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Foreign Speculators and Emerging Equity Markets

GEERT BEKAERT and CAMPBELL R. HARVEY*

ABSTRACT

We propose a cross-sectional time-series model to assess the impact of market liberalizations in emerging equity markets on the cost of capital, volatility, beta, and correlation with world market returns. Liberalizations are defined by regulatory changes, the introduction of depositary receipts and country funds, and structural breaks in equity capital flows to the emerging markets. We control for other economic events that might confound the impact of foreign speculators on local equity markets. Across a range of specifications, the cost of capital always decreases after a capital market liberalization with the effect varying between 5 and 75 basis points.

THROUGHOUT HISTORY AND IN MANY MARKET ECONOMIES, the speculator has been characterized as both a villain and a savior. Indeed, the reputation of the speculator generally depends on the country where he does business. In well-functioning advanced capital markets, such as the United States, the speculator is viewed as an integral part of the free-market system. In developing capital markets, the speculator, and in particular the international speculator, is looked upon with many reservations.

Recently, many so-called "emerging" markets have opened up their capital markets to foreign investors, creating an ideal laboratory for examining the impact of increased foreign portfolio investment in developing equity markets. Our main focus is the impact on expected equity returns—the cost of equity capital. However, we also examine the effects of increased foreign

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investment activity and market integration on three other variables: volatility, the world beta, and the correlation between emerging markets and the world market returns.

Excess volatility induced by foreign investors has often served as an argument in favor of stalling the liberalization process and is the topic of a number of contemporaneous studies. Less is known about the effect of liberalization on emerging market correlations with the world market returns. Recent evidence from country funds investing in emerging markets but priced in the United States (Bailey and Lim (1992) and Bekaert and Urias (1996)) suggests that correlations may increase. If this finding is confirmed, it may have an impact on the change we are likely to find in the cost of capital. A reduction in the cost of capital is brought about by foreign investors bidding up local prices in order to obtain the superior diversification benefits of emerging market stocks. With higher correlations, these benefits are reduced and the corresponding price increase and cost of capital decrease is smaller. Put together, evidence on changes in expected returns, volatility, and correlations after capital market liberalizations may provide important information which may help efforts to incorporate emerging markets into global asset allocation models.

The outline of our paper is as follows. In Section I, we briefly survey the literature on the impact of speculative activity on price volatility and welfare, focusing more specifically on the role of foreign speculators in emerging markets. We emphasize the *gradual* nature of the capital market integration process, identifying the event "increased foreign investment activity," with three different indicators: the gradual introduction of American Depositary Receipts (ADRs) and country funds, the actual lifting of investment restrictions, and the extent of U.S. capital flows into the emerging equity market.

Whereas our measures of conditional volatility, beta, and correlation build on previous work, Section II presents a novel present value model, accommodating time-varying expected returns, to motivate the use of dividend yields as a measure of the cost of equity capital. Our work here is closely related to that of Henry (2000) who measures the abnormal return to market liberalization in 12 emerging markets. Section III sets out the empirical framework, which pools time-series and cross-sectional information to measure the economic impact of increased foreign investment activity while controlling for other factors that may affect local equity markets. Section IV reports the empirical results on the costs of capital, in Section V we discuss the results for other variables, and in Section VI we offer some concluding remarks.

I. The Role of Speculators in Emerging Markets

A. *Speculation, Market Efficiency, and Volatility*

Economic theory generally suggests that speculative activity enhances the informational and allocational role of asset markets thereby making markets more efficient (see Grossman (1995) and Grossman and Stiglitz (1980)). Foreign speculative activity in emerging markets can play a particularly

important role. First, the potential of market manipulation is acute in small emerging markets and liquidity is often poor. Although there are many policy initiatives that could increase liquidity and reduce the degree of collusion among large traders, there may not be a sufficient mass of domestic speculators to ensure market liquidity and efficiency. Second, opening the market to foreign speculators may increase the valuation of local companies, thereby reducing the cost of equity capital. The intuition is straightforward (see, e.g., Bekaert and Harvey (1995)). In segmented capital markets, the cost of equity capital is related to the local volatility of the particular market. In integrated capital markets, the cost of equity capital is related to the covariance with world market returns. Given that emerging economies have different industrial mixes and are less subject to macroeconomic shocks originating from developed economies, covariances with world factors are low (see Harvey (1995)). Since local market volatilities tend to be large, the cost of capital should decrease after capital market liberalizations.

In a more complex world, the magnitude and even the sign of the cost of capital effect is not a priori obvious. First, as Stulz (1999) indicates, the decrease in the equity risk premium depends critically on the diversification potential of the local market. In the context of our one-factor example, little effect should be expected when the local market is perfectly correlated with the world market. We incorporate this idea in one of our empirical specifications below. Second, though we believe risk premiums generally decrease (see also Subrahmanyam (1975)), there may be scenarios in which the real rate of interest may actually increase (see the examples in Obstfeld (1994), Basak (1996), and Basak and Cuoco (1998)).

The predictions for the effect of speculative activity on volatility are less clear cut. Moreover, there is no clear relation between volatility and market efficiency. In the models of Newbery (1987) and Ross (1989), for example, speculative activity increases volatility but is, at the same time, welfare improving. Correlations may increase because the discount rate becomes global or cash flows become more correlated but the magnitude of these effects is hard to predict.

A major problem in bringing theory to bear on our research here is our poor understanding of international portfolio choice. For example, in relatively open capital markets, we observe substantial cross-border flows but portfolios continue to display home-asset bias (see Tesar and Werner (1995a)). Therefore, we investigate empirically how the cost of capital, volatility, correlations, and betas are affected by foreign portfolio investors. To do so, we isolate cases in which the importance of foreign speculators in the local market increases.

B. Investing in Emerging Equities

B.1. Capital Market Liberalizations

Table I is based on the detailed chronology of capital market liberalizations for the 20 emerging markets in our sample presented in Bekaert and Harvey (1998) and summarized in Appendix B. Many liberalizations are

Table I

The Opening of Equity Markets in Emerging Countries

The official liberalization dates are based on the analysis in Bekaert and Harvey (1998). Appendices are available on the Internet that detail the ADR and country fund introduction dates. The estimate of the break point in cumulative net U.S. capital flows is obtained from the algorithm in Bai, Lumsdaine, and Stock (1998). The U.S. portfolio flows data are from the *U.S. Treasury Bulletin* and represent a fraction of the total portfolio flows to these countries. Market capitalizations are from the IFC. The cumulation of the capital flows takes into account the equity market returns in each country. n/a represents not available.

Country	Official Liberalization Date	First ADR Introduction	First Country Fund Introduction	Estimate of Increase in Net U.S. Capital Flows	Cumulative Net U.S. Flows to Market Cap Dec-95
Argentina	89.11	91.08	91.10	93.04	0.2181
Brazil	91.05	92.01	87.10	88.06	0.1114
Chile	92.01	90.03	89.09	88.01	0.0745
Colombia	91.02	92.12	92.05	93.08	0.0400
Greece	87.12	88.08	88.09	86.12	0.0357
India	92.11	92.02	86.06	93.04	0.0114
Indonesia	89.09	91.04	89.01	93.06	0.0669
Jordan	95.12	n/a	n/a	n/a	n/a
Korea	92.01	90.11	84.08	93.03	0.0480
Malaysia	88.12	92.08	87.12	92.04	0.0159
Mexico	89.05	89.01	81.06	90.05	0.1897
Nigeria	95.08	n/a	n/a	n/a	n/a
Pakistan	91.02	n/a	91.07	93.04	0.0123
Philippines	91.06	91.03	87.05	90.01	0.1232
Portugal	86.07	90.06	87.08	94.08	0.0637
Taiwan	91.01	91.12	86.05	92.08	0.0021
Thailand	87.09	91.01	85.07	88.07	0.0184
Turkey	89.08	90.07	89.12	89.12	0.0442
Venezuela	90.01	91.08	n/a	94.02	0.0005
Zimbabwe	93.06	n/a	n/a	n/a	n/a

clustered in the late 1980s or early 1990s. Although such an event may be considered a prime candidate for testing the impact of increased foreign speculative activity, there are a number of factors that could confound this experiment. First, the investment restrictions may not have been binding. Second, liberalizations can take many different forms—relaxing currency controls, reducing foreign ownership restrictions, etc.,—and not all market reforms take place at the same time. This makes the choice of the "liberalization date" in Table I open to debate. Third, 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. Two examples of such indirect participation of foreign speculators in local stock markets are Country Funds and American Depositary Receipts (ADRs). Although countries might enact official liberalizations of their capital markets, foreign investors still face many market imperfections, such as poor liquidity. Country Funds and ADRs provide the advantage of trading in transparent and liquid markets in New York and London. We review the theoretical and empirical evidence on the effects of these external financing vehicles in Sections I.B.2 and I.B.3. Fourth, a liberalization may not be enough to induce foreign investors to actually invest in the country, either because of other concerns or because of home bias. Therefore, we also use information from capital flows, which we discuss in Section I.B.4.

B.2. Country Funds

A closed-end country fund is an investment company that invests in a portfolio of assets in a foreign country (e.g., an emerging market) and issues a fixed number of shares domestically (e.g., in the United States). Each fund provides two distinct market-determined prices: the country fund's share price quoted on the market where it trades, and its net asset value determined by the prices of the underlying shares traded on the foreign market. Closed-end mutual funds were the original vehicles for foreign investment in emerging financial markets. For example, until the late 1980s the closed-end Mexico Fund was the only way U.S. investors could invest in the Mexican market. The Korea Fund partially opened up the Korean equity market to foreign investors in 1984, long before the capital market liberalizations of 1991. Table I presents the dates of the introduction of the first country fund for our sample of emerging markets.

Errunza, Senbet, and Hogan (1998) theoretically show that the introduction of country funds drives up the prices of local companies and reduces the cost of capital. The country fund essentially renders the local market partially integrated with global markets. These results hold even though the typical size of a country fund is very small relative to the total market capitalization of the emerging market. Using an event-study of returns around country fund launchings, Tandon (1997) presents empirical evidence that seems to support these claims.

B.3. American Depositary Receipts

American Depositary Receipts are rights to foreign shares that trade in dollars on a U.S. exchange or over-the-counter. Table I details the earliest ADR introduction for the emerging markets in our sample. ADRs overcome many of the investment restrictions, transaction costs, and informational problems associated with investing in foreign securities. For example, since ADRs are treated as U.S. securities in most legal situations, they enable mutual funds, pension funds, and other U.S. institutions to hold securities that are fungible with foreign shares.

The effects of ADRs on local stock market prices are theoretically similar to those of country funds (see Urias (1994)). Importantly, local stocks that are correlated with the newly cross-listed security respond as well, even though they are not themselves cross-listed. That is, there are *spill-over effects*. A variety of empirical studies[1] find mixed results, but mostly the local price effect of ADR introductions is positive.

B.4. Capital Flows

Arguably, the best measure of the foreign presence in an emerging market is the percentage of stocks held by foreign investors. However, the only available data are U.S. capital flows to emerging markets since 1985. These data are published monthly in the U.S. *Treasury Bulletin*.[2]

We accumulate the capital flows to obtain an approximate measure of the ratio of U.S. ownership to market capitalization. The accumulation takes into account the local market equity appreciation realized by the U.S. investor. That is, the dollar position of U.S. investors in emerging market i is

$$\text{Own}_{i,t} = \text{Flow}_{i,t} + \text{Own}_{i,t-1}(1 + R_{i,t}),$$

where $\text{Flow}_{i,t}$ is the net capital flow in period t and $R_{i,t}$ is the market i return in U.S. dollar terms from the IFC. The last column in Table I reports the U.S. percentage ownership at the end of 1995, which is largest in Mexico and Argentina.

These data are not without problems. First, although for most countries portfolio flows were zero before 1985, for others, not knowing the initial foreign ownership (in 1985) makes the resulting estimates hard to interpret. Second, it may be the case that foreigners hold portfolios different from the IFC index. Kang and Stulz (1997) show that foreign investors are more likely to invest in securities that are large and well known. The IFC indexes pos-

[1] See Foerster and Karolyi (1999), Miller (1999), the survey in Karolyi (1998), and Domowitz, Glen, and Madhavan (1997, 1998) for studies at the individual firm level and see Bekaert (1995) for a study at the market level.

[2] Table CM-V-4 reports on a monthly basis foreigners' gross purchases of foreign stocks (U.S. sales, column 7) and foreigners' gross sales of foreign stocks (U.S. purchases, column 14). See Tesar and Werner (1995b) for an early analysis and see Hamao and Mei (1997) for a study of the effects of foreign investment on Japanese equity pricing.

sess some advantage here over more comprehensive local indexes because of the IFC's focus on large, relatively liquid securities. Third, and perhaps most importantly, U.S. investors may invest in emerging markets through third countries, like the U.K. Hence, the large flows to the U.K. could partially reflect emerging market investment that we are unable to track. Fourth, the relation between the cost of capital and foreign ownership may be nonlinear. That is, stocks will be priced differently when foreigners become the marginal investors. It is not clear at what level of foreign ownership this occurs.

Our approach is to test for a structural break in the U.S. ownership series to identify when the foreign investors' presence in the market increases significantly. We employ the endogenous break point tests detailed in Bai, Lumsdaine, and Stock (1998). Briefly, the test searches for a break in the mean within the context of an autoregressive model for the ownership series. Apart from a structural break test, the procedure yields a break date with a 90 percent confidence interval.[3] We report the results in the fourth column of Table I.

II. Measuring the Cost of Capital

The cost of capital is notoriously difficult to measure. The problems are compounded in our setting, since we believe that the cost of capital changes when markets integrate with world capital markets and that the process of integration is gradual. In such an environment, it is very difficult to use average returns to measure changes in the cost of capital. However, a change in the marginal investor and the different valuation it implies should have discrete effects on the price level of stocks (see also Korajczyk (1996) for similar arguments). Hence, it is likely that a technique exploiting information in price levels may be more powerful. Whereas Henry (2000), in effect, attempts to measure the discrete price change directly by estimating the abnormal return during the liberalization period, we use aggregate dividend yields to measure cost of capital changes.

Why dividend yields? First, shocks to prices should dominate its variation over time. Second, the dividend yield is intricately linked to the cost of capital in many asset pricing models, as we demonstrate below. Third, the dividend yield is directly measurable—that is, it need not be preestimated—and is a stationary random variable.[4] That is, in most rational expectations models, a transversality condition ensures that the price-dividend ratios (and hence the dividend yields) are stationary. The capital market liberalization process can be viewed as a structural break that renders dividend yields nonstationary over the full sample. Our empirical approach only requires

[3] We thank Robin Lumsdaine for the use of her program.

[4] With emerging markets, the dividend yield calculation is not straightforward. In our cost of capital regressions, we use the dividend yields provided by the IFC which are a 12-month moving average of dividends divided by the current price level. However, in high inflation countries, one can make the case that an average of the last 12 months' dividend yields is a more appropriate measure, since this assumes past dividends are reinvested in the stock market. We use this alternative dividend specification as one of our local instrumental variables.

them to be stationary before and after the liberalization.[5] In the United States, dividend yields have recently displayed a downward trend that is often partially ascribed to the marked increase in share repurchases, constituting an alternative means of dispensing cash to shareholders. Such repurchases are minor or entirely absent in emerging markets.[6]

A. *Dividend Yields versus Average Returns as a Cost of Capital Measure*

Consider first a simple example. Assume rational expectations and a discounted dividend model for the stock price, P_t:

$$P_t = E_t\left[\sum_{i=1}^{\infty} \delta_{t+i}^{i} D_{t+i}\right], \tag{1}$$

where D_t are the dividends and δ_t is the discount factor, and where the usual transversality condition holds. Let

$$Y_t^x = \begin{cases} 0, & \text{before liberalization;} \\ 1, & \text{after liberalization.} \end{cases}$$

The x superscript indicates different measures of liberalization (see below). We further assume that the liberalization is a one-time, unexpected event. When the market is segmented, the required rate of return is constant and equal to r. When the market opens up, the required rate of return drops to $\bar{r}$. We can represent this simple model for expected returns as

$$\delta_t = \frac{1}{1 + r - \eta Y_t^x}, \tag{2}$$

where $\eta = r - \bar{r}$, the drop in the cost of capital. Under this set of assumptions, the relation between the change in the dividend yield $\bar{D}_t/\bar{P}_t - D_t/P_t$ and the change in the cost of capital η depends on the dividend process.

In the standard Gordon model, which assumes that $E_t D_{t+i} = (1+g)E_t D_{t-1+i}$, this relation is virtually one to one. It is straightforward to show that

$$\eta = (1+g)\frac{D_t}{P_t} - (1+\bar{g})\frac{\bar{D}_t}{\bar{P}_t} + g - \bar{g}. \tag{3}$$

[5] This break complicates the interpretation of the notoriously powerless standard unit root and stationarity tests applied to dividend yields. This is especially the case for emerging markets which have short samples to begin with. A whole battery of tests yields the typical conclusion that it is about equally hard to reject the null of a unit root as to reject the null of stationarity. A Bayesian unit root test (Sims and Uhlig (1991)) overwhelmingly rejects the presence of a unit root in emerging market dividend yields.

[6] We searched the IFC database for negative changes in shares outstanding. Most of the negative numbers were traced to rights issues that were not fully subscribed. There is little evidence of share repurchases in emerging markets. Indeed, it is not uncommon for repurchases to be illegal in many emerging markets.

If the growth rate of dividends is not affected by the capital market liberalization, a regression of D_t/P_t onto Y_t^x yields $\eta/(1+g)$. Hence, the slope coefficient provides a slight underestimate of the true response of the cost of capital.

The Gordon model is not a realistic model for stock price determination but its main intuition remains valid with more general models. Consider the following present value model. Dividend growth follows an autoregressive process with homoskedastic innovations:

$$\Delta d_t = \mu(1-\rho) + \rho \Delta d_{t-1} + \epsilon_t$$

$$E_{t-1}[\epsilon_t^2] = \sigma_\epsilon^2, \tag{4}$$

where $d_t = \ell n(D_t)$ and $\epsilon_t \sim N(0, \sigma_\epsilon^2)$. This process for dividend growth is not entirely realistic, because there may be seasonal patterns in dividend growth rates and the innovations may be heteroskedastic (see Bollerslev and Hodrick (1995)). Nevertheless, a more general model in the log-linear class has implications similar to the model analyzed here. Moreover, we allow for time-varying log-discount rates, $\delta_t = \exp(-r_t)$ and assume that the continuously compounded expected return follows an autoregressive process:

$$r_t = q(1-\phi) + \phi r_{t-1} + \eta_t$$

$$E_{t-1}[\eta_t^2] = \sigma_\eta^2 \tag{5}$$

and $\eta_t \sim N(0, \sigma_\eta^2)$. We also assume that η_t and ϵ_t are uncorrelated. This present value model bears some resemblance to the setup of Campbell and Shiller (1988) but we provide closed-form solutions for the price-dividend ratio. Although the current specification is quite simple, our solution technique would go through in the case of correlated residuals or a square root process for r_t (see Bekaert and Grenadier (1999) for more complex models in this framework).

Starting from

$$\frac{P_t}{D_t} = E_t\left[\sum_{i=1}^{\infty} \exp\left(\sum_{j=1}^{i} -r_{t+j-1} + \Delta d_{t+j}\right)\right], \tag{6}$$

Appendix A shows by induction

$$\frac{P_t}{D_t} = \sum_{i=1}^{\infty} \exp(a_i + b_i \Delta d_t + c_i r_t), \tag{7}$$

where

$$
\begin{aligned}
a_{i+1} &= a_i + \bar{\mu}(1 + b_i) + \frac{\sigma_\epsilon^2}{2}(1 + b_i)^2 + c_i\bar{q} + \frac{\sigma_\eta^2}{2}c_i^2 \\
b_{i+1} &= \rho(1 + b_i) \\
c_{i+1} &= -1 + \phi c_i,
\end{aligned} \tag{8}
$$

and $\bar{\mu} = \mu(1 - \rho)$; $\bar{q} = q(1 - \phi)$ and $a_0 = b_0 = c_0 = 0$. The expressions for $\{a_{i+1}, b_{i+1}, c_{i+1}\}$ are Ricatti difference equations, which, for our simple specification, have closed-form solutions as a function of the model parameters:

$$
\begin{aligned}
a_{i+1} &= i\left(\bar{\mu} + \frac{\sigma_\epsilon^2}{2}\right) + \sum_{j=1}^{i}\left[(\bar{\mu} + \sigma_\epsilon^2) + \frac{\sigma_\epsilon^2}{2}b_j\right]b_j + \sum_{j=1}^{i}\left(\bar{q} + \frac{\sigma_\eta^2}{2}c_j\right)c_j \\
b_{i+1} &= \rho\,\frac{1 - \rho^{i+1}}{1 - \rho} \\
c_{i+1} &= -\frac{1 - \phi^{i+1}}{1 - \phi}.
\end{aligned} \tag{9}
$$

Hence, the price-dividend ratio at each point in time is a function of the two state variables r_t and Δd_t. In the constant expected returns case, the price-dividend ratio only depends on the current dividend growth rate (see Appendix A for more details). Returns are computed as

$$
R_{t+1} = \exp(\Delta d_{t+1})\,\frac{D_t}{P_t}\left[1 + \frac{P_{t+1}}{D_{t+1}}\right]. \tag{10}
$$

This simple model fits the data very well.[7] We calibrate the model parameters to annual U.S. data on real dividend growth, dividend yields, and real stock returns for the S&P 500. Appendix A reveals a close match with the first three moments of these series. For example, our model generates a standard deviation of 22.9 percent for real stock returns (20.0 percent in the data) and an average dividend yield of 5.0 percent (4.4 percent in the data).

Is the change in the dividend yield still a good proxy for the change in the cost of capital after a market liberalization? When expected returns are varying through time, dividend yields forecast both future dividend changes and future returns. Time variation in expected returns may therefore induce changes in dividend yields that do not reflect a change in the long-term cost

[7] This may surprise readers familiar with the excess volatility literature. The key feature that improves performance is the assumption of a unit root in the dividend process (see Kleidon (1986) and Cochrane (1992)).

of capital brought about by market integration. Such change is nevertheless likely to be near permanent and to have a larger effect on dividend yields than a transitory change in expected returns. Ideally, we would introduce a variable in our regressions that controls for time-variation in expected returns. The fact that this time-variation may be tracked by different variables before versus after liberalization (local versus global information variables) complicates this task. Nevertheless, since the change in the cost of capital induced by market integration is near permanent, investigating dividend yields is again superior to investigating returns.

What makes dividend yields superior in small samples is their lack of variability relative to returns. It is difficult to illustrate this superiority analytically given the persistence in dividend yields and returns. In Appendix A, we describe a Monte Carlo experiment that illustrates the relative performance of the two measures of cost of capital changes (average returns before and after the break versus changes in dividend yields) in the context of the present value model. We simulate samples of 40 data points (years) with the cost of capital (as measured by q) falling by two percent after 20 years. The results can be summarized as follows:

1. The distribution of the changes in average simple returns is so spread out that there is a larger than 10 percent probability one concludes that the cost of capital increased by more than five percent although it actually dropped by 2.19 percent in the population.[8] Dividend yields virtually always decrease.
2. When we investigate experiments where average returns just before liberalization are unusually high or low, the return measure is severely biased, whereas the dividend yield shows very little bias. This suggests that when there is endogeneity bias (for example, governments choosing to liberalize when it appears most advantageous to them, such as in times of depressed stock prices), the dividend yield measure is robust but the average return measure is not.
3. Cross-sectional pooling dramatically improves the performance of both the return and dividend yield measures, making the dividend yield measure extremely accurate.

B. Caveats

B.1. Growth Opportunities versus Cost of Capital Changes

Despite the gain in accuracy that the use of dividend yields brings, their use also creates some potential interpretation problems. First, the change in the dividend yield may overestimate the cost of capital because of its link to economic growth. A liberalization may enhance the growth prospects for a country (see Obstfeld (1994)), leading to increased prices. The Monte Carlo experiment described in Appendix A considers a case where in

[8] The change in expected return is computed from $E[\exp(r_t)] = \exp(\mathrm{q} + \frac{1}{2}[\sigma_\eta^2/(1 - \phi^2)])$.

addition to a two percent reduction in the cost of capital, the permanent growth rate of dividends increases by one percent after a liberalization (see Appendix A, Table AII, Panels A and C, experiment 2). The dividend yield now drops by approximately 3.25 percent, of which 2.19 percent is due to a change in the cost of capital and the remainder is due to the change in the dividend growth rate. Hence, a decrease in the dividend yield may reflect a lower cost of capital or better growth opportunities. It is very hard to disentangle these two effects but we devote considerable attention to this problem.

First, in our cross-sectional analysis below, we add control variables that can pick up variation in D_t/P_t that is not accounted for by changes in the cost of capital. If these variables are correlated with better growth opportunities, they may alleviate the problem. For example, if the liberalization is accompanied by macroeconomic reforms and trade liberalization, the resulting increase in the growth potential of the country may be controlled for by a variable such as exports plus imports as a fraction of GDP or by country risk variables. Henry (2000) shows that trade and financial liberalization often are clustered in time and attempts to disentangle their effects on equity prices.

Second, following Henry (2000), we also use excess returns as the dependent variable in our regression analysis. When dividend yields drop by a large amount but excess returns do not, the dividend yield change is likely driven by an improvement in growth opportunities. Nevertheless, Section B of Appendix A shows that it remains the case that increases in average returns often are still consistent with a population decrease in the cost of capital.

Third, our experiments generally confirm that the response of dividend yields to cost of capital changes is indeed near linear (see Appendix A). Hence, we can simply attempt to "measure" the change in growth opportunities (for example, by reporting increased long-run GDP growth) and subtract it from the total dividend yield change to estimate the change in the cost of capital. We deliver a number of statistics on changes in growth opportunities after liberalizations in Section IV.A.5 below.

Fourth, since the linearity of dividend yield responses may not be general if other structural parameters change (e.g., dividend growth or return volatility), we also provide a calibration exercise of our structural model before and after liberalization, which yields direct estimates of changes in expected returns and dividend growth for an "average" emerging market (see Section C of Appendix A).

B.2. Corporate Finance Issues

Corporate finance theory also suggests that dividend yields may decrease for reasons other than a decrease in the cost of capital. If emerging market firms truly enjoy better growth opportunities after liberalizations, they may

choose to distribute fewer dividends and invest more. Henry (1999) documents increased aggregate investment after financial market liberalizations. Of course, this increase may also be due to decreases in the cost of capital.

B.3. Other Caveats

Our analysis so far assumes there is one unexpected liberalization. When liberalizations are anticipated, prices adjust before the actual liberalization occurs. If some uncertainty remains about the liberalization, a positive price movement may still occur on the actual date. Since returns are likely to be positive in the period between anticipation and actual liberalization, expected liberalizations are another reason to be wary of the use of returns for testing the cost of capital effect. We attempt to take anticipated liberalizations into account in our measurement of the liberalization variable Y_t^x. One of our measures also reflects the gradual nature of capital market liberalizations.

Finally, emerging markets may be inefficient and illiquid and the arrival of foreign investors may enhance efficiency and liquidity, thereby reducing the cost of equity capital. We include control variables that measure stock market development which may partially capture this indirect liberalization effect.

III. Econometric Methodology

A. Defining the Liberalization Variables

We introduce two liberalization dummies, one based on the capital market liberalization dates and the other based on the capital flow break points in Table I. We split our sample into four parts: PRE (36 to seven months prior to liberalization), DURING (six months prior to three months after liberalization), POST (four months after liberalization to 34 months postliberalization), and AFTER (35 months after liberalization to the end of the sample). The PRE and POST periods are symmetric in duration. When liberalizations are preannounced or anticipated by market participants, expected returns may change some time before the liberalization date. By excluding nine months around the liberalization date, our procedure is hopefully robust to small errors in the dating of the liberalization. Moreover, we check the sensitivity of our results to the length and structure of the DURING window.

Our other measure uses launching data on ADRs and country funds to construct three indexes. First, $A_{t,i}$ counts the number of ADR issues in the United States or the U.K. for country i over time. Hence, for some countries this index may equal the zero vector. Second, $CF_{t,i}$ similarly "counts" the country fund launchings. Finally, $L_{t,i} = A_{t,i} + CF_{t,i}$. When attempting to measure how the cost of capital is affected by changes in these indexes, we face a number of immediate technical problems.

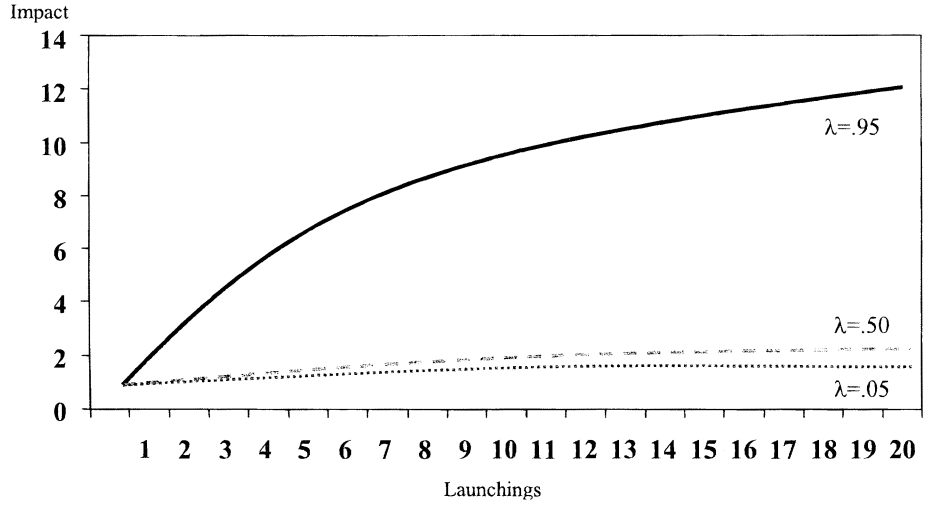

Figure 1. The decreasing impact of ADR and Country Fund launchings. The impact function is $(1 - \lambda^x)/(1 - \lambda)$ where x goes from 1 to 20. The size of λ determines how fast the additional impact of further launchings decline. For low λs, there is little effect of additional launchings.

First, the effect of the very first ADR and/or country fund is likely to be much larger than that of further ADR issues and/or country funds launchings. This is suggested by the theoretical analyses mentioned above and makes sense at an intuitive level. To accommodate that possibility, we introduce the variable

$$Y_t^x = \frac{1 - \lambda^{x_t}}{1 - \lambda}, \quad \text{for } x = A, CF, \text{ or } L, \tag{11}$$

where $0 < \lambda < 1$. The size of λ determines how fast the additional impact of further launchings declines. Figure 1 shows what happens for three different λs assuming the index goes from 1 to 20 continuously (in reality, Y_t^x will be a step function). As can be seen, for very low λs, the additional issues generate almost no additional effect.

Second, as indicated above, it is important to account for rational expectations of the market participants. Fortunately, for some ADRs, we have the actual announcement dates, using information provided by Miller (1999),[9]

[9] When announcement dates are unavailable, a proxy is used. For ADRs listed on the major stock exchanges (such as the NYSE, Nasdaq, and AMEX), a four-month period prior to the actual initial public offering (IPO) date is used; for OTC ADRs, a one-month period prior to the IPO is used; and for 144A ADRs, a two-month period prior to the IPO period is used. These are estimated from median announcement leads on the ADRs for which we have both announcement and listing dates.

but we only have the launching dates for the country funds. However, in earlier work, we found little impact on our results after introducing an announcement lead of three months for the country funds.

Expectations of future liberalizations may be partially captured by adjusting λ. For example, a second ADR issue would produce a reduction in the cost of capital by $\eta\lambda$, where $\lambda \leq 1$. However, it seems natural that ADR issues trigger expectations of further ADR issues and market openings. This implies that the jump on the liberalization date may be higher and λ smaller if expectational effects play an important role.[10]

More generally, if such expectation effects are important, what matters is the first signal of liberalization. This may occur in the form of a country fund, ADR, or a large-scale liberalization. Our final liberalization variable splits up the sample into four parts as was done for the capital market liberalization dummy. However, the date used is the date of the first sign of openness through whatever form.

B. Econometric Framework

Denote the variable of interest by Z_t^i, so $Z_t^i = D_t^i/P_t^i$ (dividend yield) or $Z_t^i = \ell n(P_t^i/P_{t-1}^i)$ (including dividends) less the U.S. Treasury bill rate (excess returns measure). Later we use the same model for conditional volatilities, correlations, and betas as the dependent variables. Our general model is

$$\begin{aligned} Z_t^i &= \boldsymbol{\alpha}^i + \boldsymbol{\beta}' \mathbf{W}_t^i + \gamma Y_t^{x^i} + \epsilon_t^i \\ \epsilon_t^i &= \rho^i \epsilon_{t-1}^i + u_t^i. \end{aligned} \tag{12}$$

This model pools time-series and cross-sectional information and allows us to examine all observations simultaneously. The intercept specification allows for fixed effects. Fixed effects may capture cross-sectional differences in dividend yields due to differential tax regimes, for example. The set of variables that control for variation in Z_t^i, not accounted for by liberalizations, $\mathbf{W}_t^i$, is detailed below.

Notice that the liberalization variable is constrained to have the same slope coefficient, γ, across countries. This greatly enhances the power of our tests. In a sense, we measure the average impact of a market liberalization controlling for other variables, in the spirit of the event study methodology in finance. An alternative would be to write down the process for Z_t^i, assume that all parameters change after the liberalization, and test whether the parameter change is significant. Given the noise in the data, this approach is unlikely to be fruitful. Of course, there are reasons to expect that γ is not equal across countries. For example, the price response of a liberalization

[10] Another potential limitation is that we do not have data on the market capitalizations of the ADRs. It is possible that the first issue is "small" and relatively unimportant.

may depend on the nature of the existing restrictions or the size of the ADR or country fund. Some of these effects are controlled for by variables in $\mathbf{W}_t^i$ but not all. Underlying our approach is the view that the dominant effect of a market opening—a different marginal investor driving up the price—should be similar across countries. Hence, cross-sectional information effectively circumvents the peso-type problem that we only have one liberalization per country. It also allows us to make predictions about the likely effect of a capital market liberalization for countries that are as yet closed to international investors.

We conduct two experiments in which the liberalization variable is scaled by a country-specific variable so that country-specific responses are allowed for. The first variable is a correlation index, computed as $\ell n[2 - \rho^{\text{pre}}]/\ell n[3]$, where ρ^{pre} is the correlation between the local excess return and the world market excess return before the liberalization. Consequently, whereas we still estimate a country invariant γ, the liberalization effect is country-specific and increases the lower is the correlation with the world market before the liberalization. In particular, the effect is zero if the preliberalization correlation is perfect and γ if the preliberalization correlation is -1. In another experiment, we weigh the dummies by the postliberalization five-year average value of foreign ownership in the case of the "Official Liberalizations" and "First Sign" measures and by the change in the five-year average of foreign ownership post- versus preliberalization for the capital flow break regressions. If the extent of foreign ownership significantly alters the cost of capital effect, γ ought to be large in such a regression.

Finally, in a previous version of the paper, we checked the robustness of our results to country-specific liberalization effects. To maintain power, we estimated one country at a time. That is, in the first regression, there was a country-specific coefficient for Argentina but the liberalization effect was restricted to be the same for the other countries. We found that the country-specific coefficients were rarely significant and generally insignificantly different from the overall coefficient.

C. Estimation Issues

We perform generalized least squares accounting for groupwise (country-by-country) heteroskedasticity, with a Prais–Winsten correction for serial correlation since it is unlikely that our control variables capture all serial correlation in dividend yields (and similarly in volatility below). We do not correct for potential endogeneity problems. If the government liberalizes when it is most needed (the cost of capital is temporarily high), policy endogeneity makes our estimates upper bounds on the true response. We also do not correct for correlation across residuals of different countries. First, given the low correlations between emerging market returns, it is unlikely that we will gain much efficiency by doing so. Second, it is technically nontrivial since the number of observations differs across countries.

D. Control Variables

The control variables generally fall into four categories: asset concentration, stock market development/economic integration, microstructure effects, and finally macroeconomic influences and political risk.

The asset concentration category includes the number of stocks in each of the country indexes followed by the International Finance Corporation (IFC). We also investigate a modified Herfindahl index of concentration. This index ranges from zero (equal market capitalization) to one (one dominant firm).

The stock market development/economic integration category includes two macroeconomic measures and one financial measure. The macroeconomic variables are the capitalization of the stock market relative to the country's GDP and the size of the trade sector (exports plus imports) relative to GDP. Our financial variable is the cross-sectional standard deviation of the stock returns within each index (at every month). As an economy becomes more developed and the stock market more mature, there is often less reliance on one particular sector (the correlation between stocks decreases), which increases the cross-sectional standard deviation.

We use cross-sectional standard deviation also as our main microstructure variable since other data, such as turnover and the number of stocks traded, are only available for a portion of the sample. This variable potentially wears two hats. In the model of Ross (1989), it measures the amount of information being revealed about the stocks traded in a particular country. However, as indicated above, it may also potentially reveal information about the diversity of the industrial sector. To account for these two interpretations in the volatility, correlation, and beta models, we also allow for the cross-sectional standard deviation to interact with the relative level of market development measured by the market capitalization to GDP ratio minus its cross-sectional mean. If $MC_t^i/GDP_t < \overline{(MC_t/GDP_t)}$ and the regression coefficient on the interaction variable is positive, then an increased cross-sectional standard deviation negatively affects market volatility. If $MC_t^i/GDP_t > \overline{(MC_t/GDP_t)}$, then the derivative of volatility with respect to the cross-sectional standard deviation is positive, which is what is predicted by the information flow model of Ross.

The final variables are linked to the condition of the macroeconomy. We examine the standard deviation of exchange rate changes as well as the average inflation rates. We also include a variable designed to proxy for political risk: the Institutional Investor country credit rating. Erb, Harvey and Viskanta (1996b) find that the Institutional Investor measure has high correlation with more direct measures of political risk that are available over shorter periods.

Table II presents country specific means of all the variables that we examine as well as some characteristics of the cross-sectional distribution of these variables. The large outliers in the inflation rates for Argentina and Brazil motivate a log transformation of the inflation data. It is also interesting to note the skewed nature of the market capitalization to GDP dis-

Table II
Summary Statistics

Sample averages for various variables are reported for each country. The bottom panel reports characteristics of the cross-sectional distribution using the data for all countries and all of the periods simultaneously. Volatility is the monthly standard deviation. Fitted volatility and correlations from the models are discussed in Bekaert and Harvey (1997). The number of companies in the index refers to the International Finance Corporation global indexes. The concentration ratio is a modified Herfindahl index based on market capitalization. The cross-sectional standard deviation is the standard deviation of the individual stock returns in the index at each month in time. FX volatility is a rolling three-year standard deviation of exchange rate versus U.S. dollar changes. Country credit rating is from the Institutional Investor's semiannual survey. The sample period depends on the country but ranges from January 1976 to December 1995. Unless mentioned, all data are from the IFC.

	Dividend Yield (annual)	Fitted Volatility (monthly)	Fitted Correlation	Market Capitalization to GDP	Inflation Rate (annual)	Number of Companies in Index	Concentration Ratio	Cross-Sectional Standard Deviation	FX Volatility (monthly)	Exports + Imports to GDP	Country Credit Rating (0–100 scale)
Argentina	1.53	0.277	0.122	0.034	579.28	25.0	0.250	0.199	0.220	0.152	32.4
Brazil	5.55	0.182	0.076	0.073	856.98	40.9	0.253	0.209	0.092	0.173	35.7
Chile	5.10	0.096	0.129	0.344	19.79	28.3	0.223	0.117	0.031	0.546	40.5
Colombia	4.06	0.077	0.016	0.102	25.97	21.4	0.195	0.119	0.016	0.336	38.7
Greece	6.42	0.099	0.142	0.064	17.94	20.6	0.386	0.097	0.033	0.480	51.6
India	2.40	0.081	−0.014	0.067	9.53	52.9	0.180	0.095	0.020	0.165	46.2
Indonesia	1.57	0.162	0.259	0.126	9.10	45.7	0.179	0.107	0.004	0.514	51.5
Jordan	3.70	0.047	0.173	0.349	6.31	21.2	0.534	0.067	0.019	1.223	31.0
Korean	3.51	0.084	0.139	0.153	7.98	60.7	0.184	0.092	0.011	0.672	63.1
Malaysia	1.95	0.063	0.481	1.157	3.60	71.2	0.189	0.091	0.012	1.569	61.6
Mexico	4.45	0.120	0.202	0.103	50.30	42.1	0.202	0.153	0.065	0.289	43.6
Nigeria	7.86	0.326	−0.030	0.035	45.00	23.1	0.176	0.094	0.183	0.519	18.9
Pakistan	4.10	0.090	0.053	0.085	10.17	58.9	0.160	0.097	0.012	0.357	29.5
Philippines	1.21	0.094	0.389	0.233	10.90	30.6	0.299	0.122	0.022	0.681	27.2
Portugal	3.00	0.071	0.506	0.115	8.89	29.7	0.220	0.084	0.036	0.618	64.5
Taiwan	0.76	0.195	0.064	0.591	3.91	70.2	0.176	0.099	0.012	0.903	77.8
Thailand	5.92	0.079	0.151	0.175	5.69	27.1	0.285	0.086	0.012	0.642	56.5
Turkey	4.41	0.189	0.022	0.120	75.14	28.9	0.243	0.173	0.043	0.352	42.7
Venezuela	1.64	0.151	0.044	0.089	47.57	15.3	0.262	0.142	0.061	0.535	35.7
Zimbabwe	8.36	0.089	0.076	0.138	19.60	14.5	0.278	0.148	0.037	0.587	25.0
Global means	4.16	0.143	0.137	0.189	118.48	35.6	0.254	0.122	0.051	0.535	43.4
Global minimum	0.00	0.023	−0.697	0.000	−4.55	7.0	0.107	0.005	0.000	0.115	15.8
Global maximum	27.26	1.994	0.819	2.414	8163.97	162.0	0.735	2.725	0.536	1.812	79.9
First quartile	1.66	0.067	0.041	0.028	6.28	20.0	0.181	0.071	0.012	0.301	29.1
Second quartile	3.09	0.087	0.106	0.091	13.81	25.0	0.214	0.100	0.024	0.498	41.9
Third quartile	5.85	0.129	0.213	0.230	32.48	47.0	0.286	0.144	0.047	0.636	54.9

tribution. There is relatively little difference between the first quartile and the median, but there is a sharp jump when moving from the median to the third quartile.

The role of control variables is complex in our framework. The regression that we specify in equation (12) is correct if the control variables reflect variation in dividend yields not associated with liberalizations. However, it is possible that the control variables may be correlated with growth opportunities or cost of capital changes induced by the liberalization. If we linearize our structural model around mean dividend growth rates and mean expected returns, we obtain a structural regression:

$$D_t/P_t = a(\theta) + b(\theta)Y_t^x + [c(\theta) + d(\theta)Y_t^x]\Delta d_t + [e(\theta) + f(\theta)Y_t^x]r_t \qquad (13)$$

where θs are the structural parameters, Y_t^x is the liberalization indicator, Δd_t is the log-dividend growth, and r_t represents the expected rate of return. If our control variables are correlated with structural changes in Δd_t and r_t, we may expect their data-generating process to change after financial liberalizations and we may find significant coefficients $d(\theta)$ and $f(\theta)$. We explore this below by examining whether control variables break around liberalization dates and whether they capture future growth opportunities. We also run regressions without control variables and we run "structural regressions," allowing for breaks in all the control variables.

An interesting and relevant special case is when dividend growth follows a white noise process, not an unreasonable approximation to the dividend growth rate process, and expected returns are constant. In that case, $c(\theta)$ and $d(\theta)$ are zero and, hence, the coefficient on Δd_t is also zero. As a consequence, any change in growth opportunities is absorbed in the constant $b(\theta)$, as is the change in the cost of capital. Given our previous Monte Carlo experiments, which suggest that the effect of growth opportunities on dividend yields is approximately linear, the change in the cost of capital would then be derived as $b(\theta)Y_t^x$ minus the change in the dividend growth, as we suggested earlier.

Finally, changes in control variables may be indirectly related to liberalizations, as in the case when foreign investment helps to improve liquidity and efficiency in the local market or amplifies the beneficial effect of a trade liberalization or macroeconomic reforms. After all, capital market liberalizations are often part of a broader reform package (see also Henry (2000)). More specifically, what matters is the general stock market development and openness of a country, which is proxied by a number of our right-hand-side variables.

To assess the economic significance of a liberalization from the regressions, we trace the effect on an emerging market of moving from a poorly developed capital market with poor economic performance to a median country following a capital market liberalization. To do this, we examine the cross-sectional distribution of all of the explanatory variables. We consider a change from the 25th percentile to the median for the number of companies

in the IFC index, the size of the trade sector, the cross-sectional standard deviation, the country credit rating, and the country's equity capitalization. We look at a change from the 75th percentile to the median for the concentration ratio, inflation, and foreign currency volatility. We allow for a capital market liberalization.

We dissect the cumulative effect into three groups. Stock market development includes the number of companies in the index, the concentration ratio, the cross-sectional volatility, market capitalization, and the interaction between capitalization and cross-sectional volatility. Macroeconomic development includes the inflation rate, foreign exchange rate volatility, the size of the trade sector, and the political risk rating. Finally, the financial liberalization effect is constructed from the difference between the post- and pre-liberalization indicator variables. We construct such economic impact graphs for dividend yields, volatilities, correlations, and betas.

IV. Empirical Results: Cost of Capital

A. Regression Results

A.1. No Control Variables

Table III presents our estimates of the dividend yield model without control variables. This is roughly analogous to looking at mean dividend yields before and after liberalizations.

Panels A through C report the models for ADR and Country Fund introduction indexes with a single choice of the impact parameter, $\lambda = 0.90$. To arrive at this value, we grid search 17 different values of this parameter, from 0.01 to 0.99, and record the likelihood function value.[11] The size of λ determines the effect of additional ADRs or Country Funds. High values, such as 0.90, imply that additional introductions have important effects—that is, liberalization is a gradual process. For the dividend yield regressions, the likelihood is always maximized at 0.99. For the other variables (excess returns, betas, correlations, and volatility), the maximum occurs at a value higher than 0.80 in all but two cases. Although in many cases the likelihood function appears quite flat, the overwhelming evidence points toward high λs (gradual liberalization). We impose $\lambda = 0.90$ for all of our estimations.

The coefficient on the ADR announcement index in Table III, Panel A, is negative, implying that ADR introductions reduce the cost of capital. The coefficient is about 2.7 standard errors from zero. We also present results based on ADR effective dates (dates that the ADRs were launched in contrast to the announcement dates). The coefficient is also negative and two standard errors from zero.

[11] See http://www.afajof.org. This page contains links to all of the supplementary tables for this paper, including optimal_lambda.htm.

Table III

The Impact of Liberalizations on Dividend Yields: No Control Variables

The regressions include country specific intercepts and allow for panel specific heteroskedasticity and serial correlation. In Panels A-C, we estimate a time-series cross-sectional model with the dividend yields as the dependent variable. λ represents how fast the additional impact of further liberalizations declines. We perform a grid search of the λ parameter and find that 0.9 provides the best fit. With high λs, additional issues generate large additional effects, i.e. gradual liberalization. The Intro variable is defined in the panel title. In Panel A, we contrast the use of ADR announcements with effective ADR dates. In Panels D–F, we estimate a model with dummy variables around the liberalization definition. In the regressions in Panel E, we weight the dummy variables by a function of the correlation with the world market return before the liberalization. The function is ln(2-correlation)/ln(3). In the regressions in Panel F, the weights for 'Offical Liberalization' and 'First Sign' are constructed by multiplying the dummies by the five-year post average value of ownership. The weights for the 'Capital Flows' are constructed by differencing the five-year post minus five-year pre average value of ownership. The Wald test is whether the dividend yield declines from Pre to Post liberalization. The sample period ends December 1995.

	Panel A: Gradual Liberalization Model: Introduction of ADRs			Panel B: Gradual Model: Introduction of Country Funds		Panel C: Gradual Model: Introduction of ADRs and Country Funds	
	λ	Intro (Announc.)	Intro (Effective)	λ	Intro	λ	Intro
Coefficient	0.9	−0.097	−0.047	0.9	−0.218	0.9	−0.146
t-statistic		−2.731	−1.978		−5.187		−4.634

	Panel D: Simple Liberalization Indicators					Panel E: Liberalization Indicators Weighted by Correlation with World					Panel F: Liberalization Indicators Weighted by Degree of Foreign Ownership				
	PRE	DURING	POST	AFTER	WALD	wPRE	wDURING	wPOST	wAFTER	WALD	wPRE	wDURING	wPOST	wAFTER	WALD
Official Liberalization															
Coefficient	−0.455	−0.674	−0.766	−0.945	5.700	−1.336	−1.941	−2.091	−2.492	3.990	−0.735	−1.101	−1.264	−1.559	6.040
t-statistic	−4.13	−4.76	−4.65	−5.10	*0.017*	−4.14	−4.68	−4.32	−4.58	*0.046*	−3.95	−4.63	−4.61	−5.07	*0.014*
First Sign															
Coefficient	−0.476	−0.751	−1.196	−1.361	15.910	−1.566	−2.472	−3.692	−4.114	14.470	−0.706	−1.135	−1.835	−2.108	15.020
t-statistic	−2.78	−3.52	−5.14	−5.64	*0.000*	−2.88	−3.64	−5.08	−5.49	*0.000*	−2.47	−3.23	−4.86	−5.40	*0.000*
Capital Flows Break															
Coefficient	−0.116	−0.261	−0.285	−0.383	1.710	−0.164	−0.503	−0.523	−0.802	0.920	−0.198	−0.433	−0.468	−0.607	1.700
t-statistic	−1.05	−1.83	−1.76	−1.99	*0.190*	−0.52	−1.22	−1.11	−1.49	*0.337*	−1.12	−1.90	−1.80	−1.99	*0.193*

Country fund introductions have a more significant effect on dividend yields than the ADR introductions, both statistically and economically. In Panel B, the coefficient on the country fund index is always more than five standard errors away from zero and the immediate drop in the dividend yield is close to 20 basis points.

Panel C combines the ADR and country fund indexes. The results are consistent with Panels A and B. The index enters with a negative coefficient that is significantly less than zero.

Panels D, E, and F consider different definitions of capital market liberalizations. For "Official Liberalizations," the model implies a decrease in dividend yields of 31 basis points (comparing PRE with POST in Panel D). For the "First Sign" date (first date of ADR, Country Fund, or official liberalization), the decrease is 72 basis points. A Wald test reveals that these changes are statistically significant at the 5 percent level in both of these regressions. The "Capital Flows Break" regression suggests a decrease of only 17 basis points and this decrease is not significant even at the 10 percent level.

Generally, the economic effect of liberalization is larger than the direct impact of an ADR or Country Fund introduction in the gradual liberalization models. However, if we take into account further introductions, the effects are not that dissimilar. For example, the total effect of introducing five ADRs (Country Funds) is a 40 (89) basis point decrease in dividend yields.

Panel E uses the "weighted" correlation index-scaling described in Section III.B. The Wald tests for the Official Liberalizations and First Sign indicators are significant at the 5 percent level. The POST − PRE difference is now considerably larger in absolute value but this should be interpreted as the change occurring for a country with perfect negative correlation with the world market preliberalization. For example, for the First Sign regressions, the impact for a perfect negative correlation is −2.126 (POST − PRE). Argentina has a preliberalization correlation of −0.166, which translates into a correlation index of 0.703. Therefore, the country-specific impact on dividend yields is −1.49 (−2.126 × 0.703). Chile has a preliberalization correlation of 0.304, which implies a correlation index of 0.481. Chile's dividend yield is therefore predicted to change by −1.02. Lower correlations imply bigger valuation effects.

Panel F uses the foreign ownership weighting scheme, described in Section III.B. The results are similar. Dividend yields decrease and the Wald tests reveal that for both the Official Liberalization and the First Sign regression, the change is highly significant. Nevertheless, the economic impact of higher levels of foreign ownership seems relatively small. For the First Sign indicator, for example, five percent additional foreign ownership induces about a six basis point additional decrease in the cost of capital. The dividend yield change remains insignificant for the capital flow regression.

In sum, the weighted regressions suggest that countries with low correlations before the liberalization and/or higher degrees of foreign ownership (in the postliberalization period) experience larger reductions in the cost of capital. Strikingly, the cost of capital continues to decrease in the AFTER period, which is consistent with a pattern of very gradual liberalization.

A.2. Allowing for Control Variables

The problem with examining dividend yields before and after a liberalization is that the change may be linked to phenomena unrelated to the liberalization. There are a number of interesting patterns when the control variables enter the regressions. The results in Table IV show that their presence decreases the liberalization effect but not by much. In terms of statistical significance, the only effect is on the official liberalization measures, where the cost of capital change is no longer significant at the 5 percent level, but remains significant at the 10 percent level.

The log of the number of companies in the stock index enters with a negative coefficient (the more companies, the more developed the market, and the lower the dividend yield). The coefficient, with few exceptions, is borderline significant. The concentration ratio also enters with a negative, but insignificant, coefficient. This implies that as some large firms emerge in a country, the dividend yield decreases. It is possible that this result is being driven by privatizations in a few countries and we indeed find that asset concentration tends to increase after privatizations (see priv_conc.htm).

The size of the trade sector, which is a development indicator, enters strongly with a negative coefficient in all regressions. As the size of the trade sector increases, the dividend yield decreases. The cross-sectional standard deviation is also important in each regression. More industrial diversity (suggesting development of the market) tends to decrease the dividend yield. Indeed, this variable enters the regression with coefficients six standard errors from zero.[12] The political risk indicator fails to enter any of the regressions with a significant coefficient.

Finally, the macroeconomic climate variables have mixed effects. The volatility of the foreign exchange rate changes enters with a negative coefficient that is difficult to explain. However, inflation enters with a close to significant positive coefficient indicating that lower inflation is associated with lower dividend yields. It is possible that the inclusion of three variables, proxying for macroeconomic stability (inflation, exchange rate variability, and credit ratings) leads to the anomalous sign for exchange rate variability.

A.3. Interpretation Issues When Using Control Variables

We consider two issues. First, privatizations may affect both certain control variables and the liberalization effect we measure. Second, the control variables may be impacted by the capital market liberalization.

Policymakers may strategically time the liberalization process in an attempt to maximize the revenues from privatizations. This potential correlation between liberalizations and privatizations may affect our results through

[12] Nevertheless, omitting this variable has little impact on our results, both in terms of statistical significance and magnitude. This variable is also significant in the excess return regression with the opposite sign; see ret_control.htm for some additional tables and an interpretation of this result.

Table IV

The Impact of Liberalizations on Dividend Yields Allowing for Control Variables

Group-wise heteroskedasticity and autocorrelation-consistent t-statistics are reported below the coefficients. In Panels A–C, we estimate a time-series cross-sectional model with the dividend yields as the dependent variable. λ represents how fast the additional impact of further liberalizations declines. We perform a grid search of the λ parameter and find that 0.9 provides the best fit. With high λs, additional issues generate large additional effects—that is, gradual liberalization. NUMC represents the number of companies, CONCR the concentration ratio, STDL2 the cross-sectional standard deviation of stock returns within the local index, INFL past inflation, FXV the foreign exchange volatility, XMGDP the size of the trade sector, and CCR Institutional Investor's country credit rating. The Intro variable is defined in the panel title. In Panels D–F, we estimate a model with dummy variables around the liberalization definition. In the regressions labeled 'weighted', we weight the dummy variables by a function of the correlation with the world market return before the liberalization (see, also, Table III). The Wald test is whether the dividend yield declines from Pre- to Post-liberalization.

λ	NUMC	CONCR	STDL2	INFL	FXV	XMGDP	CCR	Intro	PRE	DURING	POST	AFTER	Wald Test
Panel A: Gradual Liberalization Model: Introduction of ADRs													
0.9	−0.248	−0.944	−0.751	0.138	−3.088	−1.437	−0.057	−0.050					
Announc.	−2.19	−1.41	−6.46	1.77	−3.06	−3.53	−0.15	−1.42					
0.9	−0.296	−0.844	−0.750	0.150	−3.027	−1.410	−0.032	−0.012					
Effective	−2.61	−1.26	−6.42	1.94	−3.06	−3.34	−0.08	−0.51					
Panel B: Gradual Liberalization Model: Introduction of Country Funds													
0.9	−0.204	−0.858	−0.746	0.173	−3.026	−1.326	−0.050	−0.156					
	−1.76	−1.24	−6.37	2.21	−2.97	−2.76	−0.12	−3.70					
Panel C: Gradual Liberalization Model: Introduction of ADRs and Country Funds													
0.9	−0.201	−1.003	−0.749	0.149	−3.100	−1.291	−0.005	−0.089					
	−1.76	−1.48	−6.45	1.91	−2.94	−2.89	−0.01	−2.89					

Panel D: With Regulatory Liberalization Indicators												
	−0.286	−1.093	−0.729	0.150	−2.902	−1.544	−0.134	−0.421	−0.573	−0.641	−0.655	2.840
	−2.46	−1.55	−6.15	1.79	−2.57	−3.27	−0.30	−3.86	−4.07	−3.91	−3.55	*0.092*
Correlation	−0.269	−1.069	−0.727	0.148	−2.862	−1.486	−0.196	−0.756	−1.027	−1.208	−1.300	3.620
Weighted	−2.33	−1.54	−6.16	1.78	−2.50	−3.35	−0.44	−3.82	−4.02	−4.08	−3.89	*0.057*
Panel E: With ADR, Country Fund, and Regulatory Liberalization Indicators												
	−0.237	−1.101	−0.733	0.161	−2.820	−1.336	−0.076	−0.166	−0.347	−0.711	−0.940	9.200
	−2.13	−1.62	−6.34	1.98	−2.52	−3.09	−0.18	−0.98	−1.65	−3.06	−3.89	*0.002*
Correlation	−0.238	−1.112	−0.733	0.160	−2.820	−1.347	−0.080	−0.259	−0.537	−1.192	−1.596	9.090
Weighted	−2.14	−1.64	−6.33	1.96	−2.49	−3.21	−0.18	−0.91	−1.52	−3.01	−3.85	*0.003*
Panel F: With Cumulative Net Capital Flow Break Points												
	−0.404	−1.022	−0.773	0.161	−3.198	−1.918	−0.129	0.047	−0.019	−0.030	−0.160	0.380
	−3.52	−1.45	−6.37	1.96	−3.05	−4.11	−0.33	0.50	−0.16	−0.21	−0.80	*0.537*
Correlation	−0.445	−0.938	−0.797	0.190	−3.969	−2.392	−0.058	0.050	−0.102	−0.122	−0.405	0.530
Weighted	−3.70	−1.26	−6.22	2.06	−3.46	−4.59	−0.14	0.28	−0.47	−0.46	−0.94	*0.468*

two channels. First, the control variables that measure stock market development are directly affected by privatizations. Second, the index composition change associated with privatizations may make dividend yields less informative as a cost of capital measure. Privatized firms may have high dividends as a result of commitments made during the privatization, biasing our liberalization coefficients upward.

To examine this, we collected data from the World Bank on all privatizations in emerging markets since 1988. This includes 14 of our 20 markets. We measure privatization in two ways. First, we examine the year-by-year value of privatization divided by market capitalization at $t - 1$; this value is kept constant throughout the year. Second, we use the indicator variable suggested by Perotti and van Oijen (1997) that comes on at the peak year of the privatization program and stays on to the end of the sample. Hence, the first measure looks for temporary effects of privatizations, whereas the second measure considers permanent effects.

With these two measures of privatization activity, we conduct a number of experiments that are fully described and documented on our Internet site. Here we offer only a brief summary of our findings. First, we reestimate the Table IV regressions interacting the value of privatizations with the number of companies, the cross-sectional standard deviation, and the concentration ratio, which are our stock market development variables. The p-values of the Wald tests for the decrease in dividend yields are not substantially affected and the estimated cost of capital change does not differ materially from our estimate in Table IV.

Second, we explore in more detail the relation between dividend yields and privatizations using various regression specifications. We find evidence of a weak negative relation between dividend yields and privatizations, which is strong when Perotti and van Oijen (1997) dummy variables are used. Our result of a more significant permanent effect is consistent both with Perotti and van Oijen who postulate that privatization signals political commitment to market-oriented policy reform, including financial liberalization, and with Henry (2000) who finds privatizations have a positive valuation effect.

Finally, we introduce the value of privatizations directly into the set of Table IV regressions with the liberalization indicator variables. The privatization variable is never significant. We conclude that our main results are not affected by privatizations.

A second issue that we face is the possibility that the control variables break at the liberalization dates. The resulting misspecification of our regression model is potentially important if any of these variables are correlated with the cost of capital or with growth opportunities. Table V presents an analysis of whether the control variables are different before and after Official Liberalizations, the First Sign, and the Capital Flows Break.

The results suggest that some of the control variables break. In all three liberalization definitions, the number of companies in the index increases significantly. In two of the three definitions, the concentration ratio signif-

Table V

Do the Control Variables Break at Liberalization Dates?

Regressions use the control variables as dependent variables with simple on/off liberalization indicators. In addition to the control variables, we examine, in the last row, Investment divided by GDP. Each panel represents a different definition of the liberalization indicator. All regressions allow for country specific intercepts and all standard errors are heteroskedasticity/serial correlation corrected. The sample is from January 1976 to December 1995.

	Panel A: Official Liberalization		Panel B: First Sign		Panel C: Capital Flows Break	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Number of companies	0.0496	4.04	0.0310	2.49	0.1120	8.94
Concentration ratio	−0.0066	−2.74	−0.0041	−1.53	−0.0072	−2.71
Cross-sectional standard deviation	0.0071	1.90	0.0222	5.69	0.0019	0.58
Inflation rate	−0.0296	−2.12	−0.0084	−0.58	−0.0102	−0.81
Foreign exchange rate volatility	0.0004	1.22	0.0004	0.85	0.0000	−0.21
Trade sector to GDP	−0.0006	−0.36	−0.0014	−0.89	0.0009	0.58
Country credit rating	−0.0012	−0.51	−0.0023	−0.69	0.0048	2.55
Investment/GDP	0.7539	3.01	0.7330	3.12	0.6629	1.94

icantly decreases. There is weaker evidence of an increase in the cross-sectional standard deviation and decreases in inflation rates. Credit ratings significantly increase after the capital flows breaks.

Interestingly, the variables most obviously potentially correlated with growth opportunities or expected returns, such as trade sector to GDP and country credit rating, do not break, lessening the need for a structural regression as in equation (13). A possible exception here is the cross-sectional standard deviation, which may be an imperfect risk proxy in the more developed markets (see footnote 12). Moreover, since every control variable requires the estimation of five separate coefficients for the various windows, structural regressions may lack power. For example, when we estimate the structural counterpart of the regression with the First Sign liberalization measure, there are virtually no significant coefficients left. We fare somewhat better with the Official Liberalization measure regression (see div_struct.htm), where the regression detects a number of significant changes in the relation between the control variables and dividend yields induced by liberalizations. One example is that an increase in the number of companies leads to a smaller decrease in dividend yields BEFORE, DURING, and AFTER the liberalization compared to the early period. This is consistent with this relation being due to stock market development. Overall, however, the PRE, DURING, and POST coefficients fail to be significant. This is also true for the liberalization dummies. Although the decrease in the cost of capital now appears much larger, it is no longer statistically significant.

A.4. Liberalization and Returns

The simulation analysis shows that it is difficult to detect a change in the cost of capital by examining returns. This motivates our focus on dividend yields. Nevertheless, we might learn something from examining the behavior of the returns around liberalizations. Although this need not be generally true, in our structural model, changes in average returns are in fact not contaminated by changes in growth opportunities.

Table VI presents analysis analogous to Table IV except that excess returns are examined rather than dividend yields. In the gradual liberalization models, the coefficient on the introduction variable is negative for all three liberalization indexes. This implies a decrease in expected returns after liberalizations. However, it is not significantly different from zero. For the effective ADR case, the coefficient is 1.4 standard errors below zero.

In the liberalization indicator regressions, the message is different. In the First Sign regressions, average returns significantly increase (at the 5 percent level). For the Official Liberalization, the increase is only significant at the 10 percent level in the unweighted regression. In the Capital Flow Break regression, there is a small, insignificant decrease in average returns. These results remain largely unaltered when we introduce control variables in the regressions (see ret_control.htm). The gradual liberalization measures have

Table VI

The Impact of Liberalizations on Excess Returns: No Control Variables

The regressions include country-specific intercepts and allow for panel specific heteroscedasticity and serial correlation. In the regressions in Panel B, we weight the dummy variables by a function of the correlation with the world market return before the liberalization. The function is ln(2-correlation)/ln(3). In the regressions in Panel C, the weights for 'Offical Liberalization' and 'First Sign' are constructed by multiplying dummy variables by five-year post average value of ownership. The weights for 'Capital Flows' are constructed by differencing the five-year post minus five-year pre average value of foreign ownership. The Wald test is whether the excess return declines from PRE to POST liberalization. The sample ends in December 1995.

	Panel A: Gradual Liberalization Model: Introduction of ADRs			Panel B: Gradual Model: Introduction of Country Funds		Panel C: Gradual Model: Introduction of ADRs and Country Funds	
	λ	Intro (Announc.)	Intro (Effective)	λ	Intro	λ	Intro
Coefficient	0.9	−0.00116	−0.001	0.9	−0.00004	0.9	−0.00029
t-statistic		−0.968	−1.386		−0.038		−0.364

	Panel D: Simple Liberalization Indicators					Panel E: Liberalization Indicators Weighted by Correlation with World					Panel F: Liberalization Indicators Weighted by Degree of Foreign Ownership				
	PRE	DURING	POST	AFTER	WALD	wPRE	wDURING	wPOST	wAFTER	WALD	wPRE	wDURING	wPOST	wAFTER	WALD
Official Liberalization															
Coefficient	0.007	0.009	0.019	0.019	3.270	0.020	0.029	0.053	0.008	2.330	0.018	0.026	0.036	0.006	2.010
t-statistic	1.19	1.07	2.96	2.96	*0.071*	1.16	1.14	2.65	0.39	*0.127*	1.46	1.56	3.06	0.51	*0.156*
First Sign															
Coefficient	0.012	0.014	0.032	0.016	7.370	0.042	0.046	0.094	0.055	5.390	0.038	0.046	0.065	0.038	4.000
t-statistic	1.97	1.53	4.47	2.49	*0.007*	2.17	1.62	4.35	2.82	*0.020*	2.73	2.45	4.93	3.21	*0.046*
Capital Flows															
Coefficient	0.006	0.017	0.005	0.009	0.050	0.013	0.045	0.015	0.019	0.010	0.010	0.027	0.008	0.013	0.050
t-statistic	1.01	1.95	0.74	1.09	*0.829*	0.80	1.95	0.85	0.89	*0.935*	1.01	1.93	0.73	1.06	*0.824*

virtually no effect on returns, whereas the dummy variables record increases in returns that are now never significant at the 5 percent level. There are few significant relations with the control variables.

Why is it that the gradual liberalization regressions are suggesting a negative impact on expected returns and that some liberalization indicators are suggesting a positive impact on returns? One possibility is that the timing of the liberalization indicators is a problem. Indeed, in some cases in Table VI, we see a decrease in average returns in the AFTER period.

We investigate the sensitivity of our results to the definition of the DURING variable—which is defined as six months prior to a liberalization date to three months after. As indicated before, the DURING variable captures the period during which the "return to integration" is realized. That is, when markets open up, capital investment flows in and prices increase as investors take advantage of the diversification benefits. However, in the longer term, given the higher price level, expected returns should be lower than in the preliberalization period. How long the transition period lasts is hard to say. Henry (2000), who focuses on the excess returns during the liberalization, uses an eight-month window leading up to the implementation of the liberalization. Our analysis that allows for gradual liberalization suggests a very long period.

In results reported on the Internet, we present the sensitivity of the returns regressions to different windows for the DURING variable (see ret_window.htm). The results can be summarized as follows. First, the "return to integration" (DURING–PRE) ranges from 0.20 to 2.50 percent per month using official liberalizations, which is smaller than Henry's (1999a) findings. However, Henry examines 12 countries rather than 20 and his liberalization dates are not always the same as ours. Second, the results on returns depend on the definition of the liberalization variable, with small, insignificant increases for Official Liberalizations; a U-shaped pattern in the liberalization coefficients for the First Sign regression (PRE is low, DURING and POST are higher, and AFTER is low); and insignificant decreases in returns for the Capital Flow Break point regressions.

Whereas we find a consistent decrease in dividend yields, excess returns may increase or decrease from the pre- to postliberalization period depending on the specification. In the longer-term, average returns appear to be lower. Although the noisiness of returns most probably is the underlying factor in all of these results, there is another possibility. Our dividend yield decrease may reflect primarily an improvement in growth opportunities, leaving little room for cost of capital decreases.

A.5. Is It Growth or Lower Cost of Capital?

In the simple present value model, dividend yields are linked to both expected returns and growth opportunities. Some of our regressions could be picking up changes in growth opportunities rather than changes in the cost of capital. We conduct three exercises to address this issue.

First, we attempt to control for expectations of growth. To check whether our control variables might capture growth opportunities, we regress annual real GDP growth on lagged values of the control variables.[13] From all of our control variables, only one, the size of the trade sector, shows a significant association with future GDP growth. The coefficient for the size of the trade sector is positive (bigger trade sector, better growth prospects) and 2.9 standard errors from zero (see GDP_XMGDP.htm). The predictive power of the size of the trade sector variable holds up in a purely cross-sectional analysis, regressing average postliberalization GDP growth rates on the size of the trade sector at liberalization (see GDP_XMGDP_Post.htm).

We also investigate more direct measures of expected economic growth. Though data are available only from 1984, the International Country Risk Guide's Economic (ICRGE) rating variable is supposed to reflect future growth prospects. We find that the ICRGE rating predicts economic growth and enters the regression with a positive coefficient (higher rating, better prospects) which is 2.4 standard errors from zero (see GDP_ICRGE.htm).[14] We use the ICRGE as an additional variable in our regressions to control for growth prospects.

When we reestimate the dividend regressions with the ICRGE as an extra control variable, the results are similar to those in Table IV—even though the sample is shorter (see div_ICRGE.htm). Dividend yields decrease from PRE to POST and even more sharply from PRE to AFTER for Official Liberalizations. The change is significant at the 10 percent level. A similar pattern is found in the First Sign regressions, although the liberalization effect is now smaller, as would be expected if the original decrease we found is partially due to growth opportunities now controlled for by the ICRGE variable. The dividend yield change is also no longer significant.

Second, we attempt to directly measure the change in growth rates after liberalization. In a country-by-country examination, growth increases in 14 of 19 countries that experienced a liberalization. In a pooled GLS regression of GDP growth rates on the Official Liberalization indicator variable, the coefficient is positive and three standard errors from zero (see GDP_lib.htm). Growth increases on average by 1.26 percent. When the capital flows measure is used, the increase is smaller (61 basis points) and no longer significant. If we were to subtract this increase in growth opportunities from our estimate of the total dividend yield change, the drop in the cost of capital must have been economically very small or nonexistent.

Of course, this split-up of dividend yield changes into cost of capital changes and growth opportunity changes may be incorrect if all structural parameters change. In a third experiment, we calibrate the structural model

[13] Our discussion refers to pooled OLS estimates, but we also consider OLS with fixed effects and GLS with fixed effects regressions.

[14] Note that our other country risk variable, the Institutional Investor country credit rating, is more focused on the financial and political outlook. The ICRGE is more narrowly focused on anticipated economic performance. We did not use the ICRGE in our original regressions because of its shorter sample.

presented in Section II.A to an "average" emerging market before and after liberalizations. Appendix A contains details of the calibration procedure conducted for the capital flow liberalization measure. The output is the six structural parameters driving the present value model before and after the break, which can be used to characterize the dividend yield and log-return process before and after the break. We find a 61 basis point increase in the dividend growth rate (proxied by GDP growth) and a 75 basis point drop in the dividend yield. In the stylized simulations we conducted before, this would suggest a drop in the cost of capital of about 10 to 15 basis points. Indeed, the mean of logged returns drops from 7.16 percent to 7.05 percent, suggesting a very small drop in the cost of capital.

Our main conclusions continue to hold. Dividend yields decrease but not by more than 75 basis points. Our analysis here suggests that it is likely that part of this drop can be ascribed to improved growth opportunities making the actual drop in the cost of capital even smaller.

B. Economic Analysis of Cost of Capital Changes

Whereas the effects of capital market liberalization on the dividend yields seem small, economic integration, as measured by the size of the trade sector, does seem to have a significant effect (both economically and statistically) on the dividend yields. The economic experiment considers the global effect from stock market development, macroeconomic development, and a financial market liberalization.

Although we analyze the coefficients from three different definitions of liberalizations (Official Liberalizations, First Sign, and Capital Flow Breaks), we concentrate our discussion on the First Sign results. The economic impact is summarized in Figure 2.

Combining the coefficients from Panel E in Tables IV with the cross-sectional distribution of the control variables, we find that the dividend yield decreases by 87 basis points. Almost all of this effect is being driven by macroeconomic development and the actual liberalization.[15] Taken together, we argue that development has, at most, led to an economically small drop in the cost of capital that is often statistically insignificant.

[15] The returns results are hard to interpret given their lack of robustness but, in unreported results, we find that the macroeconomic development indicators continue to suggest a small drop in expected returns of 30 basis points. The credit rating variable implies a 1.6 percent decrease in expected returns. These results are consistent with those reported in Erb, Harvey, and Viskanta (1996a). However, this effect is offset by the financial development indicators and by the financial liberalization indicators, which suggest an overall increase in returns. The stock market development effect is primarily driven by the cross-sectional standard deviation, which experiences a break in its relation with returns postliberalization, and we have shown the returns results lack robustness.

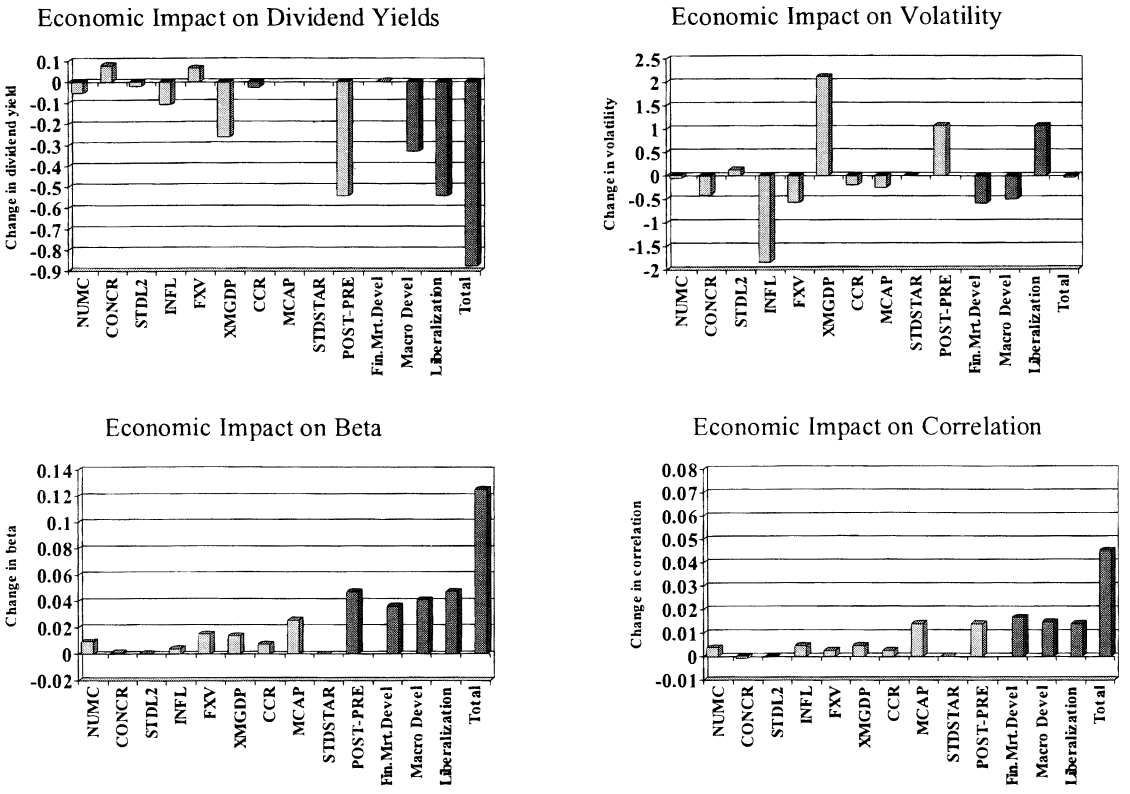

Figure 2. Country moving from 25th percentile to median after First Sign liberalization. Financial Development represents the sum of the number of companies (NUMC), the concentration ratio (CONCR), the cross-sectional standard deviation of stock returns within the local index (STDL2), the market capitalization (MCAP) and the interactive variable STDL2 and the mean adjusted MCAP (STDSTAR). Macroeconomic development is the sum of past inflation (INFL), foreign exchange volatility (FXV), the size of the trade sector (XMGDP) and Institutional Investor's country credit rating (CCR). Financial Liberalization is the difference between the coefficients on the dummy variables for the POST and PRE liberalization periods.

V. Empirical Results: Volatility, Correlation, and Beta

A. Framework

Previous studies of emerging market volatility have relied on two approaches. Some studies, such as those by De Santis and İmrohoroğlu (1997) and Aggarwal, Inclan, and Leal (1999)), use a generalized autoregressive conditional heteroskedasticity (GARCH) model (see Bollerslev (1986)). The GARCH model is fit, country by country, and often includes dummy variables for regulatory shifts. This type of modeling has many limitations. The volatility process is only affected by past returns—that is, there is no other conditioning information. The parameters of the volatility model are assumed to be constant. Finally, the dummy variable approach lacks power to detect changes when information from only one country is used.

Other studies rely on an event study methodology (see, e.g., Kim and Singal (1999) and Richards (1996)). Volatility is modeled, following Schwert (1989a, 1989b), using residuals from an autoregressive model for returns controlling for calendar effects. Though this approach pools information from different countries, it does not control for other variables that affect volatility. This approach also ignores the changes in the stochastic process for returns that gradually integrating markets undergo.

We combine both methods and improve the econometric methodology along various dimensions. First, we estimate a time-series model for volatility for each country that allows both the conditional mean and the conditional variance to vary through time. We condition on both world and local information to capture changes in the degree of market integration. This model delivers a time-series of conditional volatilities for each country as well as conditional correlations and conditional betas of each country's return with the world market return.

Second, and as we discussed in Section III, we use these conditional volatility, correlation, and beta estimates in a pooled time-series/cross-sectional analysis. Although we can only estimate an "average" response to foreign speculative activity that way, the increase in power is essential.

Since our volatility model is fully described in Bekaert and Harvey (1997), we relegate a brief description of the model to an appendix that is available from the authors upon request.

B. Diversification and Liberalization

Table VII presents regressions that omit the control variables.[16] The results suggest an indeterminant effect of liberalizations on volatility. In only one specification, First Sign, is the change in volatility significant at the 10 percent level and it is only significant at the 5 percent level when the response is weighted by the foreign ownership variable. This particular regression suggests that volatility increases after liberalization.

[16] See vol_control.htm, corr_control.htm, and beta_control.htm for the results that include control variables.

Table VII

The Impact of Liberalizations on Volatility, Correlation and Beta: No Control Variables

The regressions include country-specific intercepts and allow for panel specific heteroskedasticity and serial correlation. In the regressions in Panel B, we weight the dummy variables by a function of the correlation with the world market return before the liberalization. The formula is ln(2-correlation)/ln(3). In the regressions in Panel C, the weights for Official Liberalization and First Sign are constructed by multiplying the dummy variables by the five-year average value of ownership variable postliberalization. The weights for Capital Flows are constructed by differencing the five-year post minus five-year pre average value of foreign ownership. The Wald test is whether the volatility, correlation, or beta declines from PRE to POST liberalization. The sample ends in December 1995.

	Panel A: Simple Liberalization Indicators					Panel B: Liberalization Indicators Weighted by Correlation with World					Panel C: Liberalization Indicators Weighted by Degree of Foreign Ownership				
	PRE	DURING	POST	AFTER	WALD	wPRE	wDURING	wPOST	wAFTER	WALD	wPRE	wDURING	wPOST	wAFTER	WALD
Volatility															
Official Liberalization															
Coefficient	0.015	0.024	0.039	0.054	0.260	0.011	0.007	0.053	0.063	0.090	−0.023	0.043	0.043	0.076	0.500
t-statistic	0.39	0.48	0.75	0.88	*0.607*	0.09	0.05	0.33	0.34	*0.768*	−0.27	0.42	0.43	0.70	*0.480*
First Sign															
Coefficient	0.015	0.051	0.109	0.080	3.490	0.055	0.166	0.356	0.282	3.810	−0.046	0.085	0.182	0.127	5.160
t-statistic	0.37	0.97	1.89	1.30	*0.062*	0.44	1.02	2.01	1.51	*0.051*	−0.50	0.74	1.59	1.12	*0.023*
Capital Flows															
Coefficient	0.048	0.024	0.075	0.040	0.220	0.109	0.052	0.211	0.076	0.460	0.082	0.047	0.133	0.077	0.310
t-statistic	1.01	0.40	1.28	0.61	*0.636*	0.81	0.31	1.33	0.44	*0.499*	1.06	0.48	1.40	0.73	*0.576*
Correlation															
Official Liberalization															
Coefficient	0.007	0.027	0.049	0.040	31.800	0.023	0.088	0.150	0.121	31.890	0.010	0.050	0.087	0.073	35.270
t-statistic	1.16	3.59	5.57	4.03	*0.000*	1.29	3.78	5.66	4.02	*0.000*	1.00	3.65	5.74	4.33	*0.000*
First Sign															
Coefficient	0.007	0.019	0.023	0.040	5.280	0.019	0.055	0.065	0.113	3.780	0.011	0.033	0.041	0.067	5.580
t-statistic	1.20	2.53	2.69	4.13	*0.022*	1.13	2.34	2.34	3.65	*0.052*	1.18	2.56	2.74	4.12	*0.018*
Capital Flows															
Coefficient	0.013	0.020	0.039	0.051	10.450	0.044	0.068	0.126	0.175	11.020	0.020	0.030	0.060	0.080	9.610
t-statistic	2.10	2.40	4.04	4.49	*0.001*	2.34	2.69	4.33	5.11	*0.001*	2.04	2.28	3.88	4.32	*0.002*
Beta															
Official Liberalization															
Coefficient	0.028	0.071	0.133	0.161	39.080	0.092	0.226	0.429	0.507	42.740	0.033	0.125	0.229	0.272	44.620
t-statistic	2.15	4.16	6.99	7.43	*0.000*	2.28	4.31	7.44	7.81	*0.000*	1.30	3.89	6.74	7.25	*0.000*
First Sign															
Coefficient	0.021	0.054	0.079	0.177	11.510	0.069	0.177	0.256	0.577	11.950	0.018	0.087	0.125	0.285	13.210
t-statistic	1.56	3.06	3.98	8.44	*0.001*	1.64	3.18	4.11	8.86	*0.001*	0.69	2.62	3.57	7.92	*0.000*
Capital Flows															
Coefficient	0.053	0.094	0.135	0.225	20.150	0.165	0.287	0.418	0.675	20.980	0.085	0.150	0.213	0.348	18.590
t-statistic	3.64	4.97	6.54	8.31	*0.000*	3.73	5.03	6.82	8.85	*0.000*	3.61	4.88	6.35	7.89	*0.000*

Panel B of Table VII analyzes the behavior of correlations with world market returns around liberalizations. In all tests, correlations increase. For example, from PRE to POST for Official Liberalizations, correlation increases by 4.2 percent. This change is significant at the 1 percent level. Economically, the increase in correlation after liberalizations is too small to diminish any diversification benefits. Such benefits are likely large given that the average conditional correlation with the world market return is only 14 percent (see Table II). Panel B does show that countries which start out with low correlations experience much larger correlation increases.

The final panel examines changes in the beta with world markets. Increased correlations can come about because of cash flow or discount rate effects. In the latter case, we may expect an increase in beta. The results suggest a highly significant change in the beta. In each regression, the change from PRE to POST is significant at the 1 percent level. The size of the increase in beta ranges from 0.06 to 0.105. In the weighted regressions, the beta increases are substantially larger—in one case more than 0.33. Is the increase large enough to substantially impact the cost of capital? This analysis is complicated. Even if the beta with the world increases, this does not necessarily mean the cost of capital increases. The reason is that in the preliberalization regime the world CAPM should not hold. That is, expected returns in a segmented regime are related to the country's variance—not to its covariance with the world. Even if we were to assume that preliberalization emerging markets were integrated with the world market and the world CAPM held, the change in beta of 0.10 would imply an increase in the cost of capital of only 70 basis points (assuming a seven percent world risk premium).

C. Economic Analysis of Volatility, Correlation, and Beta

We repeat the economic analysis conducted on the dividend yields for volatility, beta, and correlation with world market returns (see Figure 2). Based on the estimates of the volatility model with control variables, we find that annualized volatility slightly decreases (by one basis point). In this case, both the financial and macroeconomic development indicators suggest a considerable decrease in volatility. This is offset by an increase in volatility attributed to the financial liberalization. These results are broadly consistent with those in Bekaert and Harvey (1997) who have a shorter sample and use a different methodology.

Correlation increases by 0.045, and all three categories contribute approximately equally to this increased correlation. Beta increases by 0.12. Similar to the analysis of correlation, financial market development, macroeconomic development, and liberalizations contribute about equally to the increase.

The economic exercise points to an insignificant change in volatility and a small increase in both correlation and beta with the world market. However, the increase in market capitalization to GDP that we use moving from the

25th percentile to the median is very small (2.8 percent to 9.1 percent). If we repeat the analysis using the 75th percentile (2.8 percent to 23.0 percent), volatility shows a more substantial decrease (0.6 percent). The increase in correlations is now 0.076 and the increase in beta is 0.182.

VI. Conclusions

There are many perceptions of the role of foreign speculators in emerging equity markets—many of which are negative. Our research looks at the various ways foreigners can access emerging market equity (ADRs, Country Funds, or direct participation in the local market) and tries to assess the impact on expected returns, volatility, beta, and correlation.

One of the major conclusions of our work is that the capital market integration process reduces the cost of capital but perhaps by less than we expected. In fact, there are reasons to believe that the effect we measure is upwardly biased. We have taken liberalizations as an exogenous event, whereas policymakers would probably choose to liberalize when it is most advantageous to do so. Although policy endogeneity would suggest our estimates are biased upward (see Henry (2000) for a similar point), the effect we measure is less than one percent. A positive effect of the liberalization on the growth potential of the country (as predicted by the new growth theory) should also decrease dividend yields, and we present some evidence in favor of a small growth effect.

In fact, one control variable that is very significant in our regressions is the economic openness of the country, which is known to be a reliable predictor of economic growth, a result confirmed in our data. Although we cannot disentangle the dividend yield changes precisely into the cost of capital changes versus changes in growth opportunities, the fact that dividend yields consistently decrease suggests some (albeit minor) beneficial effects of liberalizations. One macroeconomic variable that may be particularly sensitive to both cost of capital changes and growth opportunities is aggregate investment as a proportion of GDP. Henry (1999) already reports that financial and economic liberalization increases growth in aggregate investment. We repeat our analysis of Table V, regressing the investment to GDP ratio on the liberalization indicator. The results are striking. For the Official Liberalization, First Sign, and Capital Flows, we measure, respectively, 75, 73, and 66 basis point increases in the investment to GDP ratio—all of which are significant at the 5 percent level.

Our analysis details a small but mostly insignificant increase in the volatility of stock returns following capital market liberalizations. Moreover, the effect becomes negative when potentially concurrent movements in the control variables are taken into account. Interestingly, there is only a small increase in correlation with the world market return. Many foreign investors are attracted to emerging markets for the diversification benefits. Although correlations increase after markets open up, the magnitude of the increase is unlikely to deter investors seeking diversification.

Our research comes at a time when a number of countries are pondering the wisdom of further liberalizing their capital markets or, in the case of some East Asian countries, reversing the process. Nevertheless, much research remains to be done. As this paper illustrates, it is extremely hard to identify when market integration really occurs. If we could use returns and other financial data to "date" market integration, we may be able to determine which liberalization initiatives (ADRs, Country Funds, large-scale capital market liberalizations) have proved most effective in bringing about market integration. Ongoing research by Bekaert, Harvey, and Lumsdaine (1998) offers some insight on this important question.

Appendix A. The Relation between Dividend Yields and the Cost of Capital

We explore in greater detail the present value model described in Section II.A. This includes a sketch of the price-dividend solution procedure, a Monte Carlo study pitting dividend yields versus average returns as a cost of capital measure, and, finally, a calibration to emerging market data before and after liberalization.

A. Model Solution

The model can be summarized by three equations:

$$\Delta d_t = \mu(1-\rho) + \rho \Delta d_{t-1} + \epsilon_t; \tag{A1}$$

$$r_t = q(1-\phi) + \phi r_{t-1} + \eta_t; \tag{A2}$$

$$\frac{P_t}{D_t} = E_t\left[\sum_{i=1}^{\infty} \exp\left(\sum_{j=1}^{i} -r_{t+j-1} + \Delta d_{t+j}\right)\right]. \tag{A3}$$

Introduce $v_{t,i} = E_t[\exp(\sum_{j=1}^{i}(-r_{t+j-1} + \Delta d_{t+j}))]$. Hence,

$$\frac{P_t}{D_t} = \sum_{i=1}^{\infty} v_{t,i}. \tag{A4}$$

Our conjecture is that

$$v_{t,i} = \exp(a_i + b_i \Delta d_t + c_i r_t) \tag{A5}$$

with the evolution of the a_i, b_i, and c_i governed by the difference equations in equation (8) and $a_0 = b_0 = c_0 = 0$. It is easy to see that this works for $i = 1$. The induction step involves showing that

$$v_{t,i+1} = E_t[\exp(-r_t + \Delta d_{t+1}) v_{t+1,i}] = \exp(a_{i+1} + b_{i+1} \Delta d_t + c_{i+1} r_t), \tag{A6}$$

which is straightforward.

A special case of this model is $q = -\ell n\delta, \sigma_\eta^2 = 0$, $\phi = 0$, the case of constant expected returns. For this case, the solution can be rewritten as

$$\frac{P_t}{D_t} = Z_t \sum_{i=1}^{\infty} \delta^i \exp\left(v_i - \frac{\rho^i}{1-\rho}\Delta d_t\right) \tag{A7}$$

with

$$\begin{aligned} Z_t &= \exp\left(\frac{\rho}{1-\rho}\Delta d_t\right) \\ v_i &= \frac{1}{2}\frac{\sigma^2}{(1-\rho)^2}\left[i - 2\rho\frac{1-\rho^i}{1-\rho} + \rho^2\frac{1-\rho^{2i}}{1-\rho^2}\right]. \end{aligned} \tag{A8}$$

B. Monte Carlo Study

We first calibrate the model to U.S. data. We fix the first three moments of dividend growth both to match the data and to guarantee reasonable implied moments for dividend yields. We set the unconditional mean of the time-varying expected return equal to 0.10 and its persistence equal to 0.75. Finally, the standard deviation of r_t is only 40 percent of that of dividend growth. With these parameters, the model delivers moments within one standard error of the mean, standard deviation, and autocorrelation of dividend growth rates, and the mean and autocorrelation of stock returns. It delivers stock returns that are slightly more variable than the data, but the implied moment remains within a two standard error band of the data moment. Although the dividend yield mean and volatility are not statistically close to the data moments, they are economically of similar magnitude. Further details are provided in Table AI.

Table AII describes a Monte Carlo experiment that illustrates the relative performance of the two measures of cost of capital changes (average returns before and after the break versus changes in dividend yields) in the context of the present value model. The table is presented in terms of cost of capital decreases; hence, a negative change implies an increase in the cost of capital. We simulate samples of 40 annual observations (which is double the number of observations we have for a typical emerging market) on $[\Delta d_t, r_t]$, but the mean of the r_t process permanently changes by two percent (from 10 percent to eight percent) midway through the sample. In population, the change in average returns ought to be approximately 2.19 percent (see footnote 8). The small sample distribution for the change in average simple returns is very spread out in that there is a 10 percent probability of concluding that the cost of capital went up by 5.44 percent or more, even though it actually dropped by 2.19 percent. The low variability of dividend yields implies that they virtually always decrease and the 10 percent quantile is still a 1.43 percent drop in the dividend yield.

Table AI

A Comparison of Model and U.S. Data Moments

The annual data are from Ibbotson Associates spanning 1926–1996. The table reports the mean, standard deviation, and autocorrelation for the three series with a GMM-based standard error in parentheses. For more details, see Bekaert and Grenadier (1999). The third line is the moment implied by the present value model:

$$\Delta d_t = 0.032(1 - 0.1) + 0.1\,\Delta d_{t-1} + 0.14\,[1 - (0.1)^2]^{0.5} \times u_t,$$

$$r_t = 0.10(1 - 0.75) + 0.75\,r_{t-1} + (0.4)0.14\,[1 - (0.75)^2]^{0.5} \times v_t,$$

where u_t and v_t are jointly N(0, I). To compute the model moments, we use a simulation of 100,000 observations. The model moments indicated by a * follow directly from the model parameters. The imposed and simulated moments are identical up to three digits.

Moment	Real Dividend Growth	Dividend Yields	Real Stock Returns
Mean			
Data	0.008	0.044	0.087
Data std. error	(0.0159)	(0.002)	(0.024)
PV model	0.032*	0.050	0.107*
Standard deviation			
Data	0.128	0.150	0.200
Data std. error	(0.023)	(0.002)	(0.018)
PV model	0.140*	0.010	0.229
Autocorrelation			
Data	0.185	0.667	0.001
Data std. error	(0.154)	(0.097)	(0.103)
PV model	0.100*	0.745	−0.050

Panel B illustrates the role of time-varying expected returns. We isolate cases in which expected returns are, at the time of the liberalization, low (left columns) or high (right columns). We define low (high) expected returns as five-year average returns before the liberalization of less (more) than eight percent (12 percent). When returns were already low in the preliberalization period, the drop in the cost of capital is less noticeable. Interestingly, the dividend yield measure remains fairly robust with the difference in mean across the distributions only being 30 basis points. For average returns, on the other hand, the differences are dramatic. In the low expected return case, no drop in the cost of capital is observed on average at all, and the decrease is upwardly biased in the high expected returns case. This is potentially important for empirical work since governments may choose to liberalize when it appears most advantageous to them, such as in times of depressed stock prices. Even then, dividend yields allow a rather accurate assessment of the long-run impact on the cost of capital.

So far we have examined one country at a time. Of course, cross-sectional pooling is what renders power to event studies. Unfortunately, we only have 20 emerging markets. In Panel C, we take our 20,000 Monte Carlo experi-

ments and construct cross-sectionally averaged changes in the cost of capital over 20 experiments, yielding 1,000 observations. Although this is an idealized setup, the improvement is dramatic. The 10 percent quantile now suggests a 57 basis point decrease in the cost of capital. Nevertheless, whereas the standard deviation of the returns measure distribution shrinks by a factor of almost four (6.04 percent to 1.27 percent), so does the standard deviation of the dividend yield change distribution, which drops to 12 basis points. The actual change is now bounded between 1.78 percent and 2.56 percent for our 1,000 experiments.

Experiment 2 investigates the effect of changing the mean dividend growth rate, in addition to the change in q. Dividend yield changes now also reflect this improvement in growth opportunities, and overestimate the true cost of capital change. In another Monte Carlo experiment (not reported), we decrease the cost of capital by two percent, but increase dividend growth by three percent. Dividend yields now decrease on average by 4.18 percent, whereas returns decrease on average by 1.19 percent. However, the dispersion is large, with a 10 percent quantile of a 6.64 percent increase in returns. Cross-sectional pooling reduces the 10 percent quantile to only slightly positive changes in average returns, but with the volatility of returns observed in emerging markets much higher than in our experiments it remains unlikely that returns lead to statistically significant results. For dividend yields, the effect of changes in μ and changes in q is close to additive and the range is very tight.

C. The Cost of Capital and Growth

Our structural model requires the estimation of six parameters before and after the structural break $(\mu, \rho, \sigma_\eta^2, \sigma_\epsilon^2, \phi, q)$, characterizing the properties of dividend growth and expected returns. We identify these parameters in a two-stage approach using data on real GDP growth (as a proxy to Δd_t in the model), log returns (endogenous in the model), and dividend yields (also endogenous in the model). We seek to estimate the mean, standard deviation, autocorrelation of real GDP growth, the mean dividend yield and its autocorrelation, and the volatility of log returns for an "average" emerging market. From the first three moments we can immediately infer the parameters for the dividend growth process. We then calibrate the remaining three parameters for the expected return process so that they match the last three moments. In practice, we conduct an exactly identified simulated GMM estimation with an identity weighting matrix, using 10,000 observations for the simulated sample. Note that we do not use average returns because of the imprecision with which they are measured. Expected returns are inferred indirectly from data on dividend yields, return volatility, and the structural restrictions imposed by the model.

We define an "average" emerging market consistent with the cross-sectional regression framework. Let us illustrate for GDP growth. A similar exercise is conducted for dividend yields and log returns. We consider a panel

Table AII

Small Sample Distribution of the Various Estimators of the Cost of Capital Decrease

Panel A reports characteristics of the small sample distribution for two experiments. We draw 20,000 samples of annual 40 observations on $\{q_t, \Delta d_t\}$ and then impute implied stock market returns. For the first 20 years, $q = 10$ percent, afterward, $q = 8$ percent. The cost of capital decrease measured in the simple returns is from 10.69 percent $[\exp(q + (\frac{1}{2})\sigma_\eta^2/(1 - \phi^2)) - 1]$ to 8.5 percent; a 2.19 percent decrease. In experiment 1, the only parameter change is the mean of q, in experiment 2, the mean of Δd_t, μ, increases by one percent as well. Panel B singles out samples with unusually low or high average returns five years before the break. Panel C shows results from cross-sectionally averaging 20 samples at a time.

Panel A: Standard Monte Carlo Distribution (20,000 experiments)

	Experiment 1 Reduce Cost of Capital, q, by 2%		Experiment 2 Reduce Cost of Capital, q, by 2% Increase Mean of Δd_t by 1%	
	Returns	Dividend Yields	Returns	Dividend Yields
Mean	2.28	2.18	2.25	3.25
σ	6.04	0.58	6.05	0.54
10% quantile	−5.44	1.43	−5.49	2.47
Minimum	−20.87	−0.03	−21.18	1.49
Maximum	28.12	4.82	28.19	3.25

Panel B: Restricted Monte Carlo Distribution (approximately 7250 experiments)

	Pre-Break Expected Return <8% (Low expected returns) Experiment 1		Pre-Break Expected Return >12% (High expected returns) Experiment 1	
	Returns	Dividend Yields	Returns	Dividend Yields
Mean	0.00	2.00	4.39	2.27
σ	5.74	0.57	5.75	0.59
10% quantile	−9.48	1.37	−0.15	1.52
Minimum	−20.87	−0.03	−15.40	0.36
Maximum	20.28	4.22	28.12	4.82

Panel C: Monte Carlo Distribution for Cross-Sectional Averages (1,000 experiments)

	Experiment 1 Reduce Cost of Capital, q, by 2%		Experiment 2 Reduce Cost of Capital, q, by 2% Increase Mean of Δd_t by 1%	
	Returns	Dividend Yields	Returns	Dividend Yields
Mean	2.28	2.18	2.25	3.25
σ	1.27	0.12	1.28	0.11
10% quantile	0.57	2.03	0.54	3.12
Minimum	−1.28	1.78	−1.36	2.86
Maximum	6.32	2.56	6.30	3.60

regression with the dependent variable as real GDP growth, real GDP growth squared, or real GDP growth times past real GDP growth. The right-hand-side variables are simply a constant and the liberalization dummy. We run a cross-sectionally pooled regression with heteroskedasticity correction to obtain estimates of the constant and the liberalization effect for each moment. We use the estimated coefficients as our estimates of the corresponding uncentered moments from which we can construct the moments of interest. The regression approach has the advantage of making exactly the same assumptions about the cross section of emerging markets as our main regression framework, including the heteroskedasticity correction. The disadvantage of this approach is that the implied autocorrelation is not guaranteed to be between -1 and 1, and we experienced such a problem with the autocorrelation of the dividend yield for the Official Liberalization measure. We therefore focus the discussion on the Capital Flows measure, although the results for the Official Liberalization measure are qualitatively the same, when we fix the autocorrelation coefficient of the dividend yield at some high number.

The calibrated model fits the data moments very well. By construction, the first three moments of dividend (GDP) growth are matched exactly, as is the mean dividend yield and return volatility. The model has slightly lower dividend yield variability, 1.3 (1.0) percent before (after) the break, than is true in the data, 1.7 (1.2) percent before (after) the break. Dividend yield autocorrelation is slightly higher in the model but the overall fit is impressive. The main output is the estimate of the average decrease in log-returns versus dividend yields. Dividend yields decrease by 75 basis points, average log-returns decrease by 11 basis points.

Interestingly, it very much matters how the expected return is computed. When we investigate the mean of the expected return process (q), it *increases* from 11.72 percent to 11.98 percent and so does the mean of gross returns, from 13.60 percent to 13.99 percent. The main reason for these large differences between logged and nonlogged returns is of course the tremendous volatility characterizing emerging markets. Fama (1996) notes a similar problem in computing the cost of capital for individual stock returns in the United States, which display about the same volatility as emerging markets do.

Appendix B. Discussion of the Choices for Official Liberalization Dates[17]

Argentina: *November 1989*. New Foreign Investment regime put into place. All legal limits on foreign investment abolished. Capital gains and dividends allowed to be repatriated freely. No need for previous approval of transactions. No legal limits regarding type or nature of foreign investment. Introduction of a free exchange regime (free repatriation of capital, remittance of dividends and capital gains.) Also IFC liberalization date.

[17] This discussion is based on the chronology in Bekaert and Harvey (1998).

Brazil: *May 1991*. Foreign investment law changed. Resolution 1832 Annex IV stipulates that foreign institutions can now own up to 49 percent of voting stock and 100 percent of nonvoting stock. Economic Ministers approve rules allowing direct foreign investments; 15 percent on distributed earnings and dividends but no tax on capital gains. Foreign investment capital must remain in the country for six years as opposed to 12 under previous law. Bank debt restructuring agreement. Also IFC liberalization date. Note that until *July 1991* foreign portfolio investors could invest in Brazil only through Brazil investment funds. Now foreign investors are allowed to set up omnibus accounts which are essentially portfolios of one or more shares held in local custody. There are no minimum holding period restrictions.

Chile: *January 1992*. Regulation DL600 eases restrictions on foreign investment and repatriation of capital to minimum holding period of one year. Central Bank revalues the peso by five percent. DL600 also offers foreigners guaranteed access to the foreign exchange market. Coincides with a period of broad economic reform. For example, tariffs reduced to 11 percent across the board in *June 1991*. Note IFC liberalization date is *December 1988*. There are no particular regulatory events that coincide with this date. However, in 1987, Chile allowed, through LAN18657, Foreign Capital Investment Funds (FCIFs) to be set up outside Chile. An FCIF could neither invest more than 10 percent of its assets in a single stock nor own more than five percent of the voting shares of any stock. The funds require a local administrator.

Colombia: *February 1991*. At the end of *January 1991*, a new foreign investment code, Resolution 49, is made effective. Foreigners are given the same rights as domestic investors: remittances of up to 100 percent of most capital registered in the past year; equal access to local credit sources as well as to export incentives; and 100 percent foreign ownership of financial institutions. Also the IFC liberalization date.

Greece: *December 1987*. In 1987, there is a liberalization of currency controls. Europeans are allowed to participate in the equity market and to repatriate their capital gains. IFC considers 1987 the liberalization date for European investors but it dates the official liberalization in *December 1988* when the market is opened to non-European investors. 1987 also coincides with a number of significant macroeconomic reforms including the privatization of 190 of the largest state-controlled enterprises. Additionally, the government announces further privatization plans.

India: *November 1992*. In *September 1992*, the government announces that foreign portfolio investors will be able to invest directly in listed Indian securities. Simultaneously, the tax environment is made more conducive to foreign holdings of domestic securities. Also the IFC liberalization date.

Indonesia: *September 1989*. Minister of Finance allows foreigners to purchase up to 49 percent of all companies listing shares on the domestic exchange excluding financial firms. In *May 1989*, government accepted the IMF's conditions for currency convertibility. Also the IFC liberalization date.

Jordan: *December 1995*. Foreign investment bylaws passed, allowing foreign investors to purchase shares without government approval. Note, IFC considers liberalization date to be *December 1988*. However, at this time and afterward, there is little foreign participation in the equity market.

Korea: *January 1992*. In *September 1991*, there is an announcement that the stock market will open to investors in January of 1992. The announced regulations are that a foreign investor cannot own more than three percent of a company's shares and foreigners cannot own collectively more than 10 percent of a company. The government later raised the limit to 25 percent for 45 companies that already had more than 10 percent ownership by foreigners. Also the IFC liberalization date. Important coincident events include Korea being admitted into the United Nations in *September 1991* and Republic of Korea and Democratic People's Republic of Korea concluding an agreement covering political reconciliation, military nonaggression, and economic cooperation in *December 1991*.

Malaysia: *December 1988*. In the budget introduced in *October 1988*, plans are detailed for the liberalization of foreign ownership policies to attract more foreign investors. Also the IFC liberalization date.

Mexico: *May 1989*. In 1989, a 1973 law promoting Mexican investment and foreign investment is relaxed. Amnesty in effect for repatriation of flight capital with a one-time two percent tax only. Also the IFC liberalization date. Important coincidental economic news includes the *March 1989* Brady plan (adjustment package that combined debt relief and market-oriented reforms).

Nigeria: *August 1995*. In 1995, the government budget repeals the Exchange Control Act of 1962 and the Enterprise Promotion Act of 1989. It also legalizes the autonomous foreign exchange market that was banned in *January 1994*. Repeal of the Exchange Control and Enterprises Promotion act clears the way for the stock exchange to be opened to foreign portfolio investment. In *August 1995*, the government releases the Nigerian Investment Promotion Decree and the Foreign Exchange Monitoring and Miscellaneous Provisions Decree. These decrees open the Nigerian market to foreign portfolio investment. There is no IFC liberalization date.

Pakistan: *February 1991*. In *November 1990*, several liberalization moves were announced that relaxed both domestic and foreign investment procedures. In *February 1991*, new foreign investment law passes. Now there is no restriction on foreigners or nonresident Pakistanis purchasing shares of a listed company or subscribing to public offerings of shares. There are, however, some approvals still necessary from the Investment Promotion Bureau, the government's project sanctioning and foreign investment regulatory body. Additionally, there still exist some exchange control restrictions imposed by the State Bank of Pakistan. The first foreign investment in listed shares takes place in *March 1991*. Also the IFC liberalization date.

Philippines: *June 1991*. A Foreign Investment Act is signed into law. The Act removes, over a period of three years, all restrictions on foreign investments. Under the provisions, foreign investors are required only to

register with the Securities and Exchange Commission, and most sectors of the economy are opened to 100 percent foreign ownership. The IFC official date is *October 1989* but that is difficult to justify.

Portugal: *July 1986*. In 1986, Portugal enters the EC and agrees to eliminate all barriers to capital movements. In *July 1986*, all restrictions on foreign investment ownership are removed except for arms sector investments. The IFC official date is *December 1988*.

Taiwan: *January 1991*. Implementation date of the second phase of the liberalization plan. Eligible foreign institutional investors may now invest directly in Taiwan securities if they have applied for and received SEC approval as a qualified foreign institutional investor (QFII). Outward remittance is not allowed until three months after initial investment. Each foreign institution is limited to holding a maximum of five percent of any listed stock and total foreign holdings in any listed companies may not exceed 10 percent. Also the IFC liberalization date.

Thailand: *September 1987*. Inauguration of the Stock Exchange of Thailand's Alien Board. The Alien Board allows foreigners to trade stocks of those companies that have reached their foreign investment limits. Thais continue to trade stocks on the Main Board. The IFC liberalization date is *December 1988*, which is not associated with any particular regulatory changes.

Turkey: *July 1989*. Communiqué passes allowing foreign mutual funds to have access to equities market. Subsequently, a resolution, announced in the *Official Gazette*, declares the securities market in Turkey fully open to foreign institutional and individual investors. Also the IFC liberalization date.

Venezuela: *January 1990*. Decree 727 (January 16) opens foreign direct investment for all stocks except for bank stocks. Also the IFC liberalization date.

Zimbabwe: *June 1993*. In *April 1993*, Finance Minister Chidzero announces new investment guidelines and export incentives that effectively open the Zimbabwe Stock Exchange (ZSE) to foreign portfolio investment. Foreign investors are able to participate on the ZSE provided that: (1) they finance the purchase of shares by inward transfer of foreign currency through normal banking channels; (2) the purchase of shares is limited to 25 percent of the total equity of the company (excluding existing foreign shareholdings prior to May 1993) with the single investor limited to acquire at most five percent of the shares outstanding; and (3) investments (capital and capital gains) are freely remittable after capital gains taxes. Additionally, foreign investors participating in the stock market, under the new rules, are not required to obtain exchange control approval and can register share purchases either in their own names or names of nominee companies. These guidelines become effective on *June 23, 1993*. There is no official IFC liberalization date.

REFERENCES

Aggarwal, Reena, Carla Inclan, and Ricardo Leal, 1999, Volatility in emerging stock markets, *Journal of Financial and Quantitative Analysis* 34, 33–55.

Bai, Jushan, Robin Lumsdaine, and James H. Stock, 1998, Testing for and dating breaks in stationary and nonstationary multivariate time series, *Review of Economic Studies* 65, 395–432.

Bailey, Warren, and Joseph Lim, 1992, Evaluating the diversification benefits of the new country funds, *Journal of Portfolio Management* 18, 74–89.

Basak, Suleyman, 1996, An intertemporal model of international capital market segmentation, *Journal of Financial and Quantitative Analysis* 31, 161–188

Basak, Suleyman and Domenico Cuoco, 1998, An equilibrium model with restricted stock market participation, *Review of Financial Studies* 11, 309–341.

Bekaert, Geert, 1995, Market integration and investment barriers in emerging equity markets, *World Bank Economic Review* 9, 75–107.

Bekaert, Geert, and Steven R. Grenadier, 1999, Stock and bond pricing in an affine economy, Working paper, Stanford University.

Bekaert, Geert, and Campbell R. Harvey, 1995, Time-varying world market integration, *Journal of Finance* 50, 403–444.

Bekaert, Geert, and Campbell R. Harvey, 1997, Emerging equity market volatility, *Journal of Financial Economics* 43, 29–78.

Bekaert, Geert, and Campbell R. Harvey, 2000, Capital flows and the behavior of emerging equity market returns; in Sebastian Edwards, ed.: *Capital Inflows to Emerging Markets* (University of Chicago Press for the National Bureau of Economic Research, Chicago), forthcoming.

Bekaert, Geert, Campbell R. Harvey, and Robin Lumsdaine, 1998, Dating the integration of world capital markets, Working paper, Stanford University and Duke University.

Bekaert, Geert, and Michael S. Urias, 1996, Diversification, integration and emerging market closed-end funds, *Journal of Finance* 51, 835–870.

Bollerslev, Tim, 1986, Generalized autoregressive conditional heteroskedasticity, *Journal of Econometrics* 72, 307–327.

Bollerslev, Tim, and Robert J. Hodrick, 1995, Financial market efficiency tests; in M. Hashem Pesaran and Michael R. Wickens, eds.: *The Handbook of Applied Econometrics: Vol. 1. Macroeconometrics* (Blackwell, Oxford).

Campbell, John Y., and Robert J. Shiller, 1988, The dividend-price ratio and expectations of future dividends and discount factors, *Review of Financial Studies* 1, 195–228.

Cochrane, John, 1992, Explaining the variance of price-dividend ratios, *Review of Financial Studies* 5, 243–280.

De Santis, Giorgio, and Selahattin İmrohoroğlu, 1997, Stock returns and volatility in emerging financial markets, *Journal of International Money and Finance* 16, 561–579.

Domowitz, Ian, Jack Glen, and Ananth Madhavan, 1997, Market segmentation and stock prices: Evidence from an emerging market, *Journal of Finance* 52, 1059–1086.

Domowitz, Ian, Jack Glen, and Ananth Madhavan, 1998, International cross-listing, market segmentation and foreign ownership restrictions: The case of Mexico; in Richard Levich, ed.: *The Future of Emerging Market Capital Flows* (Kluwer Academic Publishers, Boston).

Erb, Claude B., Campbell R. Harvey, and Tadas E. Viskanta, 1996a, Expected returns and volatility in 135 countries, *Journal of Portfolio Management* 22, 46–58.

Erb, Claude B., Campbell R. Harvey, and Tadas E. Viskanta, 1996b, Political risk, economic risk and financial risk, *Financial Analysts Journal*, 29–46.

Errunza, Vihang, Lemma Senbet, and Ked Hogan, 1998, The pricing of country funds from emerging markets: Theory and evidence, *International Journal of Theoretical and Applied Finance* 1, 111–143.

Fama, Eugene F., 1996, Discounting under uncertainty, *Journal of Business* 69, 415–428.

Foerster, Stephen R., and G. Andrew Karolyi, 1999, The effects of market segmentation and investor recognition on asset prices: Evidence from foreign stocks listing in the United States, *Journal of Finance* 54, 981–1014.

Glosten, Lawrence R., Ravi Jagannathan, and David E. Runkle, 1993, On the relation between the expected value and the volatility of the nominal excess return on stocks, *Journal of Finance* 48, 1779–1802.

Grossman, Sanford, 1995, Dynamic asset allocation and the informational efficiency of markets, *Journal of Finance* 50, 773–788.

Grossman, Sanford, and Joseph Stiglitz, 1980, On the impossibility of informationally efficient markets, *American Economic Review* 70, 393–408.

Hamao, Yasushi, and Jianping Mei, 1997, Living with the "enemy": An analysis of investment in the Japanese equity market, Working paper, Columbia University.

Harvey, Campbell R., 1991, The world price of covariance risk, *Journal of Finance* 46, 111–157.

Harvey, Campbell R., 1995, Predictable risk and returns in emerging markets, *Review of Financial Studies* 8, 773–816.

Henry, Peter Blair, 1999, Do stock market liberalizations cause investment booms? *Journal of Financial Economics*, forthcoming.

Henry, Peter Blair, 2000, Stock market liberalization, economic reform, and emerging market equity prices, *Journal of Finance*, this issue, 529–564.

Karolyi, G. Andrew, 1998, *What Happens to Stocks That List Shares Abroad? A Survey of the Evidence and Its Managerial Implications*, Salomon Brothers Monograph Series (Salomon Brothers, New York).

Kang, Jun-Koo, and René M. Stulz, 1997, Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan, *Journal of Financial Economics* 46, 1–28.

Kim, E. Han, and Vijay Singal, 2000, Stock market opening: Experience of emerging economies, *Journal of Business* 73, 25–66.

Kleidon, Allan W., 1986, Variance bounds tests and stock price valuation models, *Journal of Political Economy* 94, 953–1001.

Korajczyk, Robert A., 1996, A measure of stock market integration for developed and emerging markets, *World Bank Economic Review* 10, 267–290.

Miller, Darius P., 1999, The impact of international market segmentation on securities prices: Evidence from Depositary Receipts, *Journal of Financial Economics* 51, 103–124.

Newbery, David, 1987, When do futures stabilize spot prices, *International Economic Review* 28, 291–297.

Obstfeld, Maurice, 1994, Risk taking, global diversification and growth, *American Economic Review* 84, 1310–1329.

Perotti, Enrico C., and Pieter van Oijen, 1997, Privatization, stock market development and political risk in emerging economies, Working paper, University of Amsterdam.

Richards, Anthony J., 1996, Volatility and predictability in national markets: How do emerging and mature markets differ? Staff papers, International Monetary Fund, Washington, D.C.

Ross, Stephen A., 1989, Information and volatility: The no-arbitrage martingale approach to timing and resolution irrelevancy, *Journal of Finance* 44, 1–17.

Schwert, G. William, 1989a, Business cycles, financial crises and stock volatility, *Carnegie-Rochester Conference Series on Public Policy* 31, 83–126.

Schwert, G. William, 1989b, Why does stock market volatility change over time? *Journal of Finance* 44, 1115–1154.

Sims, Christopher A., and Harald Uhlig, 1991, Understanding unit rooters: A helicopter tour, *Econometrica* 59, 1591–1600.

Stulz, René M., 1999, International portfolio flows and security markets; in Martin Feldstein, ed.: *International Capital Flows* (University of Chicago Press, Chicago).

Subrahmanyam, Marti G., 1975, On the optimality of international capital market integration, *Journal of Financial Economics* 2, 3–28.

Tandon, Kishore, 1997, External financing in emerging markets: An analysis of market responses, *Emerging Markets Quarterly* 1, 63–74.

Tesar, Linda, and Ingrid Werner, 1995a, Home bias and high turnover, *Journal of International Money and Finance* 14, 467–492.

Tesar, Linda, and Ingrid Werner, 1995b, U.S. equity investment in emerging stock markets, *World Bank Economic Review* 9, 109–130.

Urias, Michael, 1994, The impact of security cross-listing on the cost of capital in emerging markets, Unpublished dissertation, Stanford University.