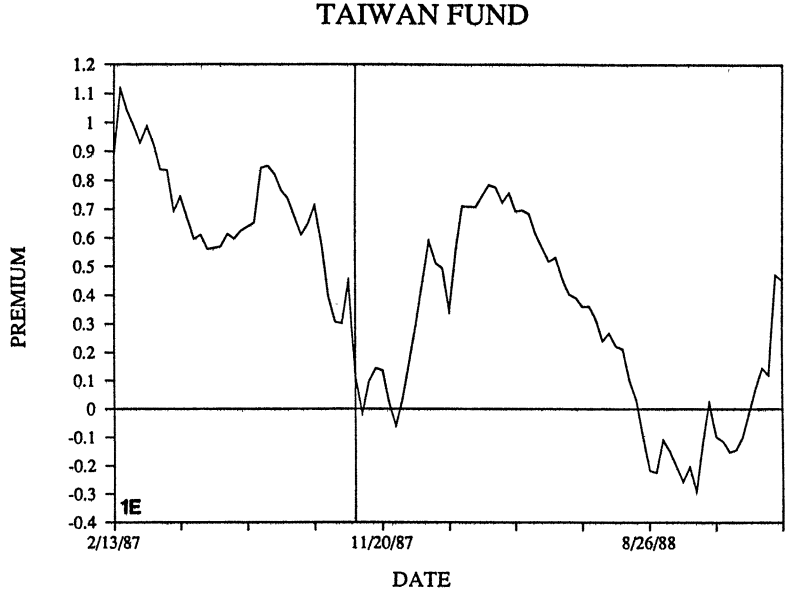

Figure 1e. Closed-end fund premium for the Taiwan Fund: February 13, 1987 to January 13, 1989. The premium is measured as the logarithm of the ratio of the fund's price to its net asset value. The vertical bar indicates the week of October 19, 1987. Note that the horizontal and vertical scales are different for each fund.

price of risk can affect these premiums if capital markets are segmented. Such variation can result from changes in the volatility of domestic relative to foreign stock returns. All else constant, an increase in the domestic market price of risk will reduce a country fund's premium, while an increase in the foreign market price of risk will increase the premium.

The graphs also reveal large decreases in the premiums on the France, Korea, Mexico, and Taiwan Funds around the October 1987 market crash. (The vertical bar indicates the week of the crash.) To investigate the sensitivity of our results to this period, we conduct tests including and excluding the five weeks surrounding the crash. Interestingly, across all funds, the price-net asset value ratios of country funds trading at large premiums before the crash declined the most. This evidence is consistent with the joint hypothesis that the ratio of the domestic to foreign market prices of risk rose on Black Monday and that large country fund premiums arise from barriers to international investment.

B. Methodology

If international investment barriers are effective, an announcement of a loosening of investment restrictions should be associated with a fall in the premium or a widening of the discount. Similarly, an announcement of a tightening of investment restrictions should be associated with a rise in the premium or a narrowing of the discount. These hypotheses are tested using the following regression model:

$$\pi_{jt} = \delta_{0j} + \delta_{1j}D_{1jt} + \delta_{2j}D_{2jt} + \delta_{3j}D_{3jt} + \epsilon_{jt}, \qquad j = 1, 2, \cdots, 5, \tag{1}$$

where π_{jt} is the change in the jth fund's premium in week t, $D_{1jt} = 1$ (-1) if t is between two and seven weeks before the announcement of a loosening (tightening) of the jth country's investment restrictions and 0 otherwise, $D_{2jt} = 1$ (-1) if t is between one week before and one week after the announcement of a loosening (tightening) of the jth country's investment restrictions and 0 otherwise, and $D_{3jt} = 1$ (-1) if t is between two and seven weeks after the announcement of a loosening (tightening) of the jth country's investment restrictions and 0 otherwise.[16] While the six-week windows for the pre- and post-announcement periods are chosen arbitrarily, other choices (e.g., four-, five-, seven-, or eight-week windows) produced similar results.

The regression coefficients δ_{1j}, δ_{2j}, and δ_{3j} measure the effects of announced changes in investment restrictions on closed-end country fund premiums and discounts. The coefficient δ_{1j} measures the average weekly effect before the announcement of regulatory changes on the jth fund's premium, while the coefficient δ_{3j} captures the effects of any movements in the premium after the announcement. The coefficient δ_{2j} measures the average weekly change in the premium or discount during the three-week period surrounding the announcement. The week before and the week after the announcement are included in the

[16] We also estimated a U.S. marked-adjusted version of (1) by including the percentage change in the discount on the U.S. closed-end fund portfolio as an additional regressor. The coefficient on this discount is insignificantly different from zero, however, suggesting little relation between premium or discount changes on closed-end foreign and domestic funds.

event period defined by D_{2jt} to allow for the effects of nonsynchronous trading or lagged reporting of the event, prices, or net asset values. Table III indicates that these effects are likely to be important. While ignoring these effects in event studies typically leads only to reduced power, ignoring them here could also bias the estimates of the coefficients in (1). Using an event period that includes the three weeks surrounding the announcement should reduce the potential for bias.[17]

Before estimating (1), the change in the premium, π_{jt}, is adjusted for two known regularities that might confound the hypothesis tests. First, observations following an announcement that the closed-end fund will be open-ended are excluded because evidence in Brauer (1984) and Brickley and Schallheim (1985) indicates that discounts go to zero following such an announcement. Of the foreign funds examined in this study, only the Japan Fund announced an open-ending (on March 3, 1987). Second, the premium changes are adjusted for the effects of dividend and capital gains payments on both the announcement and ex-dividend dates. If the fraction of the net asset value representing cash held for dividend payments is not priced at a discount or premium, unanticipated dividends will cause a price adjustment on the announcement date; hence, the variance of premium changes is likely to be higher around these dates than at other times. Fund premiums and discounts can be adjusted for this effect using a model of expected dividends. Dividend payments are assumed to follow a random walk without drift.[18] The variance of premium changes is also likely to be altered on ex-dividend dates. On the ex-dividend date, the net asset value will be reduced by the amount of the dividend and the price will fall by an amount related to the dividend. These changes depend on the total dividend, not just the unanticipated portion of the dividend. Details of the dividend effect adjustment procedures are contained in Appendix B.[19]

Consistent estimates of the effects of announcements of changes in international investment restrictions on closed-end country fund premiums can be obtained by applying ordinary least squares (OLS) to equation (1) for each fund. The sample autocorrelations of premium changes reported in Panel B of Table II suggest that the regression residuals from (1) are likely to be serially correlated. A consistent estimate of the variance-covariance matrix of the vector of OLS estimates which allows for serial correlation is obtained using the procedure in Hansen (1982). The existence of missing data, however, complicates its compu-

[17] The potential for bias can be illustrated with the following example. Suppose that a foreign country announces it will tighten investment restrictions and that the price and net asset value of the fund investing in that country fall in response. If the restrictions are binding, the fund's price-net asset value ratio will rise. If net asset values are reported with some lag, however, the fund's price will change before its net asset value changes and the fund's premium will fall in the announcement week. The premium increase would only become apparent the following week, when both components of the premium would have adjusted completely.

[18] Aharony and Swary (1980) also assume that dividends follow a random walk.

[19] A total of seventy-one premium changes are adjusted because they cover dividend announcement and ex-dividend periods. The adjusted premium changes are smaller on average and less volatile than those they replaced. The mean adjusted change is 0.22% compared to the mean unadjusted change of 1.12%. The standard deviation of the adjusted changes is 2.41% compared to the standard deviation of the unadjusted changes they replaced of 7.36%. The regression coefficients are also estimated without adjusting for dividends. The results differed little from those reported here.

tation. The details of the adjustments we make for these missing data appear in Appendix C.[20]

C. Empirical Results

The results of estimating equation (1) are reported in Table IV. The null hypothesis is that closed-end country fund premiums or discounts are unaffected by announcements of changes in international investment restrictions. The alternative hypothesis is that announcements of liberalizations of foreign investment restrictions reduce the premium or widen the discount. The p-values reported in parentheses below the coefficient estimates are for one-sided tests of the null hypothesis that $\delta_{ij} \geq 0$ against the alternative hypothesis that $\delta_{ij} < 0$ for $i = 1$ to 4 and $j = 1$ to 5. The value of δ_{4j} is constructed as a weighted average of δ_{1j} and δ_{2j} and measures the average weekly impact of an announcement of a loosening of restrictions between seven weeks before and one week after the announcement. In addition to the results reported in Table IV, equation (1) is estimated excluding the five-week period surrounding the October 1987 crash since the unusual price behavior over this period may affect estimates of the parameters and their standard errors.

Tests of the null hypothesis for the announcement period yield mixed results across individual funds. During the three-week event period, an announcement of a liberalization of investment restrictions is on average associated with an 11.5% decline ($-3.85\% \times 3$) in the France Fund's price-net asset value ratio, a 9.3% decline in the Korea Fund's ratio, and a 16.2% decline in the Mexico Fund's ratio. The hypothesis that the announcement of a loosening or a tightening of investment restrictions has no effect on the premium during the three weeks surrounding the announcement can be rejected at the 3% significance level for the France Fund, at the 2% level for the Korea Fund, and at the 1% level for the Mexico Fund. However, the hypothesis cannot be rejected for the Japan and Taiwan funds.

The null hypotheses that premiums and discounts do not fall during the weeks before and after the announcement period are also tested in Table IV. The hypothesis that $\delta_{1j} \geq 0$ is rejected at the 2% significance level for the Japan Fund: its price-net asset value ratio declines on average by 5.1% ($-0.85\% \times 6$) during the period from seven to two weeks before the announcement of a loosening of investment restrictions. This hypothesis is also rejected at the 1% level for the Korea Fund: its price-net asset value ratio declines by 16.4% during the six-week period before the announcement. These results suggest that announcements of changes in Japanese and Korean investment restrictions were partially anticipated by investors. Since the six-week period preceding one of the announcements for Korea includes the October 1987 crash, however, the estimate of δ_{1j} for Korea may be influenced by this event. When data during the five-week period surround-

[20] The standard errors were also computed adjusting for heteroskedasticity using White's (1980) procedure. The results were unaffected by this correction. In addition, because the disturbances across equations are contemporaneously correlated, more efficient estimates of the parameters can be produced by joint estimation. The results, available from the authors on request, differ little from those reported here.

Table IV

Tests of the Effect of Changes in International Investment Restrictions on Closed-End Country Fund Premiums Using Weekly Data from May 22, 1981 to January 13, 1989

$$\pi_{jt} = \delta_{0j} + \delta_{1j}D_{1jt} + \delta_{2j}D_{2jt} + \delta_{3j}D_{3jt} + \epsilon_{jt}, \qquad j = 1, 2, \ldots, 5, \; t = 1, 2, \ldots, 400,$$

where

π_{jt} = change in the log of the jth fund's premium at time t,
D_{1jt} = 1 (−1) if t is between two and seven weeks before the announcement of a loosening (tightening) of the jth country's investment restrictions, and 0 otherwise,
D_{2jt} = 1 (−1) if t is between one week before and one week after the announcement of a loosening (tightening) of the jth country's investment restrictions, and 0 otherwise,
D_{3jt} = 1 (−1) if t is between two and seven weeks after the announcement of a loosening (tightening) of the jth country's investment restrictions, and 0 otherwise.

δ_{0j}, δ_{1j}, δ_{2j} and δ_{3j} are parameters, and $\delta_{4j} = (2\delta_{1j} + \delta_{2j})/3$, the average weekly impact between seven weeks before and one week after the announcement of a loosening of the jth country's investment restrictions.

Fund	Number of Events	Number of Observations	$\hat{\delta}_{0j}$[a]	$s(\hat{\delta}_{0j})$	$\hat{\delta}_{1j}$	$s(\hat{\delta}_{1j})$	$\hat{\delta}_{2j}$	$s(\hat{\delta}_{2j})$	$\hat{\delta}_{3j}$	$s(\hat{\delta}_{3j})$	$\hat{\delta}_{4j}$	$s(\hat{\delta}_{4j})$
France	2	132	0.17	0.41	−1.32	2.09	−3.85	2.06	0.75	1.66	−2.16	1.53
			(0.66)		(0.26)		(0.03)		(0.67)		(0.08)	
Japan	8	292	0.06	0.19	−0.85	0.42	0.20	0.61	0.10	0.42	−0.50	0.37
			(0.62)		(0.02)		(0.63)		(0.59)		(0.09)	
Korea	5	208	0.71	0.45	−2.74	1.19	−3.11	1.58	0.34	1.25	−2.86	0.99
			(0.94)		(0.01)		(0.02)		(0.61)		(0.00)	
Mexico	6	314	−0.10	0.36	−1.13	1.43	−5.41	1.96	2.28	1.51	−2.56	1.12
			(0.39)		(0.21)		(0.00)		(0.94)		(0.01)	
Taiwan	2	80	−1.24	1.30	−0.46	3.77	0.82	5.18	0.79	3.42	−0.03	3.17
			(0.17)		(0.45)		(0.56)		(0.59)		(0.50)	
Overall[b]	23	1026	−0.08	0.35	−1.34	0.61	−2.28	0.80	0.84	0.60	−1.65	0.49
			(0.41)		(0.01)		(0.00)		(0.92)		(0.00)	

[a] $\hat{\delta}_{0j}$ is the OLS estimate of δ_{0j}, $s(\hat{\delta}_{0j})$ is its standard error, and so on. The coefficient estimates and standard errors are multiplied by 100. p-Values in parentheses are for tests of the hypotheses $\delta_{0j} \geq 0$, $\delta_{1j} \geq 0$, and so on.

[b] Estimates are event-weighted averages across the five funds.

ing the crash are excluded, the hypothesis that $\delta_{1j} \geq 0$ cannot be rejected for the Korea Fund at conventional significance levels. The significance of the estimate for δ_{2j}, on the other hand, is not altered by excluding this period. The hypothesis that $\delta_{3j} \geq 0$ is not rejected for any of the five single country funds.

The average weekly impact of an announcement of a loosening of international investment restrictions between seven weeks before and one week after the announcement is measured by δ_{4j}. For all funds, an announcement of a relaxation of investment restrictions is associated with a fall in the price-net asset value ratio over this nine-week period. Moreover, the hypothesis that these changes are nonnegative can be rejected in favor of the alternative that they are negative at the 1% significance level for the Korea Fund, at the 8% level for the France Fund, at the 9% level for the Japan Fund, and at the 1% level for the Mexico Fund. Without October 1987, the hypothesis that $\delta_{4j} \geq 0$ is rejected at the 3% level for the Korea Fund and at the 1% level for the France Fund. The significance levels for the other funds remain the same.

A more powerful test of whether announcements of changes in investment restrictions affect closed-end country fund premiums or discounts is obtained by testing whether a weighted average of the coefficient estimates across all funds is significantly different from zero. The weights are based on the number of announcement events. These results, reported in the last row of Table IV, indicate that announcements of liberalizations of investment restrictions on average are associated with a decrease in the premiums on closed-end country funds. An announcement of a loosening of international investment restrictions is associated with an average 6.8% ($-2.28\% \times 3$) decrease in price-net asset value ratios during the three weeks surrounding the announcement: the hypothesis that event-weighted average $\delta_2 \geq 0$ is rejected at the 1% significance level. Similarly, the hypothesis that the average $\delta_1 \geq 0$ is rejected at the 1% significance level, suggesting that, on average, these announcements were partially anticipated. This hypothesis is rejected at the 4% level when October 1987 is excluded. Over the period between seven weeks before and one week after the announcement of a liberalization, however, the weighted average decline in price-net asset value ratios for all funds is 13% when October 1987 is excluded, and this decrease is significant at the 1% level.

Announcements of the liberalization of Taiwan's international investment restrictions, on the other hand, are not associated with significant changes in the premium on the Taiwan Fund. The hypothesis that $\delta_{ij5} \geq 0$ for $i = 2$ to 4 is never rejected. Taiwan is widely thought to effectively restrict foreign access to its capital markets. These results could be due either to the ineffectiveness of Taiwan's existing barriers or to the events we identify being fully anticipated or unimportant.

Overall, the results are consistent with the hypothesis that changes in the premiums and discounts of closed-end country funds are related to announcements of changes in investment restrictions. The evidence indicates that the premiums (discounts) of closed-end country funds tend to decline (increase) with a liberalization of international investment restrictions and rise (decrease) with a tightening of these restrictions. The evidence also indicates that government-imposed barriers have been effective in segmenting international asset markets.

If the restrictions had not been binding, announced changes in international investment restrictions on average would have had no impact on fund premiums.

IV. Conclusions

Closed-end country funds offer an interesting opportunity to examine the effects of international investment restrictions on asset prices. All else constant, binding investment restrictions will raise a country fund's price relative to its net asset value by approximately the amount the marginal domestic investor will pay to circumvent these restrictions. This paper examines whether announcements of changes in international restrictions raise country fund price-net asset value ratios by segmenting international capital markets. If international capital markets are integrated, a closed-end country fund's shares and its underlying assets should have similar risk. Tests of the effects of changes in investment restrictions on country fund price-net asset value ratios therefore do not require an asset pricing model.

We test whether a relationship exists between announcements of changes in international investment restrictions and changes in country fund price-net asset value ratios using weekly data from May 1981 to January 1989. Four of the five country funds examined experience a significant decrease in their price-net asset value ratios either in anticipation of or immediately following the announcement of a liberalization of investment restrictions. Across all funds, an announcement of a liberalization is associated with a 6.8% decrease in the price-net asset value ratio during the three weeks surrounding the announcement, and this decrease is significant at the 1% level. The evidence thus indicates that government-imposed barriers have been effective in segmenting international capital markets. This evidence has important implications for international investment decisions. In particular, these results suggest that, for some of the countries considered here, the cost of capital for investment projects will depend on the country in which the funds are raised.

Appendix A: Announcements of Changes in Investment Restrictions

The following information is provided for each announcement: 1) the date of the announcement, 2) a description of the announced change in investment restrictions, 3) the source for the announcement, 4) the type of capital transaction affected by the announcement (using the IMF classification scheme described in the text), 5) whether the announcement indicates a loosening or a tightening of international investment restrictions, and 6) whether the change in restrictions will affect capital inflows or outflows. The abbreviations for the sources are: IMF, International Monetary Fund, *Exchange Arrangements and Exchange Restrictions*; FT, *Financial Times*; and WSJ, *The Wall Street Journal.*

France:

7/23/86—The French Parliament amends the government's denationalization bill by raising the limit on foreign participation in state-owned companies at the

time of sale from 15% to 20% (IMF, 1986; and WSJ, 8/1/86, p. 21): Direct investment, loosening, capital inflows.

9/30/86—The Government plans to announce a move that will allow residents to hold foreign currency bank accounts (WSJ, 10/1/86, p. 37): Foreign exchange accounts, loosening, capital outflows.

Japan:

8/24/81—Banking sources say that Japanese banking authorities are planning to raise the ceiling on yen-denominated loans outside Japan (WSJ, 8/25/81, p. 34): Commercial banks' international transactions, loosening, capital outflows.

5/17/82—Japan's Finance Ministry relaxes rules covering yen loans to foreign borrowers (WSJ, 5/18/82, p. 35): Commercial banks' international transactions, loosening, capital outflows.

1/30/83—Japan's Finance Ministry announces that it plans to lift the ban on domestic sales of foreign zero-coupon bonds (WSJ, 1/31/83, p. 34): Portfolio investment, loosening, capital outflows.

9/22/83—The Japanese Finance Ministry says that it is considering easing restrictions on investments in Japanese real estate and stocks by foreigners (WSJ, 9/23/83, p. 34): Direct and portfolio investment, loosening, capital inflows.

4/17/84—Beryl Sprinkel, undersecretary of the U.S. Treasury for monetary affairs, announces an agreement with Japan which gives U.S. and other foreign banks greater access to Japanese financial markets (WSJ, 4/18/84, p. 35): Commercial banks' international transactions, loosening, capital outflows and inflows.

3/28/85—The Finance Ministry announces that it will increase the number of foreign companies allowed to issue yen-denominated bonds in Japan. In addition, the Ministry announces that it will permit medium to long-term Euroyen loans to foreign companies. Previously, such loans were restricted to maturities of less than one year (WSJ, 3/29/85, p. 32): Portfolio investment, loosening, capital outflows.

6/23/85—A Ministry of Finance official announces that Japan will open trust banking business and pension funds to 9 foreign banks. Foreigners had anticipated only 8 banks (WSJ, 6/24/85, p. 22): Commercial banks' international transactions, loosening, capital outflows.

10/27/85—At least 7 U.S. and other non-Japanese brokerage firms have decided to apply for membership on the Tokyo Stock Exchange. This implies that foreign members can make their own trades and avoid paying 27% of their commissions to Japanese members and may facilitate the sale of Japanese stocks abroad (WSJ, 10/28/85, p. 27): Portfolio investment, loosening, capital inflows.

South Korea:

12/28/84—The Ministry of Finance announces that foreign investment will be permitted in 19 additional industries (IMF, 1984): Direct investment, loosening, capital inflows.

6/6/85—The Finance Ministry announces plans to allow foreign investment in 230 more business areas by 1988 (WSJ, 6/7/85, p. 7): Direct investment, loosening, capital inflows.

10/15/85—The Finance Ministry announces that it will open an additional 102 business areas to foreign investment (FT, 10/15/85, p. 5; and WSJ, 10/17/85, p. 32): Direct investment, loosening, capital inflows.

12/2/87—The South Korean government announces that it will allow foreigners to exchange Korean convertible bonds for stock (WSJ, 12/3/87, p. 48): Portfolio investment, loosening, capital inflows.

3/28/88—South Korean officials said that the government is likely to allow Korean securities, insurance, and investment trust companies to buy foreign stocks (WSJ, 3/29/88, p. 27): Portfolio investment, loosening, capital outflows.

Mexico:

8/13/82—The Government closes the foreign exchange markets and imposes restrictions on money in foreign currency accounts (WSJ, 8/17/82, p. 33): Foreign exchange accounts, tightening, capital outflows.

6/19/83—The Government announces that it is relaxing rules governing foreign investment (WSJ, 6/20/83, p. 31): Direct investment, loosening, capital inflows.

2/17/84—The Government announces a list of priority sectors where majority foreign ownership would be authorized (IMF, 1984): Direct investment, loosening, capital inflows.

1/18/85—The Government announces that it is rejecting IBM's application to build a 100% IBM-owned microcomputer factory. The IBM project has been "viewed by many foreign investors as a test of Mexico's stated policy of welcoming more 100% foreign-owned projects" (WSJ, 1/21/85, p. 27): Direct investment, tightening, capital inflows.

7/23/85—The Government reverses its position and accepts a proposal to allow IBM to build its factory (WSJ, 7/24/85, p. 10): Direct investment, loosening, capital inflows.

11/6/85—The Government places new restrictions on Mexican bank accounts held by foreign bank offices. Most "bankers interpreted the new measures as a means of slowing capital flight" (WSJ, 11/7/85, p. 34): Commercial banks' international transactions, tightening, capital outflows.

Taiwan:

6/14/87—The Review committees to Taiwan's Parliament approve the lifting of controls on outward foreign exchange movements (FT, 6/15/87, p. 5): Foreign exchange accounts, loosening, capital outflows.

5/5/88—A Government official announces that Taiwan's cabinet has approved a proposal to allow foreigners to invest in local securities houses. The cabinet also approved plans to increase foreign direct investment in Taiwan (WSJ, 5/6/88, p. 16): Portfolio and direct investment, loosening, capital inflows.

Appendix B: Dividend-Related Price Change Adjustment Procedures

Dividend Announcement Periods

Consider a dividend announced over the period from t (exclusive) to $t + 1$ (inclusive). Say the portion of the net asset value representing cash held for the payment of anticipated dividends is priced at no discount or premium even though, overall, the net asset value and the price are unequal. If the announced and anticipated dividends differ, the dividend announcement will cause a price change by changing the portion of the net asset value priced at no discount or premium. The procedure used to remove this price change effect of dividend announcements is given below.

Define variables as follows:

P_t ≡ price of closed-end fund at time t,
NAV_t ≡ net asset value of closed-end fund at time t,
D_t^A ≡ dividend anticipated at time t, and
D_t ≡ dividend announced over the period from time t to $t + 1$.

A premium for the invested (i.e., noncash) portion of the net asset value at time t, k_t, may be defined by

$$P_t = (NAV_t - D_t^A)\,(1 + k_t) + D_t^A, \tag{B1}$$

which implies

$$(1 + k_t) = \frac{P_t - D_t^A}{NAV_t - D_t^A}. \tag{B2}$$

If k_t follows a random walk with no drift, a hypothetical post-announcement price reflecting only the impact of the dividend announcement may be calculated as

$$P_{t+1}^H = (NAV_{t+1} - D_{t+1})\,(1 + k_t) + D_{t+1} \tag{B3}$$

$$P_{t+1}^H = (NAV_{t+1} - D_{t+1})\left(\frac{P_t - D_t^A}{NAV_t - D_t^A}\right) + D_{t+1}. \tag{B4}$$

Assuming that dividends also follow a random walk with no drift, the anticipated dividend is taken to be the last dividend of the same type (i.e., regular or capital gains) paid on the same dividend cycle (i.e., annually, semiannually, or quarterly). To remove the dividend announcement effect, the premium changes used in the analysis are based on the difference between P_{t+1} and P_{t+1}^H for dividend announcement periods as opposed to the difference between P_{t+1} and P_t, which is used for all other periods.

Ex-Dividend Periods

Closed-end fund reporting conventions require that the dividend be deducted from reported net asset value when the shares go ex-dividend, not when the dividend is paid. Assuming that the share price drops by just the amount of the

dividend when the shares go ex-dividend, both the numerator and the denominator of the price-net asset value ratio will fall by the amount of the dividend when the shares go ex-dividend. The premium changes for ex-dividend weeks were adjusted to remove this ex-dividend effect by adding the dividend to both the price and net asset value changes for the week.

Appendix C: Estimation with Missing Observations

Let N be the number of closed-end country funds, and let $N\text{-}K_t$ be the number of missing observations at time t. Also, let J_t be an N-dimensional identity matrix whose jth column is eliminated if the jth fund's observations are missing at time t, so that J_t is an $N \times K_t$ matrix. Let:

π_t = an $N \times 1$ vector of country fund premium changes,

$$X_t = \begin{bmatrix} X_{1t} & \cdot & 0 \\ \cdot & \cdot & \cdot \\ 0 & \cdot & X_{Nt} \end{bmatrix}, \quad \text{an } N \times 4N \text{ block-diagonal matrix,}$$

X_{jt} = the 1×4 vector $(1\ D_{1jt}\ D_{2jt}\ D_{3jt})$, for $j = 1, 2, \cdots, N$,

Δ = the $4N \times 1$ coefficient vector $(\delta_1, \delta_2, \cdots, \delta_N)'$, and

$\delta_j = (\delta_{0j}, \delta_{1j}, \delta_{2j}, \delta_{3j})$ for $j = 1, 2, \cdots, N$.

Equation (1) can be rewritten in matrix form as

$$\pi_t = X_t\Delta + \epsilon_t, \tag{C1}$$

while the OLS estimate of the coefficient vector Δ is

$$\hat{\Delta} = \left[\sum_{t=1}^{T} X_t' J_t J_t' X_t\right]^{-1} \sum_{t=1}^{T} X_t' J_t J_t' \pi_t. \tag{C2}$$

If $E(\epsilon_t \epsilon_{t-w}') = 0$ for $|w| > k$, then the variance-covariance matrix of the estimate $\hat{\Delta}$ is

$$\left[\sum_{t=1}^{T} X_t' J_t J_t' X_t\right]^{-1} \left[\sum_{t=1}^{T} \sum_{s=\max(t-k,1)}^{\min(t+k,T)} X_t' J_t J_t' E(\epsilon_t \epsilon_s') J_s J_s' X_s\right] \cdot \left[\sum_{t=1}^{T} X_t' J_t J_t' X_t\right]^{-1}. \tag{C3}$$

If ϵ_t is homoskedastic, a consistent estimate of $E(\epsilon_t \epsilon_{t-w}')$ is

$$\left[\sum_{t=1}^{T} J_t J_t' \hat{\epsilon}_t \hat{\epsilon}_{t-w}' J_w J_w'\right] \Big/ \left[\sum_{t=1}^{T} J_t J_t' J_w J_w'\right], \tag{C4}$$

where $\hat{\epsilon}_t$ is the OLS residual vector from the regression (C1) and '/' denotes element-by-element division. We report coefficient estimates using (C2) and standard errors of these estimates using (C3) and (C4). Inspection of the residuals from the regression (C1) suggests that k be set equal to one.

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