

Capital Controls and Market Segmentation of Emerging Stock Markets

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Using cointegration analysis, this paper studies to what extent share prices in emerging stock markets are linked to price movements in industrial country markets. Three markets are chosen which differ significantly with respect to their barriers to access. The results suggest that capital controls have generally been effective to insulate the domestic market from foreign disturbances, implying that their removal will likely cause important portfolio effects. (*JEL* G10, G31)

I. Introduction

Emerging stock markets have grown rapidly in recent years. The combined capitalization of the 20 largest markets grew sevenfold during the last decade, while annual growth rates of the volume traded in these markets sometimes exceeded 100 percent even when measured in U.S. dollar terms (International Finance Corporation 1991). Despite this rapid growth, foreign portfolio investment in these markets is still very moderate. According to a recent estimate by the World Institute for Development Economics Research (1990), the stock of foreign investment at end-1989 amounted to US\$15 billion, with a share in global portfolio investment of only about 2 percent. This suggests that emerging stock markets are not yet seen as part of a normal diversification strategy for international asset managers.

To a considerable extent this may be explained by the existence of substantial barriers to access. In many cases foreign portfolio invest-

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ment is permitted only through (closed-end) trust funds or subject to prior authorization, and even where nonresidents are free to buy and sell stocks and bonds traded on the local market, there may be general limits for foreign equity and/or significant tax disincentives.

However, a growing number of developing countries are becoming aware of the potential benefits of attracting foreign savings in the form of portfolio investment, and some countries have already announced steps to dismantle existing barriers. This would most likely result in a significant restructuring of international portfolios, first, simply because emerging stock markets would become more accessible; and second, because the removal of restrictions would change asset prices in these markets. Capital controls may imply substantial distortions of stock and bond prices, thus changing the composition of the optimal portfolio. While currently stock prices in some emerging markets tend to move in opposite directions from the Standard & Poor's Composite Index or the Japanese Nikkei Index, this enabling investors to achieve higher returns for a given level of risk, the integration of these markets would probably imply that price movements would become more closely linked to movements in other markets.

In this note, it is examined to what extent capital controls in newly industrializing countries have led to a market segmentation. By means of cointegration analysis it is formally tested whether stock prices in markets protected by different degrees of controls showed significantly different movements with respect to stock prices in industrial country stock markets. For this purpose, we chose three markets—Malaysia, Thailand, and Korea—whose controls range from "mild" to "severe." These markets which belong to the six largest emerging stock markets are briefly discussed in section II. Section III provides the empirical evidence and discusses the results. Finally, section IV summarizes and concludes.

II. Barriers to Access

The Korean market is one of the largest stock markets in developing countries. With a market capitalization of about US\$ 100 billion at end-1991, its size is even larger than many developed European markets. Moreover, it is the second most active emerging market, with a value traded in 1991 totalling about US\$ 85 billion. Compared with the Korean market, the stock markets in Malaysia and Thailand are relatively small. While their market capitalizations at end-1991 were US\$

59 billion and US\$ 36 billion, respectively, the value traded in these markets have also been considerably lower, amounting to about US\$ 11 billion and US\$ 30 billion. All three markets show relatively low degrees of concentration. With 686 companies listed on the Korean stock exchange, the ten largest stocks accounted for less than 30 percent of the total market capitalization. In Malaysia and Thailand, where 321 and 276 companies were listed at end-1991, respectively, the ratios were approximately in the same range. Finally, the Korean market has shown the relatively lowest price/earnings ratio which—relative to the Morgan Stanley World Index—was only 75 percent in early 1992, compared with 97 percent for Thailand and 128 percent for Malaysia.

However, the probably most important differences between the three markets concern their accessibility for foreigners. In the period under consideration, e.g., December 1984 to September 1990, non-residents have been able to participate in the Korean stock market only through approved mutual funds, while, subject to some restrictions, eligible Korean companies have been permitted to issue to foreign investors bonds convertible into stocks.¹ Foreign investment funds have had to be co-managed by Korean trust companies. Moreover, there has been a limit of 10 percent on foreign ownership for shares of any class of an issuer, whereby specific restrictions could be imposed by the Securities and Exchange Commission. Dividends have been subject to a 25 percent withholding tax, which could be reduced when a tax treaty was in force. While capital gains taxes have normally been eliminated in those treaties, a withholding tax also has applied to the sale of units in Korean trusts or shares in Korean companies (the lesser of 10.75 percent of the gross sales price or 26.88 percent of any capital gain). The overseas remittances of dividends and repatriation of capital have been freely permitted.

In contrast to Korea, there have been relatively few restrictions in the case of Malaysia. With the exception of first public offerings, nonresidents have been to buy and sell stocks and bonds traded on the local

¹It should be noted, however, that in the final stage of the Government's four-stage liberalization plan all remaining restrictions on portfolio investment are planned to be removed (Kim and Kim 1991). Since January 1992 foreign direct portfolio investment of up to 10 percent has been allowed. In the first quarter of 1992 foreign net investment in the Korea stock market has totaled between US\$ 650 million and US\$ 850 million, considerably less than the government had anticipated (IFC 1992).

market. While there have been no provisions to protect the domestic financial market, foreign equity has been limited to 30 percent. Purchases of securities in excess of M\$ 5 million or the equivalent of 15 percent or more of the voting power have required the approval of the Foreign Investment Committee. Country funds have not had to seek these approvals. There has been no capital gains tax (except for shares in real property companies), but non-residents have been subject to 40 percent income tax on gross dividend income. Repatriation has normally been automatic since the authority for approving payments abroad has been delegated to authorized banks.

Barriers to access in the case of Thailand have been less severe than in Korea, but significantly more restrictive than in the case of Malaysia. While registration of foreign portfolio investment has been required, foreign ownership has been restricted by law and by articles of association of most companies. These limits have varied from 25 to 49 percent, with foreign ownership of commercial banks being restricted to 25 percent. The standard withholding tax on dividends has been 20 percent and on interest and capital gains 25 percent. Provided that the investor could show that investment in securities had originated in an increased transfer of foreign exchange, permission for repatriation has been given routinely.

III. Empirical Evidence

As far as industrial countries are concerned, there is a vast empirical literature on how closely national stock markets are linked, whereby three strands can be identified. The first strand in the literature has been to test whether stock markets are segmented or integrated. In a segmented market, assets are priced according to domestic factors, while in an integrated market domestic assets are priced according to international factors (Harvey 1991). As numerous studies have shown, segmented markets may develop from several types of barriers to international investments. Discriminatory taxation, exchange restrictions on foreign capital transactions, and explicit limitations on ownership of foreign securities are examples of direct legal barriers that preclude international capital market integration. Black (1973) and Stulz (1981), for example, have shown that the world market portfolio will be efficient for neither foreign nor domestic investors in the presence of differential taxation on foreign investments. Errunza and Losq (1986) have examined a one-way barrier, which precludes domestic agents

from investing in foreign assets, but allows foreign agents to freely invest in domestic markets. As the authors have shown, such a restriction results in a higher return, or *super risk premium*, on foreign securities by foreign investors over the unrestricted equilibrium return. The impact of a legal restriction by the government that constrains the fraction of equities of local firms that can be owned by foreigners has been the subject of several studies, for example, by Eun and Janakiramanan (1986) and Gultekin, Gultekin and Penati (1989). These studies have generally shown that two different prices rule in the foreign securities market, reflecting the premium offered by the domestic investor over the price under no constraints and the discount demanded by the foreign investor.

The second strand in the literature has investigated the potential gains to an investor from diversifying his or her portfolio across countries (e.g. Grubel 1968; Levy and Sarnat 1970; Solnik 1974). These studies generally concluded that gains from international diversification—which are potentially large for markets with a low correlation with the domestic stock market—tend to accrue in the short run, while country-specific factors likely wash over into other markets in the longer run. Finally, the third strand has focused on international transmission effects of stock price movements (e.g., Dwyer and Hafer 1988; Eun and Shim 1989; Bhandari and Genberg 1990). This question has gained particular interest after the stock market crash in October 1987 when almost all stock markets fell together despite widely differing economic circumstances (e.g. Hamao, Masulis and Ng 1990; King and Wadhvani 1990).

Most empirical studies on international stock market linkages found clear evidence that the interdependence of share price movements is much less pronounced among countries than within a country, suggesting that national factors play an important role in the return-generating process. However, some of these studies also found that correlations of changes in stock price indexes increased significantly after 1973 when the fixed exchange rate regime collapsed and capital controls were substantially reduced. Taylor and Tonks (1989), who examined the effects of the abolition of exchange controls in the United Kingdom in October 1979, found a marked increase in the degree to which the United Kingdom and overseas markets have moved together in the long run after this date.

In this paper, we are concerned with the question whether capital controls in emerging stock markets have equally been effective to insu-

late the domestic market from price movements abroad. A priori, one would expect relatively close linkages between Malaysia and the U.S. and Japanese markets, respectively, and weaker correlations for Korea and Thailand.

To examine this hypothesis formally, we applied cointegration tests that provide a suitable framework for studying variables, which may be moving apart in the short run but are brought together again to a stationary equilibrium in the long run. Following the approach suggested by Engle and Granger (1987), we first employed univariate tests for unit roots. To test the null hypothesis that each element of Z_t is $I(1)$, we estimated the following equations using OLS for the period December 1984 to September 1990:

$$\Delta Z_{it} = \beta_0 + \beta_1 Z_{it-1} \quad (1)$$

$$\Delta Z_{it} = \beta_0 + \beta_1 Z_{it-1} + \sum_{l=1}^p \delta_l \Delta Z_{it-l} + \mu_t \quad (2)$$

Assuming that potential investors are primarily interested in the long-term performance of their portfolios we employed monthly data that were taken from the IFC Emerging Markets Data Base. The indexes were derived from changes in capitalization that affect prices per share, such as stock splits, stock dividends, rights issues, new issues of stock, and stock cancellations. As Bailey, Stulz and Yen (1990) have shown, using data with a lower periodicity—in particular daily observations—may understate the co-movements of markets, first, because the returns are not truly contemporaneous, and, second, because differing autocorrelation patterns across countries may make it difficult to estimate how stock price changes are related across countries. By converting all national stock price indexes into dollar-based indexes it is assumed that fluctuations in security prices represent total risk of holding global portfolios. It is important to note, however, that all three emerging economies considered here have pegged their currencies to different baskets of currencies for most of the investigation period, whereby the U.S. dollar and the Japanese yen have had particularly large weights.

In order to test the null hypothesis of $I(1)$ the conventionally calculated t -statistic for the estimated coefficient β_1 was used, with critical values taken from Guilkey and Schmidt (1989). The parameter p was chosen in such a way that the disturbance term μ_t was white noise. Those pairs of series which were integrated of the same order were then tested for cointegration. For all these tests the following regression was run:

TABLE 1
UNIT ROOT TESTS OF MONTHLY LOG STOCK PRICE INDEXES

Country	Dickey-Fuller	Augmented Dickey-Fuller (Lags)			
		1	2	3	4
Korea	-1.44	-1.43	-1.46	-1.47	-1.61
Malaysia	-1.56	-1.82	-1.90	-1.74	-1.96
Thailand	-0.58	-0.66	-0.65	-0.52	-1.35
USA	-2.10	-2.13	-2.04	-1.98	-1.96
Japan	-2.79	-2.38	-2.37	-2.39	-2.61

Note: The approximate 1, 5, and 10 percent critical values are -4.81, -3.51, and -3.18, respectively (Guilkey and Schmidt 1989). The sample size is 70.

$$X_t = \alpha_0 + \alpha_1 Y_t + \varepsilon_t. \quad (3)$$

After using the Cointegrating Durbin-Watson (CRDW) statistic as a quick approximation, regression, (4) and (5) were estimated for the Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF) tests, respectively.

$$\Delta\mu_t = \phi\mu_{t-1} + \varepsilon_t \quad (4)$$

$$\Delta\mu_t = \phi\mu_{t-1} + \sum_{j=1}^p \phi_j \Delta\mu_{t-j} + \varepsilon_t \quad (5)$$

where μ_t denotes the residuals from equation (3) and $\Delta\mu_t$ their first differences. Taking into account that the use of data-based information criteria for determining p may result in reduced power of the tests, a rather pragmatic approach was chosen. First, equation (5) was estimated with $p = 4$. In those cases where the estimated coefficients were significant, equation (5) was regarded as the appropriate regression. Otherwise, equation (4) was estimated and the DF statistic was selected.

As shown in Table 1, the results were overwhelmingly supportive of the null hypothesis that the (log) level of each stock price index has a unit root. Not even in one case were the tests able to reject the null hypothesis of I(1).

Based on these findings, the cointegrating regression (3) was run. The results, which are presented in Table 2, tend to confirm our hypothesis.

Only in the case of Malaysia stock prices appear to be closely linked with the U.S. market, with both the CRDW statistic and the DF test

TABLE 2
COINTEGRATING REGRESSIONS AND TESTS FOR COINTEGRATION

Country	Constant	S&P500 (USA)	Nikkei (Japan)	R^2	CRDW	DF	ADF ($p=4$)
Korea	-7.92	2.40		0.79	0.23	-1.93	-
	-0.10		0.96	0.94	0.39**	-	-2.07
Malaysia	3.58	-0.63		0.57	1.07***	-3.83**	-
	3.45		0.21	0.33	0.21	-	-2.73
Thailand	-6.55	2.11		0.71	0.14	-1.61	-
	0.66		0.78	0.73	0.12	-1.20	-

Note: R^2 is the coefficient of determination, CRDW is the cointegrating Durbin-Watson statistic, with approximate critical values of the 1, 5, and 10 levels of significance of 0.511, 0.386, and 0.322, respectively. Approximate critical values for the Dickey-Fuller statistic (DF) at the 1, 5, and 10 percent levels are, respectively, -4.07, -3.37, and -3.03. For the Augmented Dickey-Fuller statistic (ADF) the approximate critical values are -3.77, -3.17, and -2.84 for test sizes of 1, 5, and 10 percent (Engle and Granger 1987). *, **, and *** denote significance at 1, 5, and 10 percent levels, respectively.

indicating significance at the 1 and 5 percent levels, respectively. However, while share prices in the Bangkok Stock Exchange appear to be linked neither with the U.S. market nor with the Japanese market, the CRDW statistic suggests that the Korean and Japanese markets are relatively closely integrated.² This result seems somewhat surprising in light of Korea's tight capital controls. As Jeon et al. (1992, p.28) argue, who obtained similar results using (G)ARCH models, this "... may be contributed to various indirect channels of linkages including macroeconomic factors and (Korea's) increasing dependence on and interaction with industrial economies as foreign sourcing and market places..." Another possible channel of transmission could be the existence of "contagion" between markets, where national agents try to infer information from price changes in other markets (King and Wadhvani

²This does not necessarily imply that nominal stock price movements in Thailand, the United States and Japan, on the one hand, in Korea and the United States, on the other hand, are unrelated. What it does indicate is that relative stock price movements do not simply offset nominal exchange rate change. In fact, Cheung and Mak (1992), who applied Granger-causality tests using stock indexes in national currencies, also found market segmentation for Korea and Thailand, arguing that this "...is probably attributable to the degree of openness of (their) respective stock markets."

1990). It cannot be ruled out that the Japanese market, because of its closer geographic proximity, is regarded as more relevant than the U.S. market.

IV. Conclusions

Starting from the observation that emerging stock markets have grown rapidly in recent years but are not yet seen as part of a normal diversification strategy for international asset managers, this paper has focused on the question to what extent share prices move together with prices in industrial country stock markets. By means of cointegration analysis empirical support was found for the hypothesis that capital controls are in general effective to insulate the domestic market from foreign disturbances. However, as the case of Korea seems to imply market segmentation is likely to be less than complete if strong economic ties exist. In any case, there is reason to expect that once barriers to access and institutional and legal impediments to the stock market's informational efficiency are removed,³ market returns in different countries will move more closely together. This could have important implications for determining the optimal portfolio of a global investor. While this note has focused on the behavior of stock prices over the long run, it appears highly likely that betas of LDCs stocks for a well-diversified portfolio will change significantly due to the dismantling of capital controls.⁴ With the closer integration in the international capital market and the resulting changes in the risk/return ratios, however, domestic interest rates will also become more closely linked to foreign interest rates. This is bound to have major effects on monetary policy, probably a major reason why many governments have taken a rather cautious approach regarding the abolition of capital controls. To investigate these implications in greater detail remains subject to further research.

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³On the latter issue, see Cornelius (1991).

⁴Regarding the Korean market, this hypothesis has recently gained empirical support by Kim and Kim (1991).

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