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Market Integration and Investment Barriers in Emerging Equity Markets

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This article develops a return-based measure of market integration for nineteen emerging equity markets. It then examines the relation between that measure, other return characteristics, and broadly defined investment barriers. Although the analysis is exploratory, some clear conclusions emerge. First, global factors account for a small fraction of the time variation in expected returns in most markets, and global predictability has declined over time. Second, the emerging markets exhibit differing degrees of market integration with the U.S. market, and the differences are not necessarily associated with direct barriers to investment. Third, the most important de facto barriers to global equity-market integration are poor credit ratings, high and variable inflation, exchange rate controls, the lack of a high-quality regulatory and accounting framework, the lack of sufficient country funds or cross-listed securities, and the limited size of some stock markets.

Equity portfolio flows to developing economies, especially to the so-called emerging markets, have sharply increased in magnitude in recent years. The increase in financial flows to emerging markets raises three important questions:

- What are the expected return and diversification benefits of investing in these markets?
- How well are these markets integrated with the markets of industrial economies and to what extent is integration a function of identifiable barriers to investment?
- What are the opportunity costs, in terms of higher cost of capital, associated with these barriers?

These questions are closely related. The return properties and potential diversification benefits from investing in emerging markets have been investigated by

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a number of authors, including Divecha, Drach, and Stefek (1992); Harvey (1993); Speidell and Sappenfield (1992); and Wilcox (1992). However, barriers to investment can make potential diversification benefits unattainable for foreign investors. As a consequence, capital flows from the industrial world, which might reduce domestic capital costs and increase economic welfare through more efficient resource mobilization, might not be forthcoming. This article will try to shed some light on the last two questions, with primary emphasis on market segmentation. The analysis is restricted to nineteen equity markets contained in the Emerging Markets Data Base (EMDB) of the International Finance Corporation (IFC).

There are two major approaches to testing and measuring the degree of market segmentation. The first approach assumes that markets are integrated and that a particular asset-pricing model holds (for example, Campbell and Hamao 1992). The second approach models the restrictions to integration explicitly and derives their effects on equilibrium returns (for example, Cooper and Kaplanis 1986, 1994; Errunza and Losq 1985; Eun and Janakiramanan 1986; Hietala 1989; Stulz 1981; and Wheatley 1988).

The second approach is unsatisfactory because I do not want to restrict the analysis to the effects of one particular barrier to investment and there are too many different barriers to consider. The first approach is hampered by the lack of a universally accepted international asset-pricing model. Recent research on international equity and foreign exchange markets, for instance, has uncovered considerable time variation in expected excess returns, but no consensus has emerged on what drives this apparent predictability. Some empirical papers show that common risk factors explain a large fraction of the time and cross-sectional variation in returns (for example, Harvey 1991). This suggests that markets in industrial economies, at least from 1980 onward, are relatively well integrated. In any case, the use of a formal asset-pricing model requires further research on capital market integration in general and is left for future work.

My approach consists of two steps. First, in section I, I examine whether predictable components in the excess returns from investing in emerging markets are similar to those observed in industrial equity markets. If the predictable components track time-varying risk premiums, examining these components can inform on market integration as well. I include both local factors (the lagged return and the dividend yield) and global factors (the lagged return on the U.S. market, the U.S. dividend yield, and the U.S. interest rate) in regression analysis to investigate the relative importance of global, compared with local, components in the predictability of excess returns in emerging markets. I interpret the predictive power of global factors as indicative of some degree of integration. Similarly, I interpret the lack of predictive power by the local instruments as indicative of integration, although some international asset-pricing models imply that economy-specific factors are priced (Adler and Dumas 1983).

Second, I use the regressions to compute correlations of expected returns in emerging markets with expected returns in equity markets in industrial econ-

omies. If there were only one source of risk and markets were perfectly integrated, expected returns would be perfectly correlated (see Cumby and Huizinga 1992). Bekaert (forthcoming), for instance, uses a vector autoregressive framework to compute correlations between expected returns on foreign exchange and finds that they are highly correlated. Although it seems unlikely that one risk factor explains all of the cross-sectional and time variation in equity returns, it is equally unlikely that expected returns in perfectly integrated markets would show low correlation. In fact, as shown in section II, the expected equity returns in the major industrial markets are highly correlated. This correlation is a measure of the common component in expected stock returns and hence, indirectly, of market integration (see also Campbell and Hamao 1992). However imperfect, the correlation of expected returns is the measure of market integration used in this article. To check for robustness, I have provided an alternative measure of market integration, based on the change in predictable variation in returns when an observable proxy for the world factor (the world market portfolio return) is added to the forecasting equations.

In section III, I discuss various other return characteristics and examine how they relate to the measure of market integration. The remainder of the article links the degree of market integration, as measured by the expected return correlation with the U.S. market, to various barriers to investment.

I distinguish between three kinds of barriers. First are legal barriers arising from the different legal status of foreign and domestic investors, for example, ownership restrictions and taxes. Second are indirect barriers arising from differences in available information, accounting standards, and investor protection. Third are barriers arising from emerging-market-specific risks (EMSRs) that discourage foreign investment and lead to de facto segmentation.

EMSRs include liquidity risk, political risk, economic policy risk, macroeconomic instability, and, perhaps, currency risk. Some might argue that these risks are in fact diversifiable and are not priced. However, such an argument seems inconsistent with the amount of resources spent on, for example, measuring political risk throughout the world. Chuhan (1992), for instance, on the basis of a survey of market participants in Canada, Germany, Japan, the United Kingdom, and the United States, reports liquidity problems as a major impediment to investing in emerging markets. But the survey yielded the surprising result that restrictions in host economies are not a crucial factor. The other EMSRs are related to the notion of country risk. For example, credit ratings not only reflect assessments of political stability but also incorporate factors related to the economic environment. Unstable macroeconomic policies, for instance, appear to have detrimental effects on stock market performance.

Barriers to investment are a direct function of the domestic policies pursued in the various economies. This article is intended as a preliminary empirical investigation into the association between a set of broadly defined barriers to investment and measures of market integration and other return characteristics. Because quantitative measures of these barriers to investment are necessarily crude,

the association is simply measured through rank correlations. This approach has the obvious disadvantage of precluding strong quantitative policy implications, but it allows a broader analysis that can provide useful insights for further research. In section IV, I investigate the association between market integration and direct and indirect barriers to investment. I also examine whether any of the described return characteristics are related to measures of "openness" of the emerging markets, for example, the existence of country funds and cross-listed securities or the extent of ownership restrictions. Section V focuses on EMSRs.

Because I do not specify a formal asset-pricing model, I cannot make an explicit link between market integration and the cost of equity capital. The analysis here takes as a starting point the belief that a higher degree of market integration is necessarily accompanied by lower costs of capital and increased capital flows. Some of the return characteristics reported in section III are correlated with the cost of capital, but without a generally accepted asset-pricing model, estimating the cost of capital precisely is extremely difficult and is not formally attempted. A related disadvantage of the approach here is that the rankings are typically taken at a point in time or are based on averages. No dynamic relation between changes in barriers to investment and return properties is described. Some further implications for future research are discussed in section VI, which offers conclusions.

Finally, cost-of-capital issues cannot be fully analyzed without incorporating the configuration of the entire financial market in the developing economy, including bond, money, and informal markets, all of which are ignored in this analysis. Eventually, it would be fruitful to take the viewpoint of the developing economy, rather than a global asset-pricing perspective, as the basis of the analysis. A model of a developing economy with rudimentary financial markets could explicitly address how opening up the equity market to foreign investors would affect returns, the cost of capital, and ultimately social welfare.

I. The Predictability of Returns in Emerging Equity Markets

To assess the predictability of excess returns earned on investments in emerging markets, I regressed the dollar index return in excess of the U.S. interest rate onto five instrumental variables (see also Bekaert and Harvey 1994, Buckberg 1995, and Harvey 1993). I used two local instruments, the local dividend yield and the lagged excess return, and three global instruments, the U.S lagged excess return, the U.S. dividend yield, and the U.S. interest rate relative to a one-year backward-moving average. These instruments were shown to predict excess returns on equities and foreign exchange in Germany, Japan, the United Kingdom, and the United States in Bekaert and Hodrick (1992). Because no reliable interest rate data are available for most emerging markets, I could not emulate Bekaert and Hodrick's specification, which uses the local excess return as the dependent variable and the forward premium as a predictor.

Table 1 reports the regression results for 1985–92, using data sampled at the end of each month for nineteen emerging markets.[1] The emerging-market indexes used are those compiled by the IFC as their so-called global indexes (IFC various issues). (Indonesia was excluded from the sample because of insufficient data.) The 1980s were a decade of increasing globalization and deregulation of financial markets. These developments, and the fact that the large financial flows to emerging equity markets only occurred near the end of the sample, motivated the choice of the sample period. Moreover, for some markets, data are only available since 1986. Several test statistics are reported. The $\chi^2(5)$ statistic is a Wald test of the joint predictive power of the five instruments, and the $\chi^2(2)$ and $\chi^2(3)$ statistics test the predictive power of the local and global instruments, respectively. The *l*-statistic is a test developed by Cumby and Huizinga (1993) for the remaining serial correlation in the residuals. It is robust to conditional heteroskedasticity and to the fact that the residuals are estimated.

The adjusted R^2 is greater than 10 percent in Chile, Colombia, Mexico, the Philippines, Portugal, Turkey, Venezuela, and Zimbabwe but is negative in Argentina, India, Nigeria, and Thailand. The joint predictability test for all five instruments rejects the null of no predictability at the 1 percent level for six economies: Chile, Colombia, the Philippines, Portugal, Venezuela, and Zimbabwe. Except for Portugal, this rejection appears to derive from the local instruments. For Malaysia the test for no predictability of the local instruments also rejects at the 1 percent level; for Brazil, the Republic of Korea, and Turkey, it rejects at the 5 percent level. Although this result could be construed as evidence of market inefficiency, it is important to point out that the predictive power of the dividend yield, not the lagged return, drives some of the rejections (see, for example, Brazil, Portugal, and Zimbabwe). The dividend yield predicts excess returns in the industrial equity markets as well (see, for example, Bekaert and Hodrick 1992). Campbell and Ammer (1993) use a log-linear decomposition of stock returns to show that the dividend yield should perform well as a proxy for the long-horizon expected excess return.

The predictive power of the global instruments is generally weak. The Wald test only rejects at the 1 percent level for Portugal, at the 5 percent level for Turkey, and at the 10 percent level for Chile. For Malaysia, the predictability is primarily caused by the local instruments. This does not necessarily mean that the Malaysian market is segmented, because the local instruments might partially track the common component in expected returns. This possibility will be examined in section II. Note that the return for the emerging-markets composite index is significantly predictable at the 1 percent level using all five instruments and at the 10 percent level using the global instruments.

The same type of analysis was done for four industrial economies: Germany, Japan, the United Kingdom, and the United States (not reported).[2] Surprisingly,

1. See the appendix for more details on all data used in the article.
2. Here and throughout the article, results that are not reported are available from the author on request.

Table 1. *Predictable Components in Emerging Equity Markets, December 1985 to December 1992*

	Coefficient estimates						*Predictability statistics*[b]			
Market	*U.S. excess dollar returns,* r_{1t}	*Local excess dollar returns,* r_{it}	*U.S. dividend yield,* dy_{1t}	*Local dividend yield,* dy_{it}	*U.S. interest rate,*[a] i_{1t}	*Adjusted* R^2	*All five instruments,* $\chi^2(5)$	*Local instruments,* $\chi^2(2)$	*Global instruments,* $\chi^2(3)$	*Residual autocorrelation,*[c] $l(5)$
Argentina	0.39	−0.19	−3.55	−0.65	8.18	−0.022	1.95	1.18	1.33	2.72
	(0.37)	(0.18)	(88.79)	(13.74)	(36.34)		[0.86]	[0.55]	[0.72]	[0.74]
Brazil	0.34	−0.13	−37.3	29.2	1.96	0.025	9.66	7.60	1.44	6.67
	(0.40)	(0.10)	(90.7)	(10.74)	(39.7)		[0.085]	[0.022]	[0.70]	[0.25]
Chile	0.38	0.25	45.3	0.67	−7.38	0.111	25.8	5.67	6.68	7.39
	(0.15)	(0.11)	(44.6)	(4.71)	(14.82)		[0.0001]	[0.06]	[0.08]	[0.19]
Colombia	−0.005	0.40	−3.73	2.94	−11.04	0.166	20.13	14.94	1.36	2.95
	(0.18)	(0.18)	(37.3)	(2.80)	(11.33)		[0.001]	[0.0006]	[0.71]	[0.71]
Greece	0.42	0.09	−50.8	2.14	8.74	0.003	9.12	1.98	5.66	5.12
	(0.27)	(0.08)	(63.0)	(4.75)	(17.8)		[0.10]	[0.37]	[0.13]	[0.40]
India	−0.06	0.077	−34.3	41.5	−37.46	−0.011	4.78	4.03	4.23	2.98
	(0.18)	(0.14)	(41.5)	(22.2)	(19.6)		[0.44]	[0.13]	[0.24]	[0.70]
Jordan	0.0017	−0.20	−3.73	−1.84	−11.75	0.003	5.43	3.02	3.04	8.22
	(0.09)	(0.14)	(14.2)	(2.13)	(7.55)		[0.36]	[0.22]	[0.39]	[0.14]
Korea, Rep. of	0.26	−0.24	35.2	13.03	17.06	0.090	12.41	8.56	4.81	4.28
	(0.16)	(0.12)	(33.64)	(5.15)	(10.81)		[0.029]	[0.014]	[0.19]	[0.51]
Malaysia	0.10	0.01	86.66	68.53	−24.27	0.088	10.95	9.93	2.85	3.77
	(0.20)	(0.13)	(52.22)	(22.15)	(15.8)		[0.05]	[0.007]	[0.41]	[0.58]
Mexico	1.34	0.19	90.2	3.43	−24.5	0.259	8.04	2.40	5.22	7.99
	(0.60)	(0.15)	(85.14)	(5.58)	(24.50)		[0.15]	[0.30]	[0.16]	[0.16]

Nigeria	0.26	0.08	−33.1	−0.83	16.1	−0.035	0.71	0.30	0.59	6.67
	(0.35)	(0.14)	(71.1)	(4.79)	(25.43)		[0.98]	[0.86]	[0.90]	[0.25]
Pakistan	−0.13	0.21	−1.72	−0.92	8.39	0.015	3.83	0.88	1.79	10.37
	(0.15)	(0.22)	(23.9)	(6.15)	(8.86)		[0.57]	[0.64]	[0.62]	[0.07]
Philippines	0.19	0.27	30.61	14.9	2.33	0.183	27.42	19.1	2.37	5.53
	(0.19)	(0.10)	(56.26)	(6.22)	(16.97)		[0.00005]	[0.00007]	[0.50]	[0.35]
Portugal	0.72	−0.12	−279.2	−75.5	−4.04	0.299	29.8	10.7	29.00	8.77
	(0.34)	(0.17)	(69.3)	(23.2)	(21.42)		[0.00002]	[0.005]	[0.000002]	[0.12]
Taiwan (China)	0.64	−0.04	9.24	37.03	7.58	0.008	7.80	2.57	2.93	2.88
	(0.40)	(0.14)	(87.6)	(23.6)	(26.24)		[0.17]	[0.28]	[0.40]	[0.72]
Thailand	0.33	0.02	14.9	2.87	−3.07	−0.018	3.41	0.45	1.63	11.4
	(0.28)	(0.16)	(65.14)	(4.26)	(19.03)		[0.64]	[0.80]	[0.65]	[0.04]
Turkey	1.05	−0.01	−171.3	20.9	46.22	0.162	14.6	7.78	9.05	2.89
	(0.46)	(0.11)	(109.0)	(8.21)	(30.96)		[0.01]	[0.02]	[0.03]	(0.72)
Venezuela	−0.37	0.21	−52.5	47.66	−7.98	0.116	14.6	9.83	2.81	1.59
	(0.24)	(0.08)	(45.7)	(18.5)	(19.6)		[0.012]	[0.007]	[0.42]	[0.90]
Zimbabwe	−0.06	−0.008	24.72	12.5	12.44	0.207	25.3	17.1	3.08	2.53
	(0.13)	(0.10)	(31.5)	(3.65)	(11.36)		[0.0001]	[0.0002]	[0.38]	[0.77]
Emerging-markets composite	0.41	−0.0026	11.13	14.93	2.60	0.057	17.38	2.24	6.40	7.16
	(0.19)	(0.13)	(43.5)	(10.0)	(13.76)		[0.004]	[0.33]	[0.09]	[0.21]

Note: Figures in parentheses are heteroskedasticity-consistent standard errors; those in brackets are *p*-values.

a. In relation to a one-year backward-moving average.

b. Tests on the joint explanatory power of all five instruments, $\chi^2(5)$; the two local instruments, $\chi^2(2)$; and the three U.S. instruments, $\chi^2(3)$.

c. Tests for residual serial correlation using the first five autocorrelations of the residuals and is distributed $\chi^2(5)$ (Cumby and Huizinga 1993).

Source: Author's calculations.

Table 2. *Predictable Components in Emerging Equity Markets, December 1976 to September 1985*

Market	*Coefficient estimates*						*Predictability statistics*[b]				
	U.S. excess dollar returns, r_{1t}	*Local excess dollar returns,* r_{it}	*U.S. dividend yield,* dy_{1t}	*Local dividend yield,* dy_{it}	*U.S. interest rate,*[a] i_{1t}	*Adjusted* R^2	*All five instruments,* $\chi^2(5)$	*Local instruments,* $\chi^2(2)$	*Global instruments,* $\chi^2(3)$	*Residual autocorrelation,*[c] $l(5)$	*Chow-type test for stability*[d]
Argentina	0.08	0.07	−56.7	30.6	3.036	−0.021	5.05	2.25	1.82	1.54	7.39
	(0.52)	(0.08)	(45.7)	(29.1)	(11.7)		[0.41]	[0.32]	[0.61]	[0.91]	[0.29]
Brazil	−0.37	0.13	−31.2	1.37	−2.40	−0.003	4.73	1.64	2.73	9.9	14.3
	(0.30)	(0.11)	(24.8)	(3.49)	(7.04)		[0.45]	[0.44]	[0.43]	[0.08]	[0.027]
Chile	−0.04	0.04	−12.9	20.3	7.53	0.079	13.5	9.26	2.32	6.41	10.0
	(0.30)	(0.09)	(19.1)	(7.11)	(5.70)		[0.02]	[0.01]	[0.51]	[0.27]	[0.13]
Greece	−0.12	0.02	−9.6	−3.62	−7.71	0.009	6.57	3.72	5.09	5.73	10.8
	(0.12)	(0.12)	(12.2)	(1.95)	(3.75)		[0.25]	[0.15]	[0.16]	[0.33]	[0.094]
India	0.40	−0.06	−15.3	9.30	−0.66	0.092	23.7	1.34	19.1	9.16	14.4
	(0.10)	(0.12)	(9.54)	(8.34)	(2.84)		[0.0002]	[0.51]	[0.0002]	[0.10]	[0.026]
Jordan	0.08	0.07	15.80	31.26	−3.53	−0.012	4.46	3.46	1.73	7.29	7.72
	(0.17)	(0.12)	(18.24)	(20.48)	(3.94)		[0.48]	[0.18]	[0.63]	[0.20]	[0.259]
Korea, Rep. of	−0.34	0.04	−26.1	3.47	3.28	0.005	9.00	0.37	6.76	3.93	10.1
	(0.19)	(0.09)	(13.9)	(9.68)	(4.71)		[0.11]	[0.83]	[0.08]	[0.56]	[0.12]
Mexico	0.62	−0.002	−34.7	0.59	12.45	0.034	12.4	0.01	11.77	5.95	4.33
	(0.23)	(0.14)	(23.2)	(6.62)	(4.97)		[0.03]	[1.00]	[0.008]	[0.31]	[0.63]
Thailand	0.038	0.06	−26.3	−0.53	−4.14	0.039	18.7	0.40	16.8	4.58	2.76
	(0.16)	(0.10)	(11.1)	(2.92)	(2.84)		[0.002]	[0.82]	[0.0008]	[0.47]	[0.84]
Zimbabwe	0.34	0.12	−10.0	−0.40	−2.97	−0.006	3.51	1.19	2.33	7.37	10.9
	(0.30)	(0.11)	(20.2)	(2.84)	(6.81)		[0.62]	[0.55]	[0.51]	[0.19]	[0.091]

Note: Figures in parentheses are heteroskedasticity-consistent standard errors; those in brackets are *p*-values.

a. In relation to a one-year backward-moving average.

b. Tests on the joint explanatory power of all five instruments, $\chi^2(5)$; the two local instruments, $\chi^2(2)$; and the three U.S. instruments, $\chi^2(3)$.

c. Tests for residual serial correlation using the first five autocorrelations of the residuals and is distributed $\chi^2(5)$ (Cumby and Huizinga 1993).

d. Robust to heteroskedasticity on the six coefficients in the regressions, including the constant (see, for example, Hodrick and Srivastava 1984).

Source: Author's calculations.

there is only marginal evidence of predictability; for the excess returns on German, Japanese, and U.K. equity, all R^2s are negative and the Wald statistics never reject at the 5 percent level. This result is in sharp contrast to the large body of empirical literature on international predictability of equity returns (Bekaert and Hodrick 1992; Ferson and Harvey 1993; Harvey 1991). It is therefore of independent interest and deserves further scrutiny.

Because similar instruments were used in previous studies, it is probable that the lack of significant predictability is specific to the more recent sample period. The differences between the 1985–92 sample and the 1976–85 sample are striking. For the earlier period there is evidence of strong predictability that primarily derives from global instruments. The decrease in predictability for the later period complicates the interpretation of the predictable variation through global factors as an indicator of global-market integration. One possible explanation would be that the predictability is merely an indication of market inefficiency that was eliminated with increasing globalization at the end of the 1980s. Alternatively, the nature of time-varying risk premiums may have changed, making them more difficult to track with the instruments typically used in empirical studies. For Japan, for instance, including the local interest rate or the forward premium as an instrument improves predictability marginally, whereas in Germany changes that have occurred in the exchange rate help to predict future returns. However, formal tests for stability fail to reject the hypothesis that the coefficients have not changed for Germany, Japan, and the United Kingdom, but the tests reject at the 1 percent level for the United States. And, based on the *l*-tests, the forecasting variables used here suffice to eliminate all serial correlation in the residuals.

Table 2 reports the results for 1976–85 for ten emerging markets where data were available. The test for stability rejects for Greece and Zimbabwe at the 10 percent level and for India and Brazil at the 5 percent level. There is no clear pattern in how the predictability patterns move over time. For example, it is striking how the predictability arising from global factors was actually stronger in the early period for Greece, India, Korea, Mexico, and Thailand. The apparent decline of global predictability is not necessarily inconsistent with the fact that most markets became more open to foreign investment during the 1980s (see below).

In sum, expected returns generally vary through time, although predictability is stronger for both industrial and emerging markets before 1986 than it is in the late 1980s and early 1990s. I conclude that predictability tests do not yield much useful information on market segmentation.

II. A Measure of Market Integration

I interpret the fitted values of the regressions of excess returns on five predetermined variables to be estimates of expected returns. There are several asset-

pricing models that justify this procedure. For example, suppose the returns satisfy a multifactor model with expected returns depending on the risk loadings (βs) with respect to risk factors and on the prices of these risks (their expected returns). In a K-factor model, the conditional expected value of an excess return, r_{it+1}, satisfies

$$E_t(r_{it+1}) = \sum_{k=1}^{K} \beta_{ikt} \lambda_{kt} \tag{1}$$

where β_{ikt} is the factor loading of asset i for the kth factor at time t and λ_{kt} is the market price of risk for the kth factor at time t. To yield a projection equation on a number of forecasting variables as the reduced-form model, several auxiliary assumptions are needed. One sufficient set of assumptions is constant βs and time-varying prices of risk, with the time variation assumed to be a linear function of the information set (see, for example, Campbell and Hamao 1992). To see this, let Z_t be a vector of forecasting variables, $Z_t = (r_{1t}, r_{it}, dy_{1t}, dy_{it}, i_t)'$, where r_{1t} is the U.S. lagged excess return, r_{it} is the local lagged excess return, dy_{1t} is the U.S. dividend yield, dy_{it} is the local dividend yield, and i_t is the U.S. interest rate relative to a one-year backward-moving average. Let

$$\lambda_{kt} = \sum_{l=1}^{L} \alpha_{lk} Z_{lt}\,, \qquad \beta_{ikt} = \beta_{ik}\,. \tag{2}$$

with α_{lk} the sensitivity of the kth price of risk to the lth variable in Z_t. Combining equations 1 and 2,

$$E_t(r_{it+1}) = \sum_{k=1}^{K} \beta_{ik} \sum_{l=1}^{L} \alpha_{lk} Z_{lt} = \sum_{l=1}^{L} \delta_{il} Z_{lt}\,. \tag{3}$$

The δ_{il} coefficients can be recovered from a linear projection of r_{it+1} onto Z_t.

Alternatively, the βs could be assumed to be linear functions of the information set (see, for example, Ferson and Harvey 1993), which also would imply an equation such as equation 3. In either case, the coefficients on the forecasting variables are a function of coefficients that determine the βs or prices of risk in a multifactor model. The advantage of this reduced-form approach is that it is model free, and the factors do not have to be specified or measured. Allowing for time variation in expected returns is important, given the rapidly changing nature of the economies and stock markets. The evidence for predictability detected in the previous section confirms the presence of time variation in expected returns. My integration measure is the correlation of the regression estimates of the expected returns in the United States and the emerging markets. This correlation is an indicator of the common component in expected returns and hence, indirectly, of market integration.

A couple of caveats must be noted. First, because I compute the unconditional correlation coefficient, no changes in the degree of market integration are allowed over the sample period. This is another motivation for using the relatively short sample (1986–92) as opposed to the full sample available, which is longer

for many economies. I examine whether integration changed over time by computing the correlations for an earlier sample as well. Harvey (1995) computes five-year rolling correlations between emerging-market returns and the world market. His results suggest that these correlations are increasing for many emerging markets.

Second, I want to stress that the measure is only a perfect measure of market integration in a one-factor world with constant risk exposures. Suppose the world equity market is fully integrated and assets are priced according to a multifactor model. Emerging markets might display dramatic cross-sectional differences in their risk exposures. These differences, in turn, might affect the correlation of expected returns with the U.S. market, without reflecting actual barriers to investment (broadly defined). For instance, the various emerging markets have different industrial structures, which might result in different exposures to "industry factors" (see Divecha, Drach, and Stefek 1992 on emerging markets, and Heston and Rouwenhorst 1994 and Roll 1992 on industrial markets). Moreover, some economies are dependent on a limited number of natural resources (for example, Nigeria on oil), which might give rise to different "commodity exposures." In section VI, I briefly assess the importance of these industry and commodity factors in the measurement of market segmentation.

In table 3, I report three different correlations. The regression decomposes the return into an expected and unexpected part. The reported correlations are then the correlation of the return, of the expected return, and of the unexpected return in economy i with its counterparts in the United States. The methodology borrows from Bekaert and Hodrick (1992) and Bekaert (forthcoming). Assume that Z_{it}, which includes the U.S. excess return, the emerging-market excess return, the two dividend yields, and the relative U.S. interest rate, follows a first-order vector autoregression:

$$Z_{it+1} = \mu + A Z_{it} + u_{it+1}. \tag{4}$$

If the vector autoregressive framework is correctly specified, $E_t(u_{it+1}) = 0$. Let the variance-covariance matrix of the innovations u_{it} be V. Let Σ be the variance-covariance matrix of Z_{it}. As it is found from

$$\text{vec}(\Sigma) = (I - A' \otimes A')^{-1} \text{vec}(V), \tag{5}$$

V and Σ are sufficient to compute the correlation of returns and unexpected returns. To compute the correlation of expected returns, the covariance matrix of $E_t(Z_{it+1})$, Σ_E, is derived to be

$$\Sigma_E = A \Sigma A'. \tag{6}$$

Standard errors are obtained by estimating A and V using the general method of moments and applying the Mean Value Theorem. Note that this technique assumes that the vector autoregressive framework generates the expected returns correctly. If there is measurement error in the resulting expected-return estimates that is uncorrelated across the United States and emerging markets, the esti-

Table 3. *Return Correlations with the U.S. market, 1976–85 and 1985–92*

	1985:12–1992:12					*1976:12—1985:09*		
Market	*Return,* $\rho\,(r_{1t}, r_{it})$	*Expected return,* $\rho\,(rp_{1t}, rp_{it})$	*Unexpected return,* $\rho\,(u_{1t}, u_{it})$	*Rank based on expected-return correlation estimate*[a]	*Rank based on a variance ratio*[b]	*Return,* $\rho\,(r_{1t}, r_{it})$	*Expected return,* $\rho\,(rp_{1t}, rp_{it})$	*Unexpected return,* $\rho\,(u_{1t}, u_{it})$
Argentina	0.10	−0.14	0.12	12	12	0.03	−0.575	0.07
	(0.09)	(0.56)	(0.11)			(0.08)	(0.45)	(0.075)
Brazil	0.13	−0.06	0.15	14	14	−0.07	−0.41	−0.04
	(0.08)	(0.38)	(0.09)			(0.10)	(0.33)	(0.09)
Chile	0.32	0.485	0.30	5	11	−0.11	−0.47	−0.07
	(0.12)	(0.48)	(0.17)			(0.08)	(0.31)	(0.08)
Colombia	0.11	−0.16	0.16	15	19	—	—	—
	(0.12)	(0.46)	(0.08)					
Greece	0.145	−0.38	0.19	18	20	0.04	0.57	0.005
	(0.11)	(0.45)	(0.11)			(0.08)	(0.32)	(0.08)
India	−0.13	−0.57	−0.07	21	8	0.03	−0.14	0.06
	(0.075)	(0.35)	(0.08)			(0.08)	(0.32)	(0.08)
Jordan	0.06	−0.44	0.10	19.5	22	0.05	0.13	0.04
	(0.13)	(0.43)	(0.14)			(0.10)	(0.53)	(0.10)
Korea, Rep. of	0.21	0.135	0.21	11	7	0.04	−0.67	0.095
	(0.08)	(0.39)	(0.08)			(0.10)	(0.34)	(0.10)
Malaysia	0.66	0.80	0.64	3	9	—	—	—
	(0.07)	(0.24)	(0.10)					
Mexico	0.49	0.33	0.54	7	10	0.125	−0.77	0.21
	(0.09)	(0.52)	(0.13)			(0.085)	(0.21)	(0.09)
Nigeria	0.04	−0.33	0.06	13	21	—	—	—
	(0.08)	(0.78)	(0.06)					
Pakistan	−0.02	0.25	−0.05	10	16	—	—	—
	(0.10)	(0.37)	(0.10)					

Philippines	0.29 (0.16)	0.74 (0.34)	0.20 (0.14)	2	6	—	—	—
Portugal	0.26 (0.10)	−0.265 (0.45)	0.43 (0.11)	17	13	—	—	—
Taiwan (China)	0.195 (0.12)	0.12 (0.67)	0.20 (0.13)	9	5	—	—	—
Thailand	0.43 (0.14)	0.30 (0.68)	0.44 (0.16)	6	4	−0.09 (0.11)	−0.02 (0.46)	−0.10 (0.11)
Turkey	−0.16 (0.15)	−0.71 (0.34)	−0.08 (0.11)	22	15	—	—	—
Venezuela	−0.06 (0.07)	−0.35 (0.34)	−0.02 (0.10)	19.5	17	—	—	—
Zimbabwe	−0.14 (0.09)	−0.01 (0.28)	−0.18 (0.11)	16	18	0.13 (0.10)	0.28 (0.415)	0.12 (0.105)
Emerging-markets composite	0.40 (0.12)	0.19 (0.77)	0.42 (0.15)	—	—	—	—	—
Germany	0.42 (0.10)	0.73 (0.345)	0.43 (0.12)	4	1	0.25 (0.10)	0.31 (0.27)	0.24 (0.12)
Japan	0.23 (0.09)	0.34 (0.49)	0.23 (0.09)	8	3	0.21 (0.09)	−0.21 (0.445)	0.25 (0.10)
United Kingdom	0.67 (0.06)	0.96 (0.13)	0.67 (0.07)	1	2	0.39 (0.07)	0.56 (0.17)	0.37 (0.08)

—Not available.

Note: The correlations are computed using the dynamic structure of a vector autoregressive framework on the U.S. excess return, the emerging-market excess return, the two dividend yields, and the relative U.S. interest rate. Standard errors (in parentheses) are computed as in Bekaert (forthcoming) using three Newey-West lags.

a. The ranking is based on the sum of two ranks: one according to the point estimate of the correlation of expected returns estimated for the most recent sample, one based on the number of standard errors away from perfect correlation computed for the same sample.

b. Returns are regressed on the instruments plus the world market portfolio return. The statistic used for the rankings is the ratio of the predictable variation caused by the instruments in the model with the world market portfolio as an observable factor relative to the predictable variation in the regressions without the world market portfolio reported in tables 1 and 2. See Campbell and Hamao (1992).

Source: Author's calculations.

mated correlations will overestimate the true degree of expected-return correlation.

By far the highest expected-return correlation in table 3 is observed for the United Kingdom (0.96), as would be expected given the high degree of integration and the extent of cross-listing of securities between the London and New York markets. Germany, Malaysia, and the Philippines exhibit correlations of over 0.60. Japan has an expected return correlation of about 0.34, which is similar to the expected-return correlations of Chile, Mexico, and Thailand, which are 0.49, 0.33, and 0.30, respectively. Korea, Pakistan, and Taiwan (China) have expected-return correlations of 0.14, 0.25, and 0.12, respectively. All the other economies display negative expected-return correlations. Most markets show fairly large correlations for their unexpected returns. Hence, there must exist global news factors affecting many markets simultaneously, including the emerging markets.

The results for the 1976–85 sample conform to the trend toward increasing integration of equity markets. According to this measure, the industrial markets all became more integrated with the U.S. market during the last half of the 1980s, the change being most dramatic for Japan. Chile, Korea, and Mexico show negative correlation with the U.S. market in the early sample. In fact, before 1984, when the first Korean country fund was introduced, the Korean market was virtually closed to foreign investment. Some conundrums, however, do exist. For example, markets in Greece and Zimbabwe show high, albeit imprecisely measured, expected-return correlations with the U.S. market in the early sample.

In table 3 the rank based on the expected-correlation estimate is the sum of a ranking on the point estimate and a ranking on the size of the deviation from perfect correlation in number of standard errors. The expected-return correlations might not give an adequate picture of the common component in expected returns because the evidence for predictability is weak for some markets. To check the robustness of the results, I also provide an alternative measure of market integration based on the analysis in Campbell and Hamao (1992). Suppose that the emerging equity markets obey a multifactor model, where the first factor is international and the other factors are domestic; suppose that the international factor is well proxied by the world-stock-index return; and consider a regression of the excess equity returns on that world-market return and the forecasting variables. The variance of the predictable variation caused by the forecasting variables in that regression, in relation to the variance of the fitted values of the regressions reported in table 1, is a measure of the variation in risk prices of domestic factors relative to the variation in the risk prices of all factors. I interpret low ratios as indicative of more integration. In table 3, the column "Rank based on a variance ratio" ranks the markets on the basis of this ratio. For lack of space, further results are not reported.

There are some notable differences in the rankings based on the variance ratio compared with the earlier rankings (India and Nigeria are examples), but the

rank correlation between the measures is 0.693, which is more than three standard errors from zero. The ratio is lower than 0.7 for only two emerging markets, Taiwan (China) and Thailand. I also checked whether inclusion of the world-market return changed the predictability tests. Significant rejections of the null of no predictability only disappeared for Greece (at the 10 percent level) and for Malaysia (at the 5 percent level). I also substituted a regional index for the world-market index to test whether there was any evidence of regional integration. (From Morgan Stanley Capital International I used the Pacific index for the Asian markets, the Europe index for the European and African markets, and the North America index for the Latin American markets.) The only markets for which the variance ratio dropped relative to the world-market regression were Chile and Korea. The regional βs were substantially higher only for Argentina, Chile, Mexico, and Venezuela. Hence there is weak evidence that regional integration is stronger than global integration in Latin America. In what follows, I will occasionally refer to results that use the ratio when they differ from the results that use the expected-return correlation measure.

III. Market Integration and Return Characteristics

In this section I provide a fuller picture of the properties of emerging-equity-market returns in order to relate them to various measures of barriers to investment. Some of the return properties might be correlated with popular cost-of-capital measures.

Tables 4 and 5 summarize some return properties for the two sample periods for nineteen emerging markets, an emerging-markets composite, and four major industrial markets. The first three columns report the mean, standard deviation, and Sharpe ratio. The Sharpe ratio is a measure of the risk-return tradeoff, computed as the excess return divided by the standard deviation of the excess return. Emerging markets offer higher but more variable returns compared with the industrial markets, although there are some notable exceptions to this rule (for example, in Jordan and Zimbabwe). The risk-return tradeoff during 1986–92 is most favorable in a number of Latin American markets (in Chile, Colombia, and Mexico), and it is generally better in emerging markets than in the industrial world. The composite index has a slightly higher mean return than the U.K stock market and a slightly higher risk. Its diversification potential stems from the relatively low correlation with the industrial markets. This is further illustrated in figure 1.

Tables 4 and 5 report the constant (α) and slope coefficient (β) of a regression of the excess return onto a constant and the world-market return. The Capital Asset Pricing Model (CAPM) would predict that the α coefficient equals zero. The major markets display very high βs with respect to the world-market portfolio and relatively small αs (pricing errors). In the emerging markets, high βs are found for Brazil, Korea, Malaysia, Mexico, the Philippines, Taiwan (China), and Thailand. Chile, Colombia, Mexico, the Philippines, and Thailand also

Table 4. *Properties of Emerging-Market Equity Returns, 1986–92*

Market	Dollar excess returns			World pricing error, α	World risk loading coefficient, β	First-order autocorrelation coefficient
	Mean	Standard deviation	Sharpe ratio[a]			
Argentina	62.048	104.396	0.594	64.735	−0.422	−0.082
				(40.616)	(0.638)	
Brazil	22.299	77.824	0.287	17.368	0.773	−0.030
				(28.419)	(0.504)	
Chile	41.186	28.508	1.445	39.593	0.250	0.310*
				(10.788)	(0.243)	
Colombia	43.069	33.524	1.285	41.899	0.184	0.479*
				(12.868)	(0.193)	
Greece	26.684	50.089	0.533	23.627	0.479	0.120
				(18.720)	(0.285)	
India	7.476	35.458	0.211	9.638	−0.339	0.103
				(13.473)	(0.212)	
Jordan	−2.369	17.139	−0.138	−3.113	0.117	−0.160
				(6.539)	(0.130)	
Korea, Rep. of	16.836	32.028	0.526	13.115	0.584	−0.099
				(11.388)	(0.178)	
Malaysia	11.782	26.520	0.444	6.789	0.783	0.031
				(9.031)	(0.212)	
Mexico	49.925	48.832	1.022	44.419	0.864	0.355*
				(18.239)	(0.374)	
Nigeria	−5.263	39.075	−0.135	−6.720	0.229	0.086
				(15.132)	(0.217)	
Pakistan	15.455	24.739	0.625	15.288	0.026	0.255*
				(9.408)	(0.151)	
Philippines	38.654	40.482	0.955	33.559	0.799	0.345*
				(14.575)	(0.278)	
Portugal	27.666	50.224	0.551	20.087	1.189	0.287*
				(17.364)	(0.242)	
Taiwan (China)	29.377	55.994	0.525	24.810	0.716	0.058
				(21.190)	(0.429)	
Thailand	29.567	30.964	0.955	25.247	0.678	0.114
				(11.566)	(0.301)	
Turkey[b]	30.815	74.146	0.416	30.212	0.247	0.114
				(30.036)	(0.402)	
Venezuela	32.684	46.452	0.704	34.454	−0.278	0.312*
				(18.465)	(0.337)	
Zimbabwe	1.245	26.669	0.047	1.428	−0.029	0.280*
				(10.338)	(0.195)	
Emerging-markets composite	10.453	25.249	0.414	7.215	0.508	0.130
				(9.370)	(0.221)	
Germany	2.909	25.113	0.116	−2.603	0.865	−0.083
				(7.678)	(0.152)	
Japan	8.156	29.528	0.276	−0.790	1.403	0.008
				(6.959)	(0.174)	
United Kingdom	10.372	23.173	0.448	3.374	1.098	−0.049
				(5.218)	(0.078)	
United States	8.210	17.091	0.480	3.563	0.729	−0.006
				(4.668)	(0.109)	

* Significant at the 5 percent level.

Note: All returns are annualized percentages. The reported mean is arithmetic. Standard errors are in parentheses.

a. The excess mean return scaled by the standard deviation.

b. Data begin January 1987.

Source: Author's calculations.

Table 5. *Properties of Emerging-Market Equity Returns, 1976–85*

Market	Dollar excess returns: Mean	Dollar excess returns: Standard deviation	Dollar excess returns: Sharpe ratio[a]	World pricing error, α	World risk loading coefficient, β	First-order autocorrelation coefficient
Argentina	61.236	105.525	0.580	60.265	0.321	0.151
				(33.981)	(0.505)	
Brazil	7.612	44.323	0.172	7.848	−0.078	0.116
				(14.115)	(0.283)	
Chile	16.977	46.527	0.365	17.223	−0.081	0.130
				(15.150)	(0.353)	
Greece	−21.814	20.119	−1.084	−22.769	0.315	0.077
				(6.314)	(0.158)	
India	11.502	19.721	0.583	10.258	0.411	−0.003
				(6.013)	(0.135)	
Jordan[b]	4.932	18.651	0.264	4.360	0.264	0.115
				(6.996)	(0.170)	
Korea, Rep. of	5.490	32.437	0.169	4.280	0.400	0.036
				(10.158)	(0.265)	
Mexico	−1.291	40.754	−0.032	−3.003	0.565	0.136
				(12.873)	(0.310)	
Thailand	3.547	21.519	0.165	3.571	−0.008	0.101
				(6.982)	(0.122)	
Zimbabwe	−3.601	39.089	−0.092	−5.420	0.601	0.099
				(12.383)	(0.335)	
Germany	2.307	17.995	0.128	0.315	0.750	0.022
				(0.138)	(0.123)	
Japan	9.150	18.807	0.487	0.309	0.910	−0.016
				(0.129)	(0.129)	
United Kingdom	7.583	23.053	0.329	0.607	1.171	0.038
				(0.158)	(0.143)	
United States	2.138	14.071	0.152	−0.849	0.987	−0.023
				(2.221)	(0.060)	

Note: All returns are annualized percentages. The reported mean is arithmetic. Standard errors are in parentheses.

a. The excess return scaled by the standard deviation.

b. Data begin January 1979.

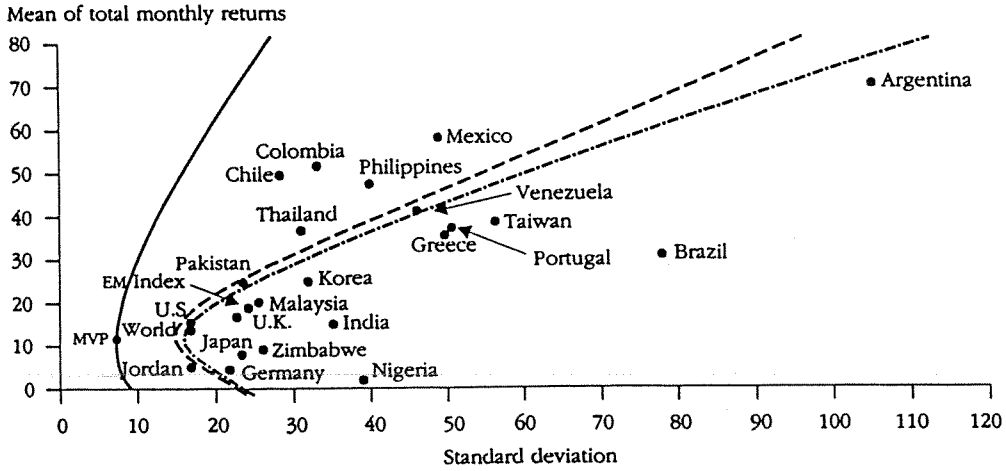
Source: Author's calculations.

display significantly positive αs. Clearly, an unconditional world CAPM model does not explain much of the cross-sectional variation in emerging-equity-market returns. Hence, it would be incorrect to conclude that higher βs increase the cost of capital. On the contrary, high βs seem to indicate a higher degree of integration with the industrial world. Compared with the earlier sample, the βs and the Sharpe ratio have increased for most but not all emerging markets. The exceptions are Argentina, India, and Zimbabwe.[3]

Finally, tables 4 and 5 report the first-order autocorrelation coefficient for the various markets. This coefficient is clearly insignificantly different from zero for

3. It will be interesting to see whether the recent capital-market liberalization in India will have an effect on these statistics.

Figure 1. *Mean–Standard Deviation Frontiers of Monthly Dollar Total Returns of Selected Portfolios, January 1986–December 1992*
(percent)



——— Emerging Markets, Germany, Japan, United Kingdom, and United States.
– – – – Emerging Markets Index, Germany, Japan, United Kingdom, and United States.
–·–·–·– Germany, Japan, United Kingdom, and United States.

Note: MVP is the minimum-variance portfolio.
Source: IFC EMDB.

the major markets, but it is significantly positive for some emerging markets, potentially signaling market inefficiencies. However, not a single emerging market displays significant positive serial correlation in the early sample.

Table 6 contains information on dividend yields and price-earnings (P/E) ratios. Both variables exhibit large cross-sectional and time variation in the emerging markets. As Buckberg (1995) points out, P/E ratios typically increase substantially when a market is opened to foreign investment. By the same token, openness would result in lower dividend yields. Significant increases in P/E ratios coupled with significant decreases in dividend yields over the sample period are observed for Colombia, Mexico, and Pakistan. Both variables are factors in simple cost-of-capital computations and are likely to be affected by the degree of market segmentation. However, given the large differences in corporate and accounting practices, the absolute magnitude of dividend yields or P/E ratios may not be very informative on market segmentation.

Table 7 provides a matrix containing the rank correlations between all the return characteristics discussed above, including the measure of market integration. The ranking for all measures is such that the three industrial markets rank high. For example, markets with high values for mean return, volatility, Sharpe ratio, the α-pricing error from the world-market model, and dividend yield get a

Table 6. *Dividend Yields and Price-Earnings Ratios in Emerging Markets, 1986–92*
(percent, annual averages)

	Dividend yields[a]					*Price-earnings ratio*[c]				
Market	*1986–92*	*1986*	*1989*	*1992*	*Rank*[b] *1992*	*1986–92*	*1986*	*1989*	*1992*	*Rank*[b] *1992*
Argentina	3.71	0.20	11.82	0.73	22	2.81	6.25	106.24	−25.19	23
Brazil	5.85	3.63	5.87	3.30	10	26.30	5.73	5.66	132.48	1
Chile	7.89	8.53	10.93	3.61	8	7.61	3.59	4.34	14.57	12
Colombia	8.19	15.39	7.62	3.50	9	6.71	−27.71	5.24	34.55	4
Greece	7.38	9.95	10.13	6.91	1	15.05	7.14	13.04	8.68	20
India	2.37	2.27	2.93	1.13	17	19.25	12.81	15.40	38.58	3
Jordan	4.82	3.00	3.63	4.23	5	11.56	12.13	13.66	12.22	17
Korea, Rep. of	2.04	6.20	1.08	0.02	23	21.71	16.43	31.18	19.17	11
Malaysia	2.42	2.26	2.64	2.62	13	28.05	21.40	29.65	20.78	8
Mexico	4.23	10.74	3.85	1.38	16	9.41	4.89	5.73	12.72	16
Nigeria	8.52	9.81	12.21	6.84	2	6.53	4.95	5.61	10.19	18
Pakistan	6.56	7.03	6.94	3.19	11	10.78	6.23	7.96	24.87	5
Philippines	2.75	7.75	1.82	0.91	20	12.62	—	13.13	13.99	14
Portugal[d]	2.27	1.59	1.79	3.76	7	15.11	10.85	16.75	9.82	19
Taiwan (China)	1.12	2.42	0.97	1.08	18	29.23	13.44	57.94	19.58	10
Thailand	4.71	9.77	3.87	2.44	14	12.47	8.47	14.01	13.73	15
Turkey	7.07	—	11.58	4.74	4	11.29	—	6.71	7.39	21
Venezuela	1.64	3.13	1.88	0.79	21	14.43	11.81	4.76	22.10	7
Zimbabwe	8.86	10.10	11.31	5.03	3	5.05	3.80	3.69	3.47	22
Germany	2.22	1.82	2.17	2.34	15	15.60	17.80	14.70	14.30	13
Japan	0.67	0.79	0.46	1.01	19	45.50	51.90	45.70	38.90	2
United Kingdom	3.60	4.03	3.41	3.80	6	14.93	11.70	13.40	19.70	9
United States	3.42	3.57	3.46	3.02	12	16.97	14.10	14.10	22.70	6

— Not available.
a. The dividend yield can be interpreted as a twelve-month reinvested average yield.
b. From high to low.
c. Twelve-month average computed by the IFC for IFC index stocks.
d. 1987 values substitute for 1986 values.
Source: Author's calculations. The earnings and dividend measures for the major markets are taken from Morgan Stanley and Company (various issues).

Table 7. *Rank Correlations between Market Integration and Other Return Characteristics, 1986–92*

Characteristic	*Mean returns*	*Volatility*	*Sharpe ratio*	*Risk loading, β*	*Pricing error, α, from the world-market model*	*Expected-return correlation*	*Dividend yield*	*Price-earnings ratio*
Market integration	−0.092	0.336	−0.268	0.610	−0.023	0.234	0.269	0.207
Mean returns		0.563	0.872	0.035	0.942	0.493	0.007	0.269
Volatility			0.209	0.054	0.472	0.051	−0.055	−0.010
Sharpe ratio				−0.027	0.905	0.612	0.028	0.251
Risk loading, β					0.175	0.228	0.403	0.557
Pricing error, α						0.584	0.156	0.366
First-order autocorrelation							0.357	0.503
Dividend yield								0.738

Note: The mean returns, volatility, Sharpe ratio, risk loading, pricing error, and autocorrelation coefficients are the return characteristics for the 1986–92 sample depicted in table 4. The 1986–92 sample averages for dividend yield and price-earnings ratio are given in table 6. The rank correlation coefficient is the Spearman rank correlation computed for nineteen emerging markets and Germany, Japan, and the United Kingdom. The standard error for each statistic is 0.22. The ranking for all measures is such that the three industrial countries rank high, that is, from low to high for the mean, volatility, Sharpe ratio, pricing error from the world-market model, and dividend yield and from high to low for the world-market risk loading and the price-earnings ratio. For the pricing error, the ranking is based on the sum of two ranks, one according to the absolute magnitude of the pricing error, another according to distance in the number of standard deviations away from zero. For the expected return correlation coefficients, countries with insignificantly small autocorrelations (smaller than 0.100 in absolute magnitude) are given the same rank.

Source: Author's calculations.

low rank for that particular statistic. The ranking is from low to high because the industrial markets typically display low values for these statistics. Likewise, the ranking is from high to low for expected-return correlation, world market β, and P/E ratio because the industrial markets typically have high values for these statistics. To help interpret the numbers, consider two examples. First, a positive rank correlation between the market-integration measure and volatility indicates that low volatility is associated with a high degree of market integration because industrial markets display low volatility. Second, a positive rank correlation between market integration and the P/E ratio indicates that higher P/E ratios typically imply higher degrees of market integration.

The only significant relation between the market-integration measure and other return characteristics is with the world β. As conjectured above, higher βs are associated with higher degrees of market integration and do not necessarily translate into higher expected returns. Although not significant, the rankings also reveal positive associations between market integration and P/E ratios and negative associations between market integration and dividend yields. This confirms the intuition that the capital flows associated with opening up markets tend to increase P/E ratios and decrease dividend yields.

Similarly, it would be expected that market integration contributes to domestic market efficiency. Because the autocorrelation ranking is from low to high, table 7 reveals the association between market-integration and the first-order autocorrelation coefficient to be negative but not significantly different from zero. The table also shows that the market-integration measure and volatility co-vary negatively. This supports my conjecture that concerns about excess price volatility in newly opened emerging stock markets might be unnecessary. The alternative market-integration measure yields similar results (not reported) with the exception that the associations with dividend yields and P/E ratios are significantly different from zero in this case.

There is no relation between mean returns and either the market-integration measures or the βs. Harvey (1995) examines the sensitivity of the emerging-market returns to measures of global risk, including the world-market portfolio. He finds that emerging markets have little or no sensitivity, which confirms the results of table 7. There is a strong positive rank correlation between average returns and volatility, the pricing error, and the autocorrelation coefficients. Consequently, high mean returns cannot be explained by the world-market model, but they might partially reflect inefficiencies in domestic markets.

IV. Market Integration and Barriers to Investment

Foreign investors face many barriers when investing in emerging markets. I distinguish two groups of direct barriers to investment and one group of indirect barriers. In the first group are direct restrictions on foreign ownership. For example, certain sectors may be closed to foreign investment, or limits may be imposed on direct ownership of equity.

Table 8. *Foreign Ownership Restrictions and Dates of Recent Liberalizations Affecting Foreign Investors*

Market	*Exchange rate regime, 1991*	*Percent investable, 1992*	*Investable index/global index (ratio)*	*Liberalization*	*Date*
Argentina	Free float	100	88.2	All limits on foreign capital abolished	December 1989
Brazil	Free float	49[a]	60.4	Group of foreign investment trusts approved	March 1987
				Interbank foreign exchange market allowed	March 1990
				Foreign ownership levels increased	May 1991
				Foreign portfolios without local custody allowed	July 1991
Chile	Pegged to basket	25	20.9	Non–Central Bank foreign exchange market authorization	April 1990
Colombia	Central Bank control	100	76.0	Made 100 percent investable	February 1991
Greece	Managed float	100	80.8	n.a.	n.a.
India	Free float	24	19.1	All shares made investable	November 1992
				Managed exchange rate abolished	March 1992
Jordan	Pegged to basket	49	29.0	n.a.	n.a.
Korea, Rep. of	Pegged to dollar	10[a]	9.6	Government-announced sweeping liberalization	December 1988
				Investment preapproval rules softened	January 1990
				Market average exchange rate system introduced	March 1990
				Foreign ownership levels increased	January 1992
Malaysia	Free float	30	67.4	n.a.	n.a.
Mexico	Free float	100[a]	87.7	Made 100 percent investable	May 1989
				Dual exchange rate system unified	November 1991
Nigeria	Pegged to French franc	0[a]	0.0	n.a.	n.a.
Pakistan	Pegged to dollar	100	29.3	Made 100 percent investable	February 1991
Philippines	Free float	40[a]	47.3	All shares made investable	November 1991
Portugal	European Monetary System	100[a]	54.1	n.a.	n.a.
Taiwan (China)	Central Bank control	10[a]	3.0	Equity market broadly opened, $5 billion maximum foreign holdings	January 1991
				Maximum foreign security holdings limit increased to $10 billion	March 1993
Thailand	Pegged to basket	100[a]	27.0	n.a.	n.a.
Turkey	Free float	100	97.3	n.a.	n.a.
Venezuela	Free float	100	36.3	Foreign ownership allowed with limits	December 1988
				All restrictions lifted	January 1990
Zimbabwe	Pegged to basket	—[a]	0.0	n.a.	n.a.

n.a. Not applicable.

a. Industry exceptions.

Source: IMF (1992), for foreign exchange policies; IFC (various issues), for foreign ownership levels and liberalizations; Park and van Agtmael (1993), for some liberalization dates.

In the second group are exchange and capital controls that affect investment in emerging markets and the repatriation of dividends and capital from emerging markets. For example, some economies have direct restrictions, such as a minimum investment period, on the remittance of profits. Taxes on dividends and capital gains are considered direct barriers in this second group (see Demirgüç-Kunt and Huizinga 1992). Some economies, such as Nigeria and Zimbabwe, are still completely closed to foreign investment. Overall, however, restrictions have been gradually relaxed, and this process has accelerated in the 1990s. Examples of economies in which restrictions have been recently lifted include Brazil, Colombia, India, Korea, and Taiwan (China). Table 8 gives some information on both groups of direct barriers. A more detailed survey of the existing restrictions on foreign investors at the end of 1992 is given in IFC (various issues).

In the third group are indirect barriers having to do with the regulatory and accounting environment. Investors might not have adequate information on these markets and on the financial health of the companies, the settlement systems might be inefficient and slow, accounting standards might be poor, and investor protection might be minimal. These factors might play a large role in the investment decisions of international investors. In her survey of market participants, Chuhan (1992) lists limited information on emerging markets as one of the key impediments to investing in emerging markets.

I considered several measures of "openness" and their relation to the market-integration measure. The difficulty was to quantify the extent of the restrictions in the various economies in order to make the computation of rank correlations possible. The IFC has recently launched indexes that take direct foreign ownership restrictions into account. The investable market capitalization of each stock is used for its weight in the index instead of the stock's total market capitalization, as in the IFC's regular global indexes.[4] Consequently, one measure of the extent of foreign ownership restrictions is the ratio of the IFC investable index to the IFC global index. That ratio is reported in table 8 and is the basis of my openness measure, Open I.

Unfortunately, the scarcity of available information prevented me from ranking the economies directly according to the severity of other capital and exchange restrictions. To gauge the effects of these restrictions indirectly, I computed a ranking based on the mean black-market premium and a ranking based on the sums of the ranks according to the mean and volatility of the premiums during 1988–92. The data used for these calculations are described in Chuhan, Claessens, and Mamingi (1993). Because some economies (Greece, Jordan, Nigeria, Portugal, Turkey, and Zimbabwe) are missing from the data set, the rank correlations have a standard error of 0.258. However, the rank correlation between black-market premiums (ranked from low to high) and the market-

4. For details on how a variety of restrictions on foreign ownership change the weights used to construct the index, see IFC (various issues).

integration measure is 0.711 if the ranking is based on the means and 0.697 if the ranking is based on the means and variances.

For indirect barriers, I used the EMDB table on the availability of market and company information, and the quality of accounting standards and investor protection, as reported by Harvey (1993). From this information, I computed a summary measure (unreported), which is the basis for my "Open II" ranking.

Despite the persistence of various restrictions on foreign investors, several emerging markets have been open to some form of foreign investment for a surprisingly long time. One of the first vehicles for foreign investment in emerging markets was country funds. Four Asian economies—Korea, Malaysia, Taiwan (China), and Thailand—individually have more than ten country funds listed abroad. There is of course potentially very useful information on market integration in the premiums that some of these closed-end funds command when traded in industrial markets (see, for instance, Bekaert and Urias 1994 and Diwan, Senbet, and Errunza 1992). More recently, some companies in emerging markets have begun to list their stock on the exchanges of industrial markets. No less than thirty Mexican companies are listed on American exchanges. I used the number of country funds and cross-listed securities to construct a third measure of openness, "Open III." The measure is imperfect because the lack of data has prevented me from weighting the funds and companies by market capitalization, and the cross-listings are restricted to the United States.

I calculated the rank correlations for the Open I, Open II, and Open III measures for the emerging markets (not reported). The rank correlations between market integration and the three measures are 0.214 for Open I, 0.601 for Open II, and 0.794 for Open III. The market-integration measure is most significantly positively associated with the Open III measure. This result indicates that the best way to effectively open up a market may be to mobilize foreign resources through country funds or cross-listed securities. Such an approach confirms the theoretical analysis of Diwan, Senbet, and Errunza (1992). They show that country funds, despite their small size, contribute significantly to capital mobilization and pricing efficiency in the originating capital markets. These results are robust to the use of the alternative measure of market segmentation; in fact, they are even stronger with the alternative measure than without it.

Somewhat surprisingly, the relation between the market-integration measure and the Open I measure is not significantly positive: either the ownership restrictions are circumvented or they are not binding. The Open I measure does correlate significantly with the world-market βs (not reported). Markets with less severe ownership restrictions tend to have high βs. In the theoretical analysis of Eun and Janakiramanan (1986) and Stulz and Wasserfallen (1992), the presence of ownership restrictions in a world CAPM leads to higher expected returns for foreign investors and to "home bias" in their portfolio holdings. How this super-risk premium affects the empirical estimates of α and β, however, is unclear. Again, the data reveal that openness goes hand in hand with higher βs.

The rank correlation between the world βs and the Open II and Open III measures is even higher than that between the world βs and the Open I measure. (The correlations with the world βs are 0.447 for Open I, 0.721 for Open II, and 0.700 for Open III.)

The Open II measure correlates significantly with the market-integration measure. The results suggest that providing more and better information on the markets and companies and improving accounting standards and investor protection should contribute to making emerging markets better integrated in the global equity market. In fact, such simple policy actions might be more important than fully abolishing ownership restrictions.

The Open II and Open III measures also correlate positively with P/E ratios and negatively with dividend yields. These results confirm that open markets tend to have lower dividend yields and higher P/E ratios. There are few other significant associations between return characteristics and the openness measures. In particular, there is no significant relation between the openness of a market and stock return volatility. Therefore, the fear that foreign-market access leads to more volatile markets might be ill-founded. In fact, the relatively high correlations with the autocorrelation measure, although not statistically significant, suggest that opening up markets is likely to improve domestic market efficiency.

V. Market Integration and Emerging-Market-Specific Risks

The first emerging-market-specific risk (EMSR) I investigated is political or, more broadly, country risk. Political instability and economic mismanagement might add substantial risk premiums to returns and deter some foreign investors. A crude and indirect measure of political risk is the secondary-market price of bank debt. Unfortunately, this is only available for a limited number of economies (unreported). Nevertheless, it is remarkable how the prices of Mexican and Chilean debt increased recently in conjunction with investors' renewed interest in these markets. Between 1989 and 1992, the price increased from 60.6 cents to 89.4 cents to the dollar for Chilean debt and from 39.7 cents to 64.3 cents to the dollar for Mexican debt. For all markets, a more direct measure of political risk is the Institutional Investor country credit rating. The credit rating did not change noticeably from 1986 to 1992 for most markets. However, the credit rating improved considerably for Chile (from 25.1 to 45.9) and for Mexico (from 30.8 to 42.6). By far, the credit rating for Taiwan (China) (77.5 in 1992) is the highest for the emerging markets.

The Economist regularly ranks the industrial countries according to three macroeconomic indicators: inflation, real gross domestic product (GDP) growth, and current account balance as a percentage of GDP. I computed this ranking for the emerging markets in the sample (not reported). The top performers are Korea and Malaysia. The United Kingdom's macroeconomic performance is only average in relation to that of the set of emerging markets; it ranks 10.5

among the sample markets. Because a current account deficit does not necessarily signal instability but could be the healthy mirror image of large capital inflows, I also computed a ranking based only on GDP growth and inflation. Korea, Malaysia, and Thailand are the best performers. The variability, rather than the level of inflation, might be a better indicator of the soundness of economic policies. Inflation is even less variable in Malaysia and Thailand than in the United Kingdom. I also computed a ranking of the economies based on their performance with respect to both level and variability of inflation. Not surprisingly, Latin American economies perform worst whereas Asian economies perform best.

Currency movements can have a dramatic impact on equity returns for foreign investors. Many developing economies manage to keep exchange rate volatility lower than that in the industrial economies. This is not surprising as many developing economies try to peg their exchange rates to the U.S. dollar or to a basket of currencies (see table 8). Dramatic exceptions are Argentina, Brazil, and Nigeria.

The second EMSR I investigated is liquidity risk. Because liquidity might be correlated with the size of the stock market, I also investigated the relative size of the market using locally compiled (not the IFC's) indexes. Most of the emerging markets are relatively small compared with the major industrial markets.[5] Mexico's market, the largest emerging market, has a market capitalization value of $127.1 billion, about one-third the size of Germany's (market-capitalization value $393.5 billion). Zimbabwe's market, the smallest (market-capitalization value $869.2 million), is about 150 times smaller than Mexico's. Recently, some markets have grown tremendously. Between 1989 and 1992 the stock markets of Chile, Colombia, Greece, India, Malaysia, Mexico, Pakistan, Thailand, Turkey, and Venezuela all more than doubled in size in dollar terms. In percentage of GDP, the markets of Chile and Malaysia, with market capitalization values of 82 percent of GDP in 1991 and 81 percent of GDP in 1989, respectively, have surpassed the level of the U.S. market. The size of other markets, such as those of Colombia, Nigeria, Turkey, and Venezuela, having market capitalization values of between 3 and 5 percent of GDP, is still tiny compared with the size of their economies.

I calculated a turnover measure (value traded as a percentage of market capitalization; not reported), which could serve as a liquidity indicator. Surprisingly, turnover is larger in many emerging markets than in the United Kingdom and Japan. Markets with particularly large turnover are those of Korea, Taiwan (China), and Thailand.

Table 9 reports rank correlations between the return characteristics and the EMSR measures. Macroeconomic performance, inflation volatility, size, and relative size all have an impact on the extent of market integration. Political risk is positively associated with market segmentation, but the correlation is not signif-

5. Data on liquidity and size of markets in this and the next paragraph are from the Emerging Markets Data Base for the emerging markets and from Allen and O'Connor (1992) for the industrial markets. GDP data are from IMF (various issues).

icantly different from zero. Not surprisingly, these variables also correlate significantly with the βs and, except for the macroeconomic performance variable, with dividend yields and P/E ratios. The only marginally significant relation between mean returns and EMSRs involves the inflation variable. High and variable inflation also contributes to volatility in the stock markets.[6] Economies with relatively small stock market capitalization as a percentage of GDP and bad macroeconomic policies tend to have more-volatile stock markets. Exchange rate volatility is not significantly related to return characteristics. The turnover measure is positively correlated with volatility and mean returns, although the correlations are not significantly different from zero. Either the result is caused by some of the Asian markets, where trading is "excessive," or turnover is a bad proxy for liquidity and does not capture the liquidity problems mentioned by foreign investors in the Chuhan (1992) survey.

When the alternative measure of market integration is used, the rank correlation between liquidity and market integration is higher (0.390). The other results are robust; in particular, the relations between market integration and macroeconomic performance, inflation volatility, size, and relative size are invariably stronger. The alternative measure also exhibits a 0.698 rank correlation with the political-risk measure.

VI. Conclusions

In this article I have attempted to identify significant relations between a number of barriers to investment, broadly defined, and a return-based measure of market integration, as well as other return characteristics. The policy prescription is that an economy should try to eliminate or lessen the impact of those barriers that are most likely to effectively segment the local market from the global capital market. I have identified the following effective barriers to global equity-market integration: poor credit ratings, high and variable inflation, exchange rate controls, the lack of a high-quality regulatory and accounting framework, the lack of sufficient country funds or cross-listed securities, and the limited size of some stock markets. I have not found a significant link between return characteristics and ownership restrictions or a turnover measure.

My analysis has some major drawbacks. Foremost, I have simply assumed that my measure of capital-market integration is positively related to capital flows and negatively related to domestic capital costs. As to the former, I could not detect highly significant correlations between my market-integration measures and cumulative capital flows (as a percentage of market capitalization). The correlation between my market-integration measure and the capital-flow data (cumulated real net U.S. purchases of foreign equity studied in Chuhan, Claessens, and Mamingi 1993) is 0.542 with a standard error of 0.258, but it is

6. Although returns are measured in nominal terms, they are measured in dollars, so that high inflation should not necessarily lead to higher stock returns.

Table 9. *Rank Correlations between Return Characteristics and Emerging-Market-Specific Risks*

Return characteristic	*Political risk*[a]	*Macroeconomic performance*[b]	*Exchange rate volatility*	*Inflation volatility*	*Level and volatility of inflation*	*Size*[c]	*Relative size*[d]	*Liquidity*[c]
Market integration	0.379	0.462	0.137	0.514	0.519	0.584	0.615	0.012
Mean returns	0.013	0.228	−0.078	0.238	0.410	−0.037	0.257	−0.258
Volatility	0.145	0.633	0.327	0.578	0.686	0.042	0.436	−0.263
Sharpe ratio	−0.069	−0.073	−0.298	−0.044	0.108	−0.016	0.173	−0.098
Risk loading, β	0.632	0.439	−0.021	0.535	0.504	0.632	0.557	0.199
Pricing error, α	0.138	0.215	−0.186	0.278	0.431	0.108	0.377	−0.153
Expected-return correlation	0.384	0.212	−0.090	0.173	0.271	0.516	0.437	0.332
Dividend yield	0.593	0.295	0.028	0.454	0.486	0.645	0.466	0.441
Price-earnings ratio	0.634	0.272	0.186	0.495	0.511	0.641	0.567	0.317

Note: Economies are ranked from high to low for size, relative size, and liquidity and from low to high for exchange rate volatility, inflation volatility, and level and volatility of inflation. The standard errors for the statistics are 0.22, except for relative size, for which it is 0.23; Argentina and Taiwan (China) are not included.

a. The ranking based on the Institutional Investor Credit Ratings for 1992.

b. Based on inflation and real GDP growth performance.

c. Based on 1992 data.

d. Average over 1986, 1989, and 1992.

Source: Author's calculations.

close to zero using the data reported in Tesar and Werner (1995). Note that both data sets involve somewhat different markets and time periods.

As for the cost of capital, I have demonstrated the difficulties associated with trying to measure the level of expected equity returns, and hence domestic capital costs. First, the lack of a relation between mean returns and any of the barriers to investment that I have considered does not bode well for approaches based on a history of returns. The market-integration measures correlate significantly with P/E ratios and dividend yields, which feature in some capital-cost calculations. Second, most efforts to measure expected returns use some version of the CAPM (see, for example, Demirgüç-Kunt and Huizinga 1992). However, my results show that high world market βs do not necessarily reflect higher expected returns but rather seem to reflect a higher degree of global capital-market integration.

There are a number of possible interpretations for this outcome. The CAPM could be a reasonable description of the returns but should be modified to allow for time-varying degrees of market segmentation. Bekaert and Harvey (1994), for instance, allow conditionally expected returns in emerging markets to depend on their covariance with a world benchmark portfolio and on the variance of the country return. The integration measure is a time-varying weight applied to these two moments, which arises from a conditional regime-switching model. It is also possible that the effect of the world-market factor is confounded by other factors in a multifactor world, where the risk exposures vary through time (Harvey 1993 makes a similar point). Additional factors that come to mind are industry factors and commodity factors.

The fact that my integration measure does not correct for different industry exposures and the general lack of diversification within indexes for emerging markets is another potential drawback. Divecha, Drach, and Stefek (1992) consider four "concentration measures": the proportion of capitalization in the top ten companies, an asset concentration factor (which is valued at one if the entire market capitalization is concentrated in one market), a sector concentration measure, and the average correlation between stocks in the index. To examine whether the industry and sectoral patterns affect my market-integration measure, I computed rank correlations between the four concentration measures as reported in Divecha, Drach, and Stefek (1992: 46) and my market-integration measure. If all markets were perfectly integrated and the correlation of expected returns only reflected different concentration or industry effects, one would expect to find positive correlations between the market integration measure and the concentration measures (ranked from low to high). I found the rank correlations to be 0.393 for the concentration measures based on the top ten companies, 0.399 for asset concentration, 0.448 for sector concentration, and -0.055 for the average correlation between stocks. Because data on Germany are not reported in Divecha, Drach, and Stefek, I used twenty-one countries, and the standard error was 0.224. When the alternative measure was used, the first three correlation coefficients were significantly different from zero. These

results seem to contradict the conclusion of Divecha, Drach, and Stefek, who state that sector concentration is not important for explaining emerging-market returns. On the contrary, the results suggest that industry factors should be an important part of future analyses.

Finally, in this article I have ignored dynamic interactions between changes in barriers to investment and market returns. Future work should explore panel-data approaches that incorporate global and domestic risk factors jointly with quantitative indicators of barriers to investment. In such an analysis, the risk exposures should be made a function of the degree of market segmentation.

This article has implications for some other interesting policy questions. Genuine concern exists among policymakers about the impact of international investment on local-market turnover and the volatility of equity returns. Tesar and Werner (1995) find no evidence that U.S. investment activity contributes to either volatility in equity returns or to higher local turnover in emerging markets. This result is confirmed in the present article. Section IV has shown that volatility is unrelated to any measure of openness. In fact, volatility is actually negatively, although not significantly, correlated with the market-integration measure. Furthermore there is no association between turnover and the market-integration measures.

Policymakers might be concerned that increasing integration between the capital market and the economy will lead to lower diversification benefits. Lower diversification benefits, in turn, might reduce the appetite of the international investment community for stocks in emerging equity markets. Table 3 reports a correlation of the composite index with the United States that is 0.40, which is not unlike correlations noted between industrial countries. The more relevant correlation of expected returns is still only 0.19, which is fairly low. I would argue that these concerns are ill-founded for two reasons. First, as shown in this article, I have not detected any relation between the risk-return tradeoff of individual markets (as measured by the Sharpe ratio) and market integration or the openness measures. Second, capital-market integration might help secure long-lasting portfolio flows from institutional investors. The trend toward international diversification has caused an increasing number of money managers and institutional investors to practice global-asset-allocation strategies. Typically, asset-allocation models start from a neutral benchmark that is close to the world-market portfolio as, for instance, defined by Morgan Stanley Capital International. Emerging markets should eventually strive to become part of the global world-market portfolio, used as a benchmark by investors worldwide.

Appendix. Data Sources

The stock return data for the emerging markets are from the IFC Emerging Markets Data Base. Annualized dividend yields are constructed as the sum of twelve monthly dividend yields. P/E ratios, market capitalizations, and turnover ratios are also taken from that data set. The stock return data for the

industrial countries are from Morgan Stanley Capital International. The U.S. interest rate used in the article is the one-month Eurorate obtained from Data Resources Incorporated (DRI) until mid-1988, from Citicorp Data Services between mid-1988 and July 1991, and from the *Financial Times* for the remainder of the sample. Equity returns for Germany, Japan, and the United Kingdom were computed using exchange rate data from Citicorp Data Services which were updated from mid-1991 onward with data from the *Financial Times*. Macroeconomic data were taken from IMF (various issues).

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