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Do Implicit Barriers Matter for Globalization?

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Market liberalization may not result in full market integration if implicit barriers are important. We test this proposition for investable and non-investable segments of twenty-two emerging markets (EMs). We also measure the degree of integration for six major developed markets (DMs) as a meaningful benchmark. We find that while the DMs are close to fully integrated, both EM segments are not effectively integrated with the global economy. We quantify the importance of implicit barriers and show that better institutions, stronger corporate governance, and more transparent markets in EMs would jointly contribute to a higher degree of integration by about 20% to 30%. (*JEL* G15, F30, G30)

Since the late 1980s, many emerging markets (EMs) have reduced explicit barriers such as the limits on foreign investor holdings for foreign portfolio investments. Nonetheless, the EMs have not attained the full integration status that one would expect. Further, the issue of what drives integration has remained

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quite elusive—that is, which factors keep equity markets from being fully integrated once legal and practical constraints are eliminated. Indeed, we would expect implicit barriers related to institutional, governance, and information environments to play an important role in explaining departure from full integration. Hence, we estimate the evolution of integration over time through a formal asset pricing model and then relate it in a comprehensive analysis to the various implicit barriers.

Our paper makes four important contributions to the existing literature. First, most previous studies have used broad market-wide index-level data, such as the International Finance Corporation Global Indices (IFCG) of S&P. These types of market indices also include securities not available to foreign investors. Instead we investigate the pricing and time variation in integration for two distinct segments of EMs, the investable as well as the non-investable.[1] We model the two segments simultaneously using the Errunza and Losq (1985; henceforth EL) equilibrium pricing model. According to this model, the equity risk premium can be decomposed into a global risk premium and a conditional local risk premium. The local risk premium depends on the availability of securities in global markets that can help span the local market. The model predicts that if countries are fully integrated, only the global systematic risk is priced, whereas under complete segmentation, only the local market risk is priced.

Second, we apply the EL model to a sample of six developed economies, the G7 excluding the United States. Consistent with the general absence of explicit and implicit barriers, we would expect these developed markets (DMs) to be close to fully integrated. Thus, measuring the degree of integration among DMs provides us with a meaningful empirical benchmark to effectively distinguish between integrated and partially segmented markets.

Third, we assess the role of implicit barriers in explaining the departure from full integration and their economic impact for both the investable and the non-investable segments. Since the construction of investable indices takes into account explicit barriers such as the limits on foreign portfolio holdings, trading volume, and market float/size, whereas non-investable indices encounter both explicit and implicit barriers, it would be reasonable to expect the level of integration to be lower and the implicit barriers to matter more for the non-investables.

Fourth, our paper also investigates the contribution of exchange traded funds (ETFs) to integration. The advent of ETFs should complement the existing country funds (CFs) and American/global depositary receipts (ADRs/GDRs) and increase the ability of investors to duplicate foreign asset portfolios without having to go abroad. If ETFs are a perfect substitute for the underlying EM/DM portfolio, there should be complete spanning, the local risk premium should

[1] Studies by Bae, Chan, and Ng (2004), Chari and Henry (2004), and Bae, Bailey, and Mao (2006) provide some support to the argument that the investable indices are more integrated with the world than the non-investables.

disappear, and the market would be fully integrated. In contrast, if ETFs are an imperfect substitute as a result of a variety of implicit barriers (for example, political risk, illiquidity, excess volatility), then their inclusion would not lead to full integration, as shown theoretically and empirically in the case of CFs by Errunza, Senbet, and Hogan (1998). Further, the additional contribution of ETFs should be marginal in the presence of other cross-listed securities.

A number of empirical studies have investigated EM asset valuation and the degree of market integration for broad market indices. Bekaert and Harvey (1995) combine the two polar specifications of full integration and complete segmentation to assess the time-varying probability that markets conform to one of the two regimes. Based on the EL model, Carrieri, Errunza, and Hogan (2007; henceforth CEH) construct an "Integration Index" that is determined by the spanning potential of global factors and substitute assets, including cross-listings and country funds. Pukthuanthong and Roll (2009) derive a simple measure, the R-squared from the regression of a country's index returns on common global factors, to investigate trends in global integration. More recently, Bekaert et al. (2011) use valuation ratios to develop a measure of market segmentation and relate it to regulations with respect to foreign capital flows and other non-regulatory factors. Our article provides new insights on the time variation in the degree of market integration of investables and non-investables and shows that overall emerging markets are indeed still less integrated than developed markets.

Past literature has also identified a number of implicit variables that might impact pricing and the degree of market integration. For example, Errunza (1977) and Errunza and Losq (1987) emphasize market development, political risk, quality of information, and market regulation. Bekaert (1995) develops a composite measure to empirically relate implicit barriers to market integration. Nishiotis (2004) provides evidence that liquidity, credit ratings, and inflation can explain the premium and discount of EM closed-end funds. Lang, Lins, and Miller (2003) and Bailey, Karolyi, and Salva (2006) provide evidence on the link between cross-listing and the change in the firms' information environment. Stulz (2005) identifies the twin agency problems related to expropriation by the state and by corporate insiders at the expense of outside investors as the primary hindrance to financial globalization. Bekaert, Harvey, and Lundblad (2007) and Lee (2011) model the impact of liquidity, and Andrade (2009) evaluates country risk effects on pricing of EM assets. While these studies improve our understanding of the importance of implicit barriers in asset valuation, our paper relates the lack of integration to the intensity of such barriers and quantifies the role of institutional, informational, and governance factors for emerging markets.

We first implement a conditional version of the EL model for the investable and the non-investable segments of twenty-two emerging markets from 1989 to 2008. We find evidence that the local risk factor is still priced and neither segment is fully integrated with the world market. While this result is not surprising for the non-investables, it is more remarkable for investables, given the increasing availability of cross-listed securities and ongoing liberalization. To capture the extent of departure from full integration, we use the Integration Index as in CEH and show that for our sample markets, the integration process is still under way. The average degree of integration is 0.63 and 0.46 for the investable and non-investable segments, respectively, and it has been increasing over time for both subsets.

Next, we investigate whether the emerging markets are indeed still different from major DMs. We estimate the EL model for a benchmark sample of the G6 countries from 1989 to 2008, all with a country ETF from March 1996. The average degree of integration for these G6 countries is 0.93, which is fairly constant and still substantially higher compared with EMs. The contribution of ETFs to market integration is subsumed by the earlier introductions of cross-listed securities such as CFs and ADRs/GDRs for both EMs and DMs and is marginal in most cases.

We next relate our integration measures for investables and non-investables to implicit barriers related to the institutional environment, corporate governance, and quality of information available to investors. The evidence clearly shows that these implicit barriers are significantly associated with the degree of integration. Specifically, we find that moving within the cross-section of countries from the 25th percentile to the 75th percentile, better institutions, stronger corporate governance, and more transparent markets would jointly contribute to a higher degree of integration by about 19% for investables and 30% for non-investables.

The rest of the paper is organized as follows. Section 1 describes the model and the empirical methodology. Section 2 explains the notion of investability and the return data. Section 3 presents empirical results regarding the integration measure. Section 4 investigates the role of implicit barriers across countries through the globalization process. Section 5 concludes. A separate appendix available online reports additional statistics, diagnostics, and robustness checks.

1. The Asset Pricing Model: Theory and Empirical Methodology

1.1 The model

We implement the international asset pricing model (IAPM) of Errunza and Losq (1985), which accounts for capital inflow barriers to international investment. The model assumes a two-country world and two sets of securities. All securities traded in the foreign market (e.g., the United States) are eligible for investment by all investors. Securities traded in the domestic market (e.g., the emerging market) are ineligible and can be held only by domestic investors. Thus, foreign investors can invest only in foreign eligible stocks, while domestic investors can invest in their local ineligible stocks as well as foreign stocks.

The expected return on a security *i* that can be held only by domestic investors is given by:

$$E(R_i)=R_f+AMcov(R_i,R_W)+(A_u-A)M_I cov\left(R_i,R_I|\underline{R_e}\right) \quad (1)$$

where $E(R_i)$ is the expected return on the *ith* security in the *Ith* market that is accessible only to its nationals, R_f is the risk-free rate, $A(A_u)$ is the aggregate risk aversion coefficient for all (*Ith*) market investors, $R_W(R_I)$ is the return on the World *(Ith)* market portfolio, $M(M_I)$ is the market value of the global *(Ith)* market portfolio, and $\underline{R_e}$ is the vector of returns on all eligible securities that can be bought by all investors irrespective of their nationality. Thus, the expected return on the *ith* security commands a global risk premium and a super risk premium that is proportional to the conditional market risk. The authors also show that the eligible securities (such as stocks traded on U.S. markets) are priced as if the market was fully integrated and command only a world market risk premium.

The EL model assumes prohibitive capital inflow controls and suggests that fully investable assets should be globally priced. The lack of investability can arise from explicit and implicit barriers. Indeed, investors are reluctant to invest in assets that face implicit barriers. Since the composition of the investable indices largely ignores implicit barriers, they are not fully investable, and hence their expected excess return should command a global and a local risk premium. Similarly, the non-investable segment will also command the two risk premia. Using the S&P/IFC global return index (IFCG) as a proxy for the broad EM index, we can write:

$$E(r_{P,t})=\delta_W cov(r_{P,t},r_{W,t})+\lambda_I cov\left(r_{P,t},r_{IFCG,t}|\underline{r}_e\right),\ P=\text{IFCI, IFCNI} \quad (2)$$

where r_{IFCG}, r_{IFCI} and r_{IFCNI} are the excess returns on the IFCG, S&P/IFC investable (IFCI), and non-investable (IFCNI) indices, respectively; r_W is the excess return on the world market portfolio; and δ_W and λ_I are, respectively, the world and the local price of risk. Note that the IFCNI is constructed from IFCG and IFCI as described in the next section.

1.2 Empirical methodology

We express the returns on the IFCG index as a market capitalization weighted sum of the IFCI and IFCNI index returns. The market weights vary through time. Thus, the time-varying version of Equation (2) can be written as

$$\begin{aligned}\mathrm{E}_{t-1}(r_{IFCI,t})=&\ \delta_{W,t-1}cov_{t-1}(r_{IFCI,t},r_{W,t})+\lambda_{I,t-1}\mathrm{w}_{I,t-1}var_{t-1}\left(r_{IFCI,t}\middle|\underline{r}_e\right)\\&+\lambda_{I,t-1}(1-\mathrm{w}_{I,t-1})cov_{t-1}\left(r_{IFCI,t},r_{IFCNI,t}\middle|\underline{r}_e\right),\end{aligned} \quad (3)$$

and

$$\mathrm{E}_{t-1}(r_{IFCNI,t}) = \delta_{W,t-1} cov_{t-1}(r_{IFCNI,t}, r_{W,t}) + \lambda_{I,t-1} \mathrm{w}_{I,t-1} cov_{t-1}\left(r_{IFCNI,t}, r_{IFCI,t} \,\middle|\, \underline{r}_e\right) + \lambda_{I,t-1}(1-\mathrm{w}_{I,t-1}) var_{t-1}\left(r_{IFCNI,t} \,\middle|\, \underline{r}_e\right), \quad (4)$$

where $\mathrm{w}_{I,t-1}$ is the market weight of the investable index. We can express the time-varying variance conditional on the eligible set as

$$var_{t-1}\left(r_{P,t} \,\middle|\, \underline{r}_e\right) = var_{t-1}(r_{P,t})\left(1-\rho^2_{P,DP,t-1}\right),$$
$$P = \mathrm{IFCI, IFCNI} \text{ and } \quad DP = \mathrm{DPI, DPNI},$$

where $\rho^2_{P,DP,t}$ is the squared correlation coefficient between $r_{P,t}$ *and* $r_{DP,t}$. $r_{DP,t}$ is the excess return on the portfolio of eligible securities that is most highly correlated with the return on $P(=\mathrm{IFCI, IFCNI})$—that is, the excess return on the diversification portfolio DP $(=\mathrm{DPI, DPNI})$. In a static framework, the different parameterizations of the conditional variance are all equivalent. That is, under the null that $r_{P,t} = r_{DP,t} + u_{P,t}$, where $r_{DP,t} = \underline{r'_{e,t}}\beta$, we have $var\left(r_{P,t} \,\middle|\, \underline{r}_e\right) = var(r_{P,t}) - var(r_{DP,t}) = var(r_{P,t}) - cov(r_{P,t}, r_{DP,t}) = var(r_{P,t})\left(1-\rho^2_{P,DP}\right)$. However, conditional on time, the different parameterizations are equivalent only if the coefficient on the diversification portfolio is conditionally equal to one. In constructing the DP, we allow the portfolio weights to vary over time as new funds are introduced but conditioning information is omitted. Because the universe of the eligible set changes over time, dealing with these breaks is difficult, and accounting for the information set will make the construction of the DPs even more complicated. Therefore, we use the correlation-based parameterization because it ensures that the integration measure, defined as one minus the ratio of the conditional variance to the total variance, is bounded *at every point in time t* by 0 and 1 as also implied by the EL model (see Equations 7 and 8 below). Similarly, we model the time-varying covariance conditional on the eligible set as

$$cov_{t-1}\left(r_{IFCNI,t}, r_{IFCI,t} \,\middle|\, \underline{r}_e\right) = cov_{t-1}(r_{IFCI,t}, r_{IFCNI,t})\left(1 - \frac{cov_{t-1}(r_{DPNI,t}, r_{DPI,t})}{cov_{t-1}(r_{IFCI,t}, r_{IFCNI,t})}\right).$$

Let $h_{j,t}$ be the elements of H_t, the (5×5) covariance matrix of the assets in the system conditional on time t. Specifically, $var_t(r_{P,t+1} \,|\, \underline{r}_e)$ is parameterized as $h_{P,t}\left(1-\frac{h^2_{P,DP,t}}{h_{P,t}h_{DP,t}}\right)$, $P = \mathrm{IFCI, IFCNI}$ and $DP = \mathrm{DPI, DPNI}$, with $h_{P,DP,t}$ the time-varying covariance, $h_{P,t}$ and $h_{DP,t}$ the time-varying variances. Similarly, $cov_{t-1}\left(r_{IFCNI,t}, r_{IFCI,t} \,\middle|\, \underline{r}_e\right)$ is parameterized as $h_{IFCI,IFCNI,t}\left(1-\frac{h_{DPI,DPNI,t}}{h_{IFCI,IFCNI,t}}\right)$.

Hence, for each country, we estimate the following system of equations:

$$(5)\begin{cases} r_{IFCI,t} = \delta_{W,t-1} h_{IFCI,W,t} + \lambda_{I,t-1} w_{t-1} h_{IFCI,t} \left(1 - \frac{h^2_{IFCI,DPI,t}}{h_{IFCI,t} h_{DPI,t}}\right) \\ \quad + \lambda_{I,t-1}(1-w_{t-1}) h_{IFCI,IFCNI,t} \left(1 - \frac{h_{DPI,DPNI,t}}{h_{IFCI,IFCNI,t}}\right) + \varepsilon_{IFCI,t} \\ r_{DPI,t} = \delta_{W,t-1} h_{DPI,W,t} + \varepsilon_{DPI,t} \\ r_{IFCNI,t} = \delta_{W,t-1} h_{IFCNI,W,t} + \lambda_{I,t-1} w_{t-1} h_{IFCI,IFCNI,t} \left(1 - \frac{h_{DPI,DPNI,t}}{h_{IFCI,IFCNI,t}}\right) \\ \quad + \lambda_{I,t-1}(1-w_{t-1}) h_{IFCNI,t} \left(1 - \frac{h^2_{IFCNI,DPI,t}}{h_{IFCNI,t} h_{DPNI,t}}\right) + \varepsilon_{IFCNI,t} \\ r_{DPNI,t} = \delta_{W,t-1} h_{DPNI,W,t} + \varepsilon_{DPNI,t} \\ r_{W,t} = \delta_{W,t-1} h_{W,t} + \varepsilon_{W,t} \end{cases}$$

We allow prices and quantities of risk to change through time as suggested in the literature (see, among others, Harvey 1991and De Santis and Gerard 1997). Because the model implies that prices of global and conditional market risks are positive, we use a square function to model their dynamics as follows:

$$\delta_{W,t-1} = \left(k'_W Z_{W,t-1}\right)^2,$$

$$\lambda_{I,t-1} = \left(k'_I Z_{I,t-1}\right)^2,$$

where $Z_{W,t-1}$ and $Z_{I,t-1}$ are, respectively, the set of time-varying global and local information variables. If local risk is priced, we should reject the hypothesis that the k_I are jointly equal to zero.

As in De Santis and Gerard (1997), we adopt the diagonal representation of the multivariate GARCH model of Bollerslev, Engle, and Wooldridge (1988), which assumes that the variances in H_t depend only on past squared residuals and an autoregressive component, while the covariances depend on the past cross-product of residuals and an autoregressive component.[2] We also impose Ding and Engle's (2001) condition that assumes the process to be covariance stationary. The advantage of this multivariate GARCH in mean parameterization is that it ensures positive definiteness of the covariance matrix H_t while reducing the number of parameters to be estimated. The dynamics of the conditional second moment H_t are specified as

$$H_t = H_0 * \left(ii' - aa' - bb'\right) + aa' * \varepsilon_{t-1}\varepsilon'_{t-1} + bb' * H_{t-1}, \qquad (6)$$

where i is a (5×1) vector of ones, a and b are (5×1) vectors of unknown parameters, and * denotes the Hadamard (element by element) matrix product.

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[2] In less than half of the cases there is a significant cross-correlation between the squared lagged returns of the world and the squared current returns of the investable (or non-investable) indices. This is in line with De Santis and Gerard (1997), who find weak evidence for volatility spillover with returns at the monthly frequency. Also, CEH find little evidence that world level shocks impact conditional variances and covariances of the other assets. More importantly, they show that the integration index measure is robust to the modeling of volatility spillover.

From the EL model, Equation system (5) has to hold at any point in time. To keep the dimensionality of the model reasonable, we separately estimate Equation system (5) for each emerging market. Since the theory predicts that the world price of risk should be the same for each country, we follow Bekaert and Harvey (1995) and use a two-step procedure. We first estimate the world return equation to obtain estimates of the time-varying world price of risk and of the coefficients of the time-varying world variance. In the second step, we impose these estimates in the country estimations. This procedure results in sampling errors from the first stage, but it is more in line with the theory and produces more powerful tests. We estimate the model by the quasi-maximum likelihood (QML) of Bollerslev and Wooldridge (1992), using the BFGS (Shanno 1985) algorithm to update the Hessian.

To capture the extent of globalization, we define the integration index (II) as:

$$II = 1 - \frac{var(r_{P,t}|r_{DP})}{var(r_{P,t})}, \quad \text{where} \quad P = \text{IFCI, IFCNI and DP} = \text{DPI, DPNI.} \quad (7)$$

By definition, the index lies between 0 and 1. We obtain II from the time-varying second moments from the empirical estimation of Equation system (5), and therefore

$$II_t = 1 - \frac{var_{t-1}(r_{P,t})\left(1-\rho^2_{P,DP,t-1}\right)}{var_{t-1}(r_{P,t})}, \quad \text{where} \quad P = \text{IFCI, IFCNI and DP} = \text{DPI, DPNI} \quad (8)$$

If a segment is perfectly spanned by the eligible set, the II is equal to 1 and the segment is integrated with the world market. In the other extreme case, when the return correlation between the segment and its diversification portfolio is 0, the II is 0. We estimate two integration indices, one for IFCI and the other for IFCNI.

We also apply Equation (2) to a group of developed markets to obtain a benchmark for the integration indices of the emerging markets. We use the following three-equations system,

$$(5') \begin{cases} \mathrm{r}_{DM,t} = \delta_{W,t-1} h_{DM,W,t} + \lambda_{I,t-1} h_{DM,t}\left(1 - \frac{h^2_{DM,DPM,t}}{h_{DM,t} h_{DPM,t}}\right) + \varepsilon_{DM,t} \\ \mathrm{r}_{DPM,t} = \delta_{W,t-1} h_{DPM,W,t} + \varepsilon_{DPM,t} \\ \mathrm{r}_{W,t} = \delta_{W,t-1} h_{W,t} + \varepsilon_{W,t} \end{cases}$$

where $\mathrm{r}_{DM,t}$ and $\mathrm{r}_{DPM,t}$ are the excess returns on the MSCI DM index and its diversification portfolio, respectively, and $h_{j,t}$ are the elements of H_t, the (3×3) conditional covariance matrix of the assets in the system. The prices of global and conditional market risks are modeled as a square function of respective instruments in a diagonal multivariate GARCH model, and the integration indices are calculated similarly to those of the EMs, as detailed above.

As is generally the case with theoretical asset pricing models, we acknowledge that the EL model is misspecified. Several other factors are likely to be priced in the international context, such as deviations from purchasing power parity, liquidity, or political risk. Note that as with most conditional asset pricing tests, our model is also lacking the intertemporal hedging terms á la Merton (1973) and is thus internally inconsistent, as argued by Dumas and Solnik (1995). We address concerns about possible misspecifications in the empirical results section.

2. Investability and Return Data

2.1 EM indices and investability

"Investability" refers to the ability of foreign investors to access markets and securities—that is, the ease with which foreign institutional investors can buy or sell securities and repatriate proceeds. "Investable" indices were developed in 1990s by IFC and MSCI, to measure returns that foreign investors would receive from investing in domestic stocks that are *legally and practically* available for foreign investment. For example, S&P/IFC determines a stock's investability weight factor (IWF) based on openness (limits on foreign ownership), liquidity, size, and float at the market and individual security level. In this paper, we use the S&P/IFC data because MSCI does not provide information on the non-investable portion since November 2001. The availability of both investable indices (IFCI) and broader market indices (IFCG) from S&P/IFC has other advantages. For example, characteristics such as market capitalization or number of firms for the two indices provide information on the extent of de jure liberalization in every country that we use later in the paper.

We include all emerging markets that have an investable index with returns data that starts no later than 1994 to have enough observations and degrees of freedom for the asset pricing estimation. We thus include Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, South Africa, Taiwan, Thailand, and Turkey, or twenty-two out of the thirty emerging markets with an S&P/IFCI index. Note that in November 2001, S&P/IFC discontinued the IFCI indices of Colombia, Pakistan, and Jordan due to their small size or illiquidity, and the returns on the S&P/IFCI indices for Israel start in 1997. All returns are monthly, dividend-inclusive, denominated in U.S. dollars, and in excess of the one-month Eurodollar deposit rate. Depending on the country, the sample period is from January 1989 or later to October 2008.

We follow Boyer et al. (2006) and construct the non-investable index return data for our sample of IFCI markets as

$$\mathrm{R_{IFCNI,t}} = \frac{\mathrm{MC_{G,t-1} R_{IFCG,t} - MC_{I,t-1} R_{IFCI,t}}}{\mathrm{MC_{G,t-1} - MC_{I,t-1}}}, \quad (9)$$

where MC_G and MC_I are the market capitalizations of, respectively, the IFCG and the IFCI indices.

Table 1
Pairwise correlations for assets returns

	Number of obs.	Mean MC_{NI} (%)	Correlation between IFCI and IFCNI	IFCI and WMP	DPI and IFCI	DPI and WMP	IFCNI and WMP	DPNI and IFCNI	DPNI and WMP	CF and country ETF
Argentina	238	5.6	0.51	0.23	0.56	0.51	0.14	0.44	0.46	NA
Brazil	238	23.8	0.93	0.45	0.75	0.59	0.43	0.81	0.53	0.96
Chile	238	31.9	0.83	0.46	0.86	0.53	0.31	0.71	0.50	0.86
China	190	67.3	0.35	0.44	0.86	0.54	0.15	0.35	0.28	0.78
Colombia	128	59.2	0.65	0.13	0.53	0.36	0.05	0.23	0.35	NA
Czech Rep.	178	23.7	0.55	0.47	0.74	0.64	0.29	0.59	0.56	NA
Hungary	190	10.2	0.71	0.59	0.91	0.65	0.48	0.78	0.65	NA
India	191	66.9	0.99	0.44	0.85	0.50	0.46	0.85	0.53	NA
Indonesia	217	28.7	0.82	0.42	0.81	0.56	0.34	0.67	0.58	NA
Israel	141	1.2	0.64	0.54	0.90	0.59	0.50	0.75	0.75	0.78
Jordan	154	76.3	0.92	0.19	0.29	0.72	0.15	0.24	0.80	NA
Korea	201	45.2	0.94	0.52	0.91	0.64	0.51	0.88	0.62	0.9
Malaysia	238	13.1	0.91	0.44	0.84	0.62	0.44	0.78	0.66	0.57
Mexico	238	10.5	0.65	0.54	0.97	0.56	0.32	0.73	0.43	0.95
Pakistan	127	66.3	0.86	0.13	0.67	0.27	0.17	0.56	0.21	NA
Peru	190	12.5	0.67	0.43	0.79	0.48	0.32	0.51	0.62	NA
Philippines	238	49.3	0.87	0.42	0.85	0.56	0.46	0.81	0.59	NA
Poland	190	1.6	0.70	0.52	0.62	0.81	0.31	0.51	0.66	NA
South Africa	190	0.8	0.69	0.60	0.94	0.65	0.44	0.75	0.67	0.87
Taiwan	213	58.3	0.94	0.48	0.84	0.61	0.45	0.81	0.62	0.92
Thailand	238	54.9	0.98	0.49	0.88	0.57	0.49	0.87	0.59	0.95
Turkey	230	5.8	0.65	0.39	0.81	0.55	0.33	0.65	0.62	0.91
Developed Markets										
Canada	238			0.78	0.98	0.80				NA
France	238			0.83	0.97	0.84				0.92
Germany	238			0.78	0.97	0.82				0.86
Italy	238			0.64	0.96	0.67				0.88
Japan	238			0.71	0.98	0.74				0.73
United Kingdom	238			0.84	0.96	0.88				0.65

Table 1 presents for each country, the average percentage market capitalization of the non-investable index, the correlation between the investable and the non-investable indices, the correlation between each index, its Diversification Portfolio (DP) and the World Market Portfolio (WMP), as well as the correlation between the country fund and country ETF when available. The diversification portfolio is constructed as described in Section 2. The emerging markets investable equity indices returns are proxied by IFC investable indices (IFCI) from the S&P/IFC Emerging Markets Database for all countries. The DM indices returns are proxied by MSCI indices. The non-investable percentage of market capitalization (MC_{NI}) is equal to $(MC_G - MC_I)/MC_G$, where MC_G and MC_I are, respectively, the market capitalization of IFCG and IFCI. The IFCNI index series are constructed from

$$R_{IFCNI,t} = \frac{MC_{G,t-1} R_{IFCG,t} - MC_{I,t-1} R_{IFCI,t}}{MC_{G,t-1} - MC_{I,t-1}}$$

The world market portfolio (WMP) return is the U.S. dollar return on the MSCI value-weighted world market portfolio. Returns are monthly percentage, denominated in U.S. dollars and in excess of the one-month Eurodollar deposit rate. The period is from January 1989 or later to October 2008, except for Colombia, Jordan, and Pakistan. IFCI for the three countries has been discontinued by S&P/IFC since November 2001 due to their small size or illiquidity.

Table 1 provides the average percentage of market capitalization for non-investables. It varies from a low of 0.8% for South Africa to a high of 76.3% for Jordan. Hence, in some countries such as Israel, Poland, and South Africa, almost the whole domestic market capitalization is investable, an indication that explicit barriers have been eliminated. In contrast, there are a few countries like China, India, Jordan, and Pakistan where explicit barriers still exist on a significant portion of the domestic market. In the case of the Czech Republic, Poland, South Africa, and Turkey there are short time periods with no meaningful market capitalization for the non-investable segment. While Boyer et al. (2006) exclude these countries from their analysis, we keep them in the country-by-country asset pricing analysis but exclude their non-investable segments in the panel analysis of Section 4.

In general, the behavior of emerging market returns is similar to that reported in past studies (see, for example, Harvey 1995; Bekaert and Harvey 1995), and hence we do not reproduce the details to conserve space. (See the separate online appendix for the basic statistics on the IFCI and IFCNI returns.) Table 1 also reports the correlation between the investable and non-investable indices. In more than half of the cases, the correlation is less than 0.85, meaning that the two segments are quite distinct.

2.2 Eligible sets and the diversification portfolios

The eligible set for the EMs includes the MSCI World index, thirty-four global market industries as reported by Datastream, seventeen closed-end country funds (CFs), eighty-four cross-listings whether these are direct placements, American depository receipts (ADRs), or global depository receipts (GDRs), and eleven country ETFs. The World index and the global industries consist of only the developed markets. The stocks cross-listed outside the United States are listed in either the United Kingdom or Germany. To preserve the degrees of freedom in the regression, we include for each country only the first incepted country fund, the five earliest cross-listings when available and the first incepted country ETF.[3] As robustness, we augment the eligible set with regional and broad funds where appropriate (see Section 3). In general we observe that countries in Latin America started cross-listing in mature markets earlier than countries in Asia. Some of the countries in our sample—for example, Israel, Mexico, Chile, Brazil, and more recently China—have a large number of cross-listings. For most markets, CF and ADR listings precede the introduction of ETFs.

Table 2 provides a detailed list of the eligible set and more information on the data sources. The monthly returns (adjusted for dividends) for CFs and ETFs are obtained from the Center for Research in Security Prices (CRSP) database. The return data on ADRs are collected from CRSP, while return data on GDRs are compiled from Datastream. To build the diversification portfolios, we follow CEH. We use a stepwise regression procedure with forward and backward threshold criteria that preserves those assets with the highest significant coefficients. We first regress the return of the IFCI index

[3] Of the available securities, we use only the listings with a minimum of three years of returns data regardless of whether they are still active or have been delisted, and that are relatively liquid—that is, without many zero returns. If a company cross-listing has many zero returns, we exclude it and use the next earliest listing. We also include all country funds regardless of whether they are open-ended or liquidated pre-October 2008. We do so because the first country fund has a stronger effect in spanning the EM indices than the subsequent funds.

Table 2
Securities for the diversification portfolios

Country	Cross-listings	Country Funds	Country ETF	Additional funds for the augmented DPs in addition to the iShares MSCI EM index fund (EEM)
Argentina	YPF S.A. (United States, July 1993), BBVA Banco Frances S.A. (United States, November 1993), Telefonica de Argentina S.A. (United States, March 1994), Transportadora de Gas Del Sur, S.A. (United States, November 1994), Metrogas S.A. (United States, November 1994)	Argentine Investment (October 1991-June 2001)	n/a	iShares S&P Latin America 40 Index Fund (October 2001)
Brazil	Aracruz Celulose (United States, May 1992), Companhia Brasileira de Distribuicao (United States, June 1997), Comp. Paranaense de Energia-Copel (United States, July 1997), Companhia Siderurgica Nacional (United States, November 1997), Petroleo Brasileiro S.A. (United States, August 2000)	Brazil Fund (March 1988-June 2006)	iShares MSCI Brazil Index (July 2000)	iShares S&P Latin America 40 Index Fund (October 2001) Guggenheim BRIC (September 2006)
Chile	Compania de Telecomunicaciones de Chile (United States, July 1990), Compania Cervecerias Unidas S.A. (United States, October 1992), Madeco S.A. (United States, May 1993), Soc. Quimica y Minera de Chile, S.A. (United States, September 1993), Enersis S.A. (United States, October 1993)	Chile Fund (September 1989)	iShares MSCI Chile Investable Mkt Index (November 2007)	iShares S&P Latin America 40 Index Fund (October 2001)
China	Sinopec Shanghai Petrochemicals A (United States, July 1993), Huaneng Power "H" (United States, October 1994), Guangshen Railway (United States, May 1996), China Eastern Airlines (United States, February 1997), China Southern Airlines (United States, July 1997)	China Fund (July 1992)	iShares FTSE China 25 Index Fund (May 2004)	Asia Pacific Fund (April 1987) Guggenheim BRIC (September 2006)
Colombia	Banco Ganadero (United States, January 1995-March 2001), Bancocolombia (United States, August 1995)	n/a	n/a	
Czech Republic	Ceske Radiokom. (Germany, June 1996), Ceska Sporitel (Germany, November 1996-June 2002), Slovakofarma AS. Gdr (United Kingdom, December 1997-June 2003)	Czech Fund (September 1994-February 1998)	n/a	Central European Equity Fund Inc. (February 1990)
Hungary	Ibusz Cert. (Austria, June 1990), Fotex Cert. (Austria, November 1992), Zwack Unicum (Germany, November 1993), Tiszai Vegyi Kom (Germany, November 1996), OTP Bank (Germany, November 1996)	n/a	n/a	Central European Equity Fund Inc. (February 1990)

(*continued*)

Table 2
Continued

Country	Cross-listings	Country Funds	Country ETF	Additional funds for the augmented DPs in addition to the iShares MSCI EM index fund (EEM)
India	Cesc Ltd. (United Kingdom, August 1996), State Bank of India (Germany, February 1997), MahanA.Gar Tel. Nigam (United Kingdom, February 1998), Infosys Technologies Ltd. (United States, March 1999), Sify Ltd. (United States, October 1999)	India Fund (February 1994)	n/a	Asia Pacific Fund (April 1987) Guggenheim BRIC (September 2006)
Indonesia	PT Indonesian S.A.tellite Corporation TBK (United States, October 1994), PT Telekomunikasi Indonesia TBK (United States, November 1995)	Indonesia Fund (March 1990)	n/a	Asia Pacific Fund (April 1987)
Israel	Teva Pharmaceutical Inds Ltd. (United States, February 1982), Elron Electronic Industries Ltd. (United States, November 1982), Optrotech Ltd. (United States, August 1984), Rada Electronic Industries Ltd. (United States, June 1985), TAT Technologies Ltd. (United States, April 1987)	First Israel Fund (February 1992)	iShares MSCI Israel Cap Invest Mkt Index (March 2008)	n/a
Jordan	Arab Potash Co. (United Kingdom, December 1997)	n/a	n/a	n/a
Korea	Korea Electric Power Corp. (United States, October 1994), Posco (United States, October 1994), SK Telecom Co. Ltd. (United States, June 1996), KT Corporation (United States, April 1999), Mirae Corp. (United States, November 1999)	Korea Fund (August 1984)	iShares MSCI South Korea Index (May 2000)	Asia Pacific Fund (April 1987)
Malaysia	Petaling Tin (United Kingdom, January 1950), Kuala Lumpur Kepong Berhad (United Kingdom, January 1973), Highlands & Lowlands Berhad (United Kingdom, February 1976)	Malaysia Fund (May 1987)	iShares MSCI Malaysia Index (March 1996)	Asia Pacific Fund (April 1987)
Mexico	Telefonos de Mexico S.A. de CV - Series A (United States, January 1976), Tubos de Acero de Mexico S.A. (United States, January 1976), Vitro S.A. de C.V. (United States, November 1991), EmpreS.A.s Ica S.A. de C.V. (United States, April 1992), Grupo Radio Centro S.A. de C.V. (July 1993)	Mexico Fund (June 1981)	iShares MSCI Mexico Investable Mkt Index (March 1996)	iShares S&P Latin America 40 Index Fund (October 2001)
Pakistan	n/a	Pakistan Invest. Fund (December 1993–June 2001)	n/a	n/a

(*continued*)

Table 2
Continued

Country	Cross-listings	Country Funds	Country ETF	Additional funds for the augmented DPs in addition to the iShares MSCI EM index fund (EEM)
Peru	Banco Wiese Limitado (United States, September 1994–June 2002), Cementos Lima (United States, March 1995), Compania de Minas Buenaventura (United States, May 1996), Telefonica del Peru S.A. (United States, July 1996–March 2004)	n/a	n/a	iShares S&P Latin America 40 Index Fund (October 2001)
Philippines	S.A.n Carlos Milling Inc. (July 1962–August 1994), Philippines Long Distance Telephone (United States, January 1970), S.A.n Miguel "B" (United States, August 1993), JG Summit Holdings (United States, 1995–September 2001), PSI Technologies (United States, March 2000)	First Philippines (November 1989–June 2003)	n/a	Asia Pacific Fund (April 1987)
Poland	KGHM Polska Miedz (United Kingdom, August 1997), Mostostal Export (United States, October 1999–July 2001)	n/a	n/a	Central European Equity Fund Inc. (February 1990)
South Africa	Highveld Steel and Vanadium (October 1981), S.A.sol (April 1982) Anglogold Ashanti (Germany, September 1988), Barloworldzert (Germany, September 1988), AbS.A. Group (Germany, January 1996)	Southern Africa Fund (February 1994–November 2004)	iShares MSCI South Africa Index (February 2003)	Central European Equity Fund Inc. (February 1990)
Taiwan	Macronix International Company Limited (United States, May 1996), Taiwan Semiconductor Manufacturing Co. (United States, October 1997), Advanced Semiconductor Engineering Inc. (United States, September 2000), United Microelectronics Corporation (United States, September 2000), Siliconware Precision Ind., Co. Ltd. (United States, September 2000)	Taiwan Fund (December 1986)	iShares MSCI Taiwan Index (June 2000)	Asia Pacific Fund (April 1987)
Thailand	Advanced Info. Service (United States, August 1993), Charoen Pokphand Group (United States, December 1994), Thai Airways Intl. (Germany, July 1997), TT&T (Germany, January 1998), Internet Thailand (Germany, January 2002)	Thai Fund (February 1988)	iShares MSCI Thailand Invest Mkt Index (March 2008)	Asia Pacific Fund (April 1987)
Turkey	Tofas Otomobil ADR (United Kingdom, December 1994), Turkcell Iletisim Hizmetleri (United States, August 2000)	Turkish Investment Fund (December 1989)	iShares MSCI Turkey Invest Mkt Index (March 2008)	Central European Equity Fund Inc. (February 1990)

(*continued*)

Table 2
Continued

Country	Cross-listings	Country Funds	Country ETF
Canada	Canadian Pacific Ltd. (January 1883), Inco Ltd. (December 1928–October 2006), Alcan Aluminium (May 1950–November 2007), Imperial Oil Ltd. (July 1962), Nexen Inc. (July 1962), BCE Inc. (July 1962), Nortel Network Corp. (November 1975–October 2009)	n/a	iShares MSCI Canada Index Fund (March 1996)
France	Rhone Poulenc Rohrer Inc. (September 1963–October 1997), Thales Group (former Thomson–CSF) (July 1986), LVMH Moet Hennessy Vuitton (November 1987–September 2002) , Alumina Ltd. (February 1990) , Total S.A. (October 1991), Alcatel Slsthom Co. General (May 1992)	France Fund Inc. (May 1986–November 1989) France Growth Fund (May 1990)	iShares MSCI France Index (March 1996)
Germany	Dresdner Bank A.G. (January 1973–April 1994), Daimler Benz A.G./ Daimler Chrysler A.G. (November 1993), QiA.Gen NV (July 1996), Fresenius Medical Care A.G. (November 1996), Deutsche Telekom A.G. (November 1996)	Germany Fund Inc (July 1986–October 2005) New Germany Fund (January 1990)	iShares MSCI Germany Index (March 1996)
Italy	Montedison (July 1987–October 2000), Fiat S.p.A. (February 1989–July 2007), Benetton Group S.p.A. (July 1989–September 2007), Luxottica Group S.p.A. (February 1990), Natuzzi S.P.A. (May 1993), Eni S.p.A. (November 1995)	Italy Fund Inc. (February 1986–January 2003) European Equity Fund (October 2005)	iShares MSCI Italy Index (March 1996)
Japan	Sony (October 1970), Panasonic Corp. (January 1972), Canon Inc. (January 1973), Mitsui & Co. Ltd. (January 1973), Honda Motor (December 1972)	Japan OTC Equity Fund (1990/03)	iShares MSCI Japan Index Fund (March 1996)
United Kingdom	Unilever (July 1962), BP Plc. (August 1962), Rexam Plc. (January 1973–October 2007), Anglo American Plc. (February 1973), Glaxosmithkline Plc. (January 1973)	United Kingdom Fund (August 1987–September 1998) European Equity Fund (October 2005)	iShares MSCI United Kingdom Index (March 1996)

Table 2 presents the eligible set for each country. Cross-listings are from the four primary depository banks, Citibank, JPMorgan, the Bank of New York Mellon, and Deutsche Bank. Direct and ADR listings are then complemented from the U.S. major exchanges; NYSE, AMEX, and NASDAQ. GDR listings are complemented from major world market exchanges, Datastream, as well as the 1998 listings available from the Sergei Sarkissian website, (http://web.management.mcgill.ca/Sergei.Sarkissian/). We report in brackets the inception and end dates for the security. All the information was cross-checked and supplemented with the listed company's website. For a full description on the procedure to obtain the ADRs listing, please refer to Karolyi (2004). The list of ETFs is from Morningstar, Bloomberg, iShares, and CRSP. The securities in the last column (Additional funds for the augmented DPs) as well as the broad ETF (ISHARES TRUST: iShares MSCI Emerging Markets Index Fund) are only used in the construction of the alternative diversification portfolios; DPaug, DPlag, and DPstep (please refer to Section 3.4 and the online appendix).

on the returns of the thirty-four global industries along with the MSCI World index, and we obtain the diversification portfolio of global securities, R_G. We then regress the return of the IFCI index on R_G, the CF, cross-listings and the country ETF. We allow the weights assigned to previous securities to vary upon the availability of new cross-listings, as in CEH. The fitted value from this regression is the return on the diversification portfolio, R_{DPI}, that we use in the estimation of Equation system (5). We follow a similar procedure with the IFCNI indices to obtain their diversification portfolios, R_{DPNI}.

Table 1 contains pairwise correlations between the World index, EM indices, and their diversification portfolios. Given our construction procedure, it is indeed the case that the highest correlation is in most cases between the EM indices and their respective diversification portfolios, reaching 0.97 for Mexico in case of investable and 0.88 for Korea in case of non-investable indices. The countries with few substitute assets show low correlations between market indices and their respective diversification portfolios—for example, 0.29 for Jordan Investable and 0.23 for Colombia non-Investable. As expected, the correlation between the country diversification portfolio and the World index is higher than the corresponding correlation between the EM indices and the World index.

Table 1 also reports the correlation between the EM country funds and their corresponding ETFs where available. In all cases, these correlations are very high. The correlations between the ADRs/GDRs and their corresponding ETFs are also high (not reported but available from the authors). Indeed, the country ETFs were floated much later than CFs and ADRs/GDRs, and given the similarity of their portfolios, this result is not surprising. Thus, we would expect the additional contribution of ETFs to the degree of market integration to be marginal.

2.3 DM benchmark

We consider the G7 major developed markets (DMs) except the United States as a benchmark for our EM integration indices. We use MSCI excess returns for Canada, France, Germany, Italy, Japan, and the United Kingdom over the period 1989–2008. The eligible set for DMs is constructed with the same approach and contains for each DM country a number of eligible securities comparable to that of the EMs. It consists of the MSCI World index, thirty-four global market industries as reported by Datastream, five ADRS and one country fund (except Canada) from the start of the whole sample period, plus a country ETF. For the DMs as a group, the ETFs were incepted in March 1996, earlier than for the EMs. The return behavior of these markets is very similar to that reported by numerous past studies, and hence we do not reproduce the details to conserve space. In the case of DMs, the correlation between the DM index returns and their respective diversification portfolios is very high, exceeding 0.95 in all cases. (See the online appendix for all summary statistics of DM data.)

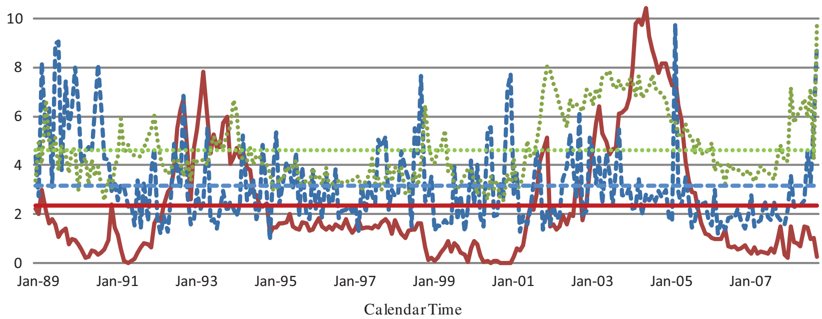

Figure 1
Time-varying prices of risk
The figure plots the estimated time-varying price of world market risk from Step 1 and its average (solid line), the equally weighted cross-country average at each point in time of the estimated prices of local risk from the Step 2 of the EL model for the developed markets and its time-series average (dashed line) and the equally weighted cross-country average at each point in time of the estimated prices of local risk from the Step 2 of the EL model for the emerging markets and its time-series average (dotted line). The sample period is monthly from January 1989 to October 2008. See Equation system (5) and (5′) of Section 1 for emerging market pricing and developed market pricing, respectively.

2.4 Global and local instrumental variables

We follow previous research in selecting the data on the global and local instrumental variables (see Ferson and Harvey 1993; Bekaert and Harvey 1995; among others). The global instruments include the change in the U.S. term premium measured by the yield difference between the ten-year Treasury bond and the three-month Treasury bill, the world dividend yield in excess of the one-month Euro-dollar interest rate, and the U.S. default premium measured by the yield difference between Moody's Baa- and Aaa-rated bonds. We also include the option volatility index (VIX) in robustness checks. The local instruments include the lagged local equity market return, the local dividend yield in excess of the one-month Euro-dollar interest rate, and the change in bilateral exchange rates $\$/FC_j$ where j is the currency of country j. Local market turnover (TURNOVER) is added in robustness checks. Since these instrumental variables have been widely used in other studies, to save space we omit a detailed description of their properties. (See the online appendix for some basic statistics as well as the pairwise correlations among the instruments.)

3. Empirical Results from the Asset Pricing Model

3.1 Pricing of risk

We obtain the price of world market risk from step 1 of the estimation. Figure 1 plots the price of world market risk, together with the equally weighted local prices of risk for our EM and DM samples obtained from the second step of estimation. The prices are time varying. The figure also reports the respective sample means. The average price of world market risk of 2.35 is economically reasonable and consistent with previous studies. The price of local risk is economically significant, with an average estimate of 4.62 for EMs and 3.18 for DMs.[4]

Table 3 contains a number of specification tests. For each country, we report robust Wald tests for the significance and time variation in the prices of conditional local market risk. The price of local market risk is significant in twenty-one and time varying in sixteen out of twenty-two countries. In contrast, for DMs, the local price of risk is significant and time varying for two of the six countries. In two instances (Japan and the United Kingdom), the linear dependency in the data due to the high correlation between the diversification portfolio and the country index prevents the inversion of the Hessian. We take this as indication that pricing for the DMs is indeed different from the EMs due to almost perfect spanning of DMs.[5] Furthermore, for all the G6 countries, the contribution of the local risk premium to total risk premium is substantially lower than for the emerging markets. The unreported average ratio of local to total risk premium is 12% for DMs, while it is 60% for investables and 65% for non-investables.

Table 3 also provides diagnostic tests to address concerns about possible model misspecifications. We follow Bekaert and Harvey (1995) and regress the (4×1) vector of return residuals, $\varepsilon_t = (\varepsilon_{IFCI,t}, \varepsilon_{DPI,t}, \varepsilon_{IFCNI,t}, \varepsilon_{DPNI,t})$, from our Equation system (5) on Ω_{t-1}, a vector of variables that can be potentially correlated with the missing factors. $\Omega_{t-1} = \left\{\Omega_{Global,t-1}; \Omega_{Local,t-1}; \Omega_{Global,t-1} \text{and } \Omega_{Local,t-1}\right\}$ where $\Omega_{Global,t-1}$ includes the default spread (USDP) and the option volatility index (VIX) that capture global investor risk sentiment. $\Omega_{Local,t-1}$includes political and liquidity risk proxies—specifically, the ratings provided by the Political Risk Services' International Country Risk Guide political risk index (POL)—and the log of the local market turnover (TURNOVER) defined as the ratio of value of shares traded to the average market capitalization. Table 3 reports Wald statistics (W), robust p-values and adjusted R-squares from the three panel regressions. The tests suggest that the model specification is rejected in ten out of twenty-two cases. In some cases (Czech Republic, Taiwan, and Thailand) the model is rejected by the Wald tests with Ω_{Local}. In other cases (Colombia, Indonesia, Pakistan, and Peru), the Wald tests suggest that the model is rejected with global or local implicit barriers variables. At times, the rejection is driven by the joint regression on global and local variables (Chile, India, and Philippines). At the same time, in these instances, the low R^2 indicate weak evidence of correlation with local or global variables from the regressions on Ω_{Local} or Ω_{Global}. The average R-squares from each of the

[4] See the online appendix for further details on the coefficient estimates, the diagnostics on the world market residuals from step 1, as well as the time-varying variance of investables/non-investables, the covariance between the two EM segments and the variance of the world market.

[5] See the online appendix for evidence on the DM pricing and a number of residual diagnostics for EMs and DMs. Overall, GARCH effects are removed and our assumption of symmetric volatility is supported by the data as indicated by the Engle-Ng (1993) test for asymmetry.

Table 3
Pricing tests of the model

Null hypothesis	For insignificant local market risk ($k_{i,I}=0$ for all i)		For constant local market risk ($k_{i,I}=0$ for i > 1)		Ω Global			Ω Local			Ω Global and Local		
	df	*p*-value	df	*p*-value	*W*	*p*-value	adj-R^2	*W*	*p*-value	adj-R^2	*W*	*p*-value	adj-R^2
Argentina	4	*0.000*	3	*0.000*	0.64	*0.727*	0.15%	1.15	*0.564*	0.14%	1.18	*0.881*	−0.05%
Brazil	4	*0.000*	3	*0.000*	2.03	*0.362*	0.62%	1.78	*0.411*	0.81%	3.38	*0.497*	1.09%
Chile	4	*0.000*	3	*0.766*	3.06	*0.216*	1.15%	5.67	*0.059*	1.47%	18.74	*0.001*	5.66%
China	4	*0.000*	3	*0.000*	2.61	*0.271*	0.68%	1.88	*0.390*	0.19%	6.28	*0.179*	0.97%
Colombia	4	*0.000*	3	*0.099*	16.01	*0.000*	4.81%	10.96	*0.004*	3.48%	17.09	*0.002*	5.33%
Czech Rep.	4	*0.158*	3	*0.075*	1.44	*0.488*	0.35%	7.46	*0.024*	2.00%	28.42	*0.000*	7.33%
Hungary	4	*0.000*	3	*0.005*	1.22	*0.542*	1.35%	5.17	*0.076*	1.32%	8.26	*0.082*	1.77%
India	4	*0.000*	3	*0.109*	1.22	*0.544*	0.46%	2.65	*0.266*	0.55%	15.04	*0.005*	4.64%
Indonesia	4	*0.000*	3	*0.000*	9.31	*0.010*	5.61%	8.32	*0.016*	3.06%	19.15	*0.001*	10.89%
Israel	4	*0.025*	3	*0.011*	2.61	*0.271*	2.28%	0.21	*0.900*	−0.26%	0.51	*0.972*	−0.52%
Jordan	4	*0.000*	3	*0.002*	1.43	*0.489*	0.12%	0.60	*0.740*	0.07%	6.20	*0.185*	1.33%
Korea	4	*0.074*	3	*0.124*	0.50	*0.779*	0.25%	5.56	*0.062*	1.69%	8.54	*0.074*	3.18%
Malaysia	4	*0.000*	3	*0.098*	2.64	*0.267*	1.91%	3.60	*0.165*	1.30%	7.35	*0.119*	4.48%
Mexico	4	*0.000*	3	*0.000*	1.77	*0.412*	0.32%	0.35	*0.842*	−0.11%	4.78	*0.311*	1.40%
Pakistan	4	*0.000*	3	*0.000*	15.39	*0.001*	6.01%	14.07	*0.001*	5.73%	18.69	*0.001*	6.88%
Peru	4	*0.000*	3	*0.259*	12.70	*0.002*	3.95%	6.85	*0.033*	1.50%	23.41	*0.000*	5.81%
Philippines	4	*0.000*	3	*0.326*	2.45	*0.293*	1.96%	1.71	*0.426*	0.31%	14.20	*0.007*	4.43%
Poland	4	*0.003*	3	*0.005*	1.64	*0.441*	1.52%	3.89	*0.143*	1.06%	3.88	*0.423*	0.77%
South Africa	4	*0.000*	3	*0.352*	2.56	*0.278*	1.83%	3.03	*0.220*	0.71%	6.63	*0.157*	3.76%
Taiwan	4	*0.000*	3	*0.000*	0.48	*0.785*	0.06%	7.04	*0.030*	1.84%	8.95	*0.062*	1.99%

(*continued*)

Table 3
Continued

Null hypothesis	For insignificant local market risk ($k_{i,I}=0$ for all i)		For constant local market risk ($k_{i,I}=0$ for i > 1)		Ω Global			Ω Local			Ω Global and Local		
	df	*p*-value	df	*p*-value	*W*	*p*-value	adj-R^2	*W*	*p*-value	adj-R^2	*W*	*p*-value	adj-R^2
Thailand	4	*0.000*	3	*0.000*	2.27	*0.321*	1.91%	11.96	*0.003*	4.00%	21.94	*0.000*	7.16%
Turkey	4	*0.000*	3	*0.020*	0.71	*0.701*	0.13%	0.34	*0.846*	−0.11%	0.59	*0.964*	−0.29%

The estimated model is:

$$\begin{cases} r_{IFCI,t}=\delta_{W,t-1}cov_{t-1}\left(r_{IFCI,t},r_{W,t}\right)+\lambda_{I,t-1}w_{I,t-1}var_{t-1}\left(r_{IFCI,t}\left|\underline{r}_e\right.\right) \\ \quad +\lambda_{I,t-1}\left(1-w_{I,t-1}\right)cov_{t-1}\left(r_{IFCI,t},r_{IFCNI,t}\left|\underline{r}_e\right.\right)+\varepsilon_{IFCI,t} \\ r_{DPI,t}=\delta_{W,t-1}cov_{t-1}\left(r_{DPI,t},r_{W,t}\right)+\varepsilon_{DPI,t} \\ r_{IFCNI,t}=\delta_{W,t-1}cov_{t-1}\left(r_{IFCNI,t},r_{W,t}\right)+\lambda_{I,t-1}w_{I,t-1}cov_{t-1}\left(r_{IFCNI,t},r_{IFCI,t}\left|\underline{r}_e\right.\right) \\ \quad +\lambda_{I,t-1}\left(1-w_{I,t-1}\right)var_{t-1}\left(r_{IFCNI,t}\left|\underline{r}_e\right.\right)+\varepsilon_{IFCNI,t} \\ r_{DPNI,t}=\delta_{W,t-1}cov_{t-1}\left(r_{DPNI,t},r_{W,t}\right)+\varepsilon_{DPNI,t} \\ r_{W,t}=\delta_{W,t-1}var_{t-1}\left(r_{W,t}\right)+\varepsilon_{W,t} \end{cases}$$

where $r_{IFCI,t}$ is the country investable index excess returns, $r_{DPI,t}$ is the diversification portfolio excess returns for IFCI, $r_{IFCNI,t}$ is the country non-investable index excess returns, $r_{DPNI,t}$ is the diversification portfolio excess returns for IFCNI, $r_{W,t}$ is the world index excess returns, δ_W is the price of world covariance risk (from first-step world market equation estimation), λ_I is the price of local risk, w_I is the investable market capitalization as fraction of total market capitalization, $(1-w_I)$ is the non-investable market capitalization as fraction of total market capitalization, and $\varepsilon_t|\vartheta_{t-1}\sim N(0,H_t)$. The time-varying prices are estimated with a different set of conditioning information. Price specifications are given by: $\delta_{W,t-1}=(\kappa_W{'}\,\mathbf{Z}_{w,t-1})^2$ where $\mathbf{Z}_W$ is a set of information variables that includes a constant, the U.S. default spread (USDP), the U.S. term structure spread (ΔUSTP), and the world dividend yield in excess of the risk-free rate (XWDY), $\lambda_{I,t-1}=(\kappa_I{'}\,\mathbf{Z}_{I,t-1})^2$ where $\mathbf{Z}_I$ is a set that includes a constant, the lagged local equity return, the local dividend yield and the change in the local exchange rate. H_t is the time-varying conditional covariance parameterized as:

$$H_t=H_0*(\iota\iota'-\mathbf{aa}'-\mathbf{bb}')+\mathbf{aa}'*\Sigma_{t-1}+\mathbf{bb}'*H_{t-1},$$

where * denotes the Hadamard product, **a** and **b** are (5×1) vector of constants, ι is (5×1) unit vector, and Σ_{t-1} is the matrix of cross error terms, $\varepsilon_{t-1}\varepsilon_{t-1}'$.

Country equity investable indices are from IFC, non-investable indices are constructed from the market capitalizations and returns of the IFC investable and global indices, and the world equity index is from MSCI. The risk-free rate is the one-month Eurodollar rate from Datastream. All returns are denominated in U.S. dollars. Sample is from January 1989 or later to October 2008. The model is estimated by Quasi-Maximum Likelihood.

The table reports *p*-values for robust Wald test for the hypothesis under each country as well as Wald statistics (W), *p*-values and adjusted R^2 from panel regressions of the (4×1) vector of return residuals ε_t that include $(\varepsilon_{IFCI,t},\varepsilon_{DPI,t}\ \varepsilon_{IFCNI,t},\varepsilon_{DPNI,t})$ on global implicit barriers (Ω Global = USDP and VIX); on local implicit barriers (Ω Local =TURNOVER and POL); on local and global implicit barriers variables. Wald tests on the joint significance of the coefficients in each regression are robust to heteroscedacticity and cross-correlation. The *p*-values are based on a χ^2 distribution with degrees of freedom (df) equal to the number of regressors (i.e. respectively df = 2, 2, and 4).

three sets of regressions across the other twelve cases are 1.5% or lower and the Wald tests fail to reject the model. Overall, the diagnostics do not present strong evidence against the specification of our model. Nevertheless, in those cases where the Wald tests suggest potential mis-specification, we need to exercise caution in interpreting the estimated integration measures.

3.2 EM integration indices

Panel A of Table 4 reports summary statistics for the estimated integration indices of Equation (8) for investables. The evidence shows that the extent of globalization is not uniform within this large sample of emerging markets. The average degree of integration is 0.63; however, there are significant cross-country differences. The least integrated countries, such as Jordan, Colombia, Pakistan, or Poland, have no country funds and/or a very small number of cross-listings. In contrast, most integrated countries such as Mexico and South Africa have country funds and many cross-listings. We can also draw interesting insights from the sub-period analysis. With the exception of a few countries, we observe a general increase across subperiods. We observe three patterns; some countries remain at their high level (for example, South Africa and Israel), others experience significant increase in their level of integration (such as Brazil, India, and Taiwan), while a few show no or very little progress (such as Colombia and Jordan).

Panel B of Table 4 reports summary statistics for the estimated integration indices of Equation (8) for non-investables. The non-investable segments of Jordan and Colombia are the least integrated, whereas those of India, Korea, and Thailand the most integrated. We also observe a general increase across subperiods, although the number of cases with no change or declines in the degree of integration across the sub-periods is somewhat larger compared with the results for investables. Overall, the average degree of integration of the investable sample is greater than that for the non-investable sample.

Next, we construct diversification portfolios excluding the country ETFs from the eligible set and re-run the two-step estimation of Equation set (5) to obtain the integration indices, "II without ETF." We then compute the averages for the II with and without ETF after ETF inception. For both the IFCI and IFCNI, these averages are very similar, with some countries experiencing an increase, some a decrease, and others no change. This is consistent with the earlier result that, in general, the ETFs are highly correlated with their corresponding CFs, ADRs, and GDRs and hence should not have a noticeable impact on the degree of integration.

We investigate the individual linear trend in each country's integration index by regressing the integration index against a constant and a trend. The coefficient on the trend for investables is positive and significant at the 5% level for twelve countries. The coefficient on the trend for non-investables is positive and significant in seven cases. Also, a pooled regression of all countries reveals

Table 4
Summary statistics for the estimated integration measures

	Obs.	CF	Number of ADRs	Mean	Std. dev.	Mean first 5 years	Mean last 5 years	Country ETF inception date	Mean over sample after country ETF inception		Test for trend	
									with ETF	without ETF	coeff.	std. error
Panel A: Integration measure for the investable index												
Argentina	20	1	5	0.42	0.18	0.18	0.41				0.014*	0.007
Brazil	20	1	5	0.69	0.14	0.50	0.77	7/10/2000	0.77	0.88	0.018***	0.004
Chile	20	1	5	0.71	0.11	0.56	0.75	11/12/2007	0.77	0.65	0.013***	0.003
China	16	1	5	0.62	0.10	0.58	0.68	5/10/2004	0.68	0.69	0.009*	0.005
Colombia	9	0	2	0.31	0.10	0.32	0.32				0.005	0.006
Czech Rep.	15	1	3	0.59	0.10	0.54	0.67				0.015***	0.004
Hungary	16	0	5	0.82	0.04	0.77	0.83				0.005***	0.001
India	16	1	5	0.70	0.11	0.56	0.74				0.014***	0.005
Indonesia	19	1	2	0.67	0.12	0.56	0.73				0.014***	0.005
Israel	12	1	5	0.82	0.01	0.82	0.83	3/26/2008	0.83	0.74	0.002**	0.001
Jordan	13	0	1	0.09	0.03	0.10	0.10				−0.001	0.002
Korea	17	1	5	0.83	0.09	0.72	0.89	5/9/2000	0.91	0.83	0.015***	0.003
Malaysia	20	1	3	0.74	0.08	0.67	0.82	3/12/1996	0.77	0.60	0.009***	0.002
Mexico	20	1	5	0.94	0.03	0.90	0.96	3/12/1996	0.95	0.91	0.004***	0.001
Pakistan	9	1	0	0.47	0.04	0.45	0.49				0.006	0.004
Peru	16	0	4	0.62	0.08	0.58	0.65				0.004	0.005
Philippines	20	1	5	0.60	0.09	0.62	0.49				−0.008***	0.002
Poland	14	0	2	0.42	0.06	0.35	0.48				0.013***	0.002
South Africa	16	1	5	0.89	0.02	0.89	0.90	2/3/2003	0.90	0.87	0.002*	0.001
Taiwan	18	1	5	0.70	0.15	0.56	0.83	6/20/2000	0.82	0.81	0.023***	0.003
Thailand	20	1	5	0.75	0.06	0.68	0.72	3/26/2008	0.79	0.77	0.002*	0.002
Turkey	20	1	2	0.52	0.13	0.48	0.48	3/26/2008	0.57	0.47	0.005	0.005
Country pool	366			0.63	0.20	0.56	0.66				0.013***	0.003

(*continued*)

Table 4
Continued

	Obs.	CF	Number of ADRs	Mean	Std. dev.	Mean first 5 years	Mean last 5 years	Country ETF inception date	Mean over sample after country ETF inception		Test for trend	
									with ETF	without ETF	coeff.	std. error
Panel B: Integration measure for the non-investable index												
Argentina	20	1	5	0.27	0.17	0.10	0.40				0.017***	0.004
Brazil	20	1	5	0.71	0.13	0.55	0.81	7/10/2000	0.79	0.78	0.017***	0.003
Chile	20	1	5	0.42	0.11	0.45	0.37	11/12/2007	0.41	0.43	−0.005	0.004
China	16	1	5	0.14	0.08	0.13	0.18	5/10/2004	0.18	0.06	0.007	0.005
Colombia	9	0	2	0.06	0.03	0.04	0.08				0.006**	0.003
Czech Rep.	15	1	3	0.39	0.14	0.43	0.49				0.008	0.006
Hungary	16	0	5	0.53	0.08	0.47	0.56				0.006	0.004
India	16	1	5	0.73	0.12	0.58	0.79				0.018***	0.004
Indonesia	19	1	2	0.56	0.09	0.58	0.52				0.000	0.004
Israel	12	1	5	0.59	0.03	0.56	0.61	3/26/2008	0.61	0.51	0.005**	0.002
Jordan	13	0	1	0.07	0.01	0.08	0.06				−0.003***	0.001
Korea	17	1	5	0.75	0.08	0.67	0.75	5/9/2000	0.79	0.77	0.007*	0.004
Malaysia	20	1	3	0.62	0.09	0.51	0.66	3/12/1996	0.66	0.49	0.009***	0.003
Mexico	20	1	5	0.51	0.04	0.53	0.48	3/12/1996	0.50	0.47	−0.003*	0.002
Pakistan	9	1	0	0.35	0.08	0.41	0.28				−0.018***	0.005
Peru	16	0	4	0.19	0.10	0.25	0.14				−0.010*	0.005
Philippines	20	1	5	0.60	0.09	0.56	0.53				−0.002	0.003
Poland	14	0	2	0.27	0.12	0.14	0.35				0.018***	0.006
South Africa	16	1	5	0.59	0.06	0.61	0.62	2/3/2003	0.62	0.59	0.000	0.003
Taiwan	18	1	5	0.62	0.11	0.56	0.64	6/20/2000	0.68	0.73	0.009*	0.005

(*continued*)

Table 4
Continued

	Obs.	CF	Number of ADRs	Mean	Std. dev.	Mean first 5 years	Mean last 5 years	Country ETF inception date	Mean over sample after country ETF inception		Test for trend	
									with ETF	without ETF	coeff.	std. error
Thailand	20	1	5	0.74	0.07	0.65	0.72	3/26/2008	0.77	0.74	0.004	0.003
Turkey	20	1	2	0.22	0.16	0.33	0.26	3/26/2008	0.47	0.30	0.000	0.006
Country pool	346			0.46	0.22	0.42	0.48				0.008**	0.004
Panel C: Integration measure for the Developed Markets												
Canada	20	0	5	0.95	0.01	0.95	0.96	12/3/1996	0.95	0.96	0.001**	0.000
France	20	1	5	0.95	0.02	0.93	0.97	12/3/1996	0.94	0.96	0.002***	0.001
Germany	20	1	5	0.94	0.02	0.92	0.95	12/3/1996	0.92	0.95	0.002***	0.001
Italy	20	1	5	0.92	0.07	0.89	0.96	12/3/1996	0.86	0.96	0.008***	0.003
Japan	20	1	5	0.95	0.01	0.96	0.94	12/3/1996	0.95	0.94	−0.001**	0.000
UK	20	1	5	0.90	0.02	0.88	0.92	12/3/1996	0.89	0.91	0.002**	0.001
Country pool				0.93	0.02	0.91	0.95		0.91	0.95	0.002**	0.001

For each country, the table presents summary statistics of the integration indices estimated from the model in Section 1. The sample period is from 1989 to 2008. The mean, subperiod means, and standard deviation are reported for each country and for the pool of observations. Panel A reports the integration index of the investable index based on the diversification portfolio constructed as described in Section 2 from the world market, industry portfolios, country fund, the cross-listings, and the country ETF when available. Mean after ETF inception is the average integration index over the period since ETF introduction. Mean without ETF is based on the diversification portfolio constructed from the same eligible set but excluding the ETF. The eligible set is detailed in Table 2. Panel B reports the integration measure of the non-investable index. Panel C reports the integration measure of the developed markets. Superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

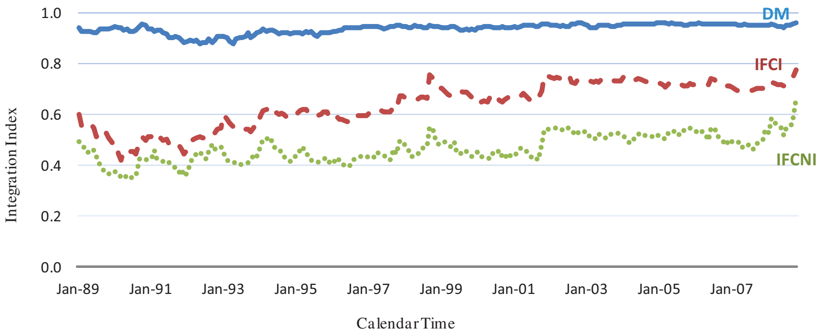

Figure 2
Time-varying integration indices
The figure plots the equally weighted cross-country averages at each point in time of the estimated integration indices from the EL model of Section 1 for the developed markets (solid line), the investable segment (dashed line), and the non-investable segment (the dotted line). The sample period is from January 1989 to October 2008.

an upward trend in integration of about 1% per year for both the investables and non-investables.

3.3 DM integration indices

Panel C of Table 4 reports summary statistics for the estimated integration indices of the developed markets based on the country-by-country estimation of the multivariate Equation system (5′). The average degree of integration across this group of DMs is 0.93, with a standard deviation of only 0.03. The level of integration is basically unchanged between the beginning and the end of our sample for most of the countries. The coefficient on the trend for DMs is positive and significant for all countries but Japan. However, the size of the trend coefficients is economically negligible. A pooled regression of all DMs reveals an upward trend in integration of only 0.2%. Our results confirm that these markets are almost fully integrated, and as reported above, the emerging markets are indeed still different. Further, in most cases, the impact of country ETFs on the level of integration of the DMs is marginal in the presence of other cross-listed securities such as country funds, ADRs/GDRs. This is not surprising given that the ETF portfolios are similar to CFs and invest in ADRs and GDRs in addition to the securities of the underlying index.

Figure 2 summarizes the estimated integration indices. We present them as equally weighted averages at each point in time for the three groups based on the statistics of Table 4. As also reported in the table, on average the non-investables show a lower level of integration compared with the investables. Similarly, the investables plot below developed markets. Moreover, the plots confirm that integration is not characterized by unimpeded and uniform advances. Despite significant removal of explicit barriers, integration for the investable segment is still lagging behind developed markets.

3.4 Robustness of the integration indices

We provide in this subsection a number of checks for robustness of the integration indices for the emerging markets.

The extant international asset pricing literature has been primarily concerned with the deviations from purchasing power parity (PPP) and barriers to portfolio capital flows. The IAPM of Chaieb and Errunza (2007) jointly accounts for barriers to international investment and differences in purchasing power across countries and allows us to assess the consequences of the omitted currency risk factors on our measure of integration. At the empirical level, Chaieb and Errunza (2006, 2007) show that although the currency risks are significantly priced, these additional factors do not affect the measure of integration obtained from the EL model.

Implicit barriers such as liquidity and political risk factors have become the focus of recent studies. Bekaert, Harvey, and Lundblad (2007) and Lee (2011) empirically analyze liquidity effects, and Andrade (2009) investigates country risk effects in EMs. Without a formal international asset pricing model that jointly accounts for implicit barriers in conjunction with barriers to portfolio flows, it is not possible to conclude whether factors, such as liquidity and political risks, would systematically impact the integration measure estimated from the EL model.

In an attempt to capture the role of implicit barriers within our empirical framework, we parameterize the time-varying prices of risk with an augmented set of conditioning information. The global instrument set includes in addition the VIX, and the local instruments also include TURNOVER. The results (provided in the online appendix) confirm the overall inference. The integration indices are remarkably similar to those obtained with the traditional set of information variables. The frequency of most of the implicit barrier proxies and/or their time span prevents us from expanding this analysis.

We run additional robustness checks for selective markets with respect to the functional form of the prices of risk (using instead an exponential function), the system with only investables, and the joint estimation of the global and local prices of risk. We find that the integration measures always deliver similar levels and patterns.

We also use a simple non-asset-pricing-based model to obtain another integration index. Specifically, we run rolling regressions using weekly returns with a one-year estimation window and obtain a series of adjusted R-squares in the vein of Pukthuanthong and Roll (2009) including global industry factors, as well as CFs, ADRs, and country ETFs also used in our diversification portfolios. We find that the level, trend and differences between investable and non-investable indices from the adjusted R-squares estimates are qualitatively similar to our IAPM-based indices over the period 1996–2008 when the eligible securities are in large number and rather liquid. In contrast, for the earlier time period, the rolling regression estimations cannot properly account for the breaks generated from the introduction of the eligible securities. As discussed earlier, dealing with such breaks is difficult and the rolling regression approach is likely not the appropriate one (see the online appendix).

Lastly, we carry out the IAPM estimation based on alternative diversification portfolios constructed with an augmented eligible set and using different approaches. We add to the previous set of substitute assets, regional closed-end funds and regional ETFs, as well as the iShares Emerging Market index ETF. We include lags in the global industry portfolios and in the substitute assets to account for possible asyncronicity and stale prices. With all the additional assets we are not able to construct diversification portfolios with time-varying weights for about half of our sample countries. Therefore, in another approach, we also run the stepwise procedure in both step 1 on the industry portfolios and in step 2 to reduce the number of assets included in our fitted portfolios. We provide correlations across the different DPs in Table 5 (see also the online appendix for details on the specifications, shortcomings of these additional portfolios, and plots of the integration indices from these alternatives). To summarize, the DPs are highly correlated and the integration measures are robust to the inclusion of additional funds and to different approaches in creating the diversification portfolios. There is marginal gain from expanding the eligible set because of the very high correlations between the additional funds and the original funds. This is not surprising given that the regional and broad funds invest in ADRs and GDRs that are part of our eligible set. Imposing constant coefficients on the eligible set results on average in lower integration levels in most cases. In the next section, we use the integration indices presented in Table 4 obtained from diversification portfolios with time-varying weights.

4. Implicit Barriers and Financial Globalization

Reduction in explicit barriers in conjunction with market liberalization has not resulted in the global pricing of EM indices. What are then the causes, other than explicit barriers, that might represent hindrance to the globalization process?

The lack of significance of the explicit barriers in our panel regressions (as reported in this section) suggests that integration should be related to implicit barriers. For example, information and monitoring costs may discourage foreign investors.[6] Alternatively, high ownership by corporate insiders and lack of investor protection may lead to poor foreign investor interest.[7] However, better information disclosure in an economy may help investors' recognition

[6] There is evidence on the role of information asymmetry in equity markets. Some papers show that local investors have an information advantage relative to foreign investors; see, for example, Kang and Stulz (1997), Portes and Rey (2005), Choe, Kho, and Stulz (2005), and Dvorak (2005). In contrast, papers like Andrade and Chhaochharia (2010) link U.S. foreign portfolio investment to differences in the information flow from foreign countries. There is also theoretical and empirical evidence that information asymmetry is priced in international equity markets based on market liquidity and adverse selection; see, for example, Chan, Menkveld, and Yang (2008).

[7] Leuz, Lins, and Warnock (2009) and Kho, Stulz, and Warnock (2009) find that U.S. investors invest less in poorly governed firms—that is, firms with large block ownership by insiders. In addition, Ferreira and Matos (2008) find that institutional investors hold fewer shares of firms that are closely held.

Table 5
Correlations among the different diversification portfolios

Correlation	Panel A: Investable						Panel B: Non-Investable					
	DP			DP_{lag}		DP_{step}	DP			DP_{lag}		DP_{step}
	with DP_{aug}	with DP_{lag}	with DP_{step}	with DP_{aug}	with DP_{step}	with DP_{aug}	with DP_{aug}	with DP_{lag}	with DP_{step}	with DP_{aug}	with DP_{step}	with DP_{aug}
Argentina*	0.93	0.90	0.92	0.97	0.90	0.92	0.81	0.76	0.71	0.87	0.79	0.90
Brazil*	0.95	0.94	0.95	0.99	0.98	0.99	0.97	0.95	0.95	0.98	0.94	0.97
Chile	0.96	0.93	0.94	0.92	0.94	0.93	0.90	0.88	0.91	0.87	0.91	0.90
China*	0.92	0.95	0.96	0.89	0.95	0.91	0.54	0.45	0.53	0.77	0.66	0.85
Colombia*	1.00	0.89	1.00	0.89	0.89	1.00	0.80	0.78	0.74	0.96	0.83	0.87
Czech Rep.*	0.84	0.79	0.88	0.94	0.81	0.85	0.81	0.68	0.79	0.85	0.68	0.84
Hungary	0.98	0.85	0.97	0.85	0.86	0.98	0.98	0.90	0.95	0.90	0.91	0.97
India	0.97	0.94	0.97	0.95	0.96	0.96	0.97	0.94	0.95	0.95	0.96	0.95
Indonesia	0.98	0.96	1.00	0.96	0.96	0.98	0.92	0.88	0.97	0.87	0.89	0.89
Israel*	0.98	0.97	0.98	0.98	0.98	1.00	0.97	0.94	0.98	0.96	0.94	0.98
Jordan	1.00	0.85	1.00	0.85	0.85	1.00	1.00	0.54	1.00	0.54	0.54	1.00
Korea	0.99	0.94	0.97	0.94	0.95	0.96	0.99	0.93	0.93	0.93	0.96	0.93
Malaysia	0.98	0.94	0.99	0.93	0.95	0.98	0.96	0.95	0.97	0.95	0.96	0.97
Mexico*	0.97	0.97	0.98	0.99	0.98	0.99	0.88	0.85	0.83	0.92	0.85	0.92
Pakistan*	1.00	0.98	1.00	0.98	0.98	1.00	0.93	0.90	1.00	0.96	0.90	0.93
Peru*	0.86	0.86	0.89	0.93	0.84	0.83	0.90	0.82	0.64	0.85	0.53	0.61
Philippines*	0.99	0.97	0.99	0.97	0.97	0.99	0.98	0.95	0.97	0.98	0.96	0.98
Poland*	0.95	0.92	0.92	0.97	0.89	0.89	0.94	0.89	0.73	0.95	0.81	0.83
South Africa	0.99	0.98	1.00	0.96	0.98	0.99	0.97	0.93	0.96	0.93	0.95	0.96
Taiwan	0.98	0.95	0.99	0.95	0.96	0.97	0.89	0.86	0.92	0.91	0.94	0.93
Thailand*	1.00	0.98	0.98	0.98	0.97	0.98	0.99	0.97	0.98	0.98	0.97	0.98
Turkey	0.93	0.93	0.98	0.87	0.93	0.92	0.93	0.90	0.94	0.90	0.90	0.93
Average	*0.96*	*0.93*	*0.97*	*0.94*	*0.93*	*0.96*	*0.91*	*0.85*	*0.88*	*0.85*	*0.85*	*0.90*

*Augmented diversification portfolios are constructed with constant weights.
Table 5 reports diversification portfolios constructed from the fitted values of this general specification:

$$R_{P,t} = \left[\alpha + \alpha'_{J_I} \mathbf{D}_{j,t}\right] R_{G,t} + \sum_{j=1}^{J_I} \left[\gamma'_{j,J_{I-j+1}} \mathbf{D}_{J_{I-j+1},t}\right] R_{j,t} + u_{P,t'}, \qquad P = IFCI, IFCNI$$

where $R_{G,t}$ is the return on the global portfolio constructed using a stepwise regression procedure with a forward and backward threshold criteria on the returns of 34 global industry portfolios along with the MSCI World Index constructed from the developed markets, $R_{j,t}$ are the returns of eligible securities, and $D_{j,t}$ is a vector of dummy variables set to one at the introduction of the eligible securities (CFs, ADRs, ETFs) $j = 1 \ldots J_I$ to allow for time-varying weights for each country I.

DP. Diversification portfolio from eligible set constructed as in Section 2 of the paper from the above regression. Please refer to Table 2 for a list of the eligible securities.

DP_{aug}. A portfolio augmented with additional regional funds as well as the iShares Emerging Market fund. The $D_{j,t}$ are switched off at the introduction of subsequent securities for the subset S2 of our sample countries (Argentina, Brazil, Colombia, Czech Rep., Israel, Mexico, Pakistan, Peru, Philippines, Poland, Thailand). Please refer to Table 2 of the paper for a list of the additional funds.

DP_{lag}. A portfolio with the first lag for both the global portfolio, R_G, and for the augmented set of eligible securities. The $D_{j,t}$ are switched off for all countries.

DP_{step}. A portfolio with time-varying weights for those securities selected in two stages by the stepwise procedure in both step1 for the global portfolio, R_G, and in step 2 for the eligible securities, including open-ended funds (Fidelity Latin America Fund, T Rowe Price Latin America Fund, BlackRock Latin America Fund, DWS Latin America Equity Fund).

and improve risk sharing and thus should be empirically related to differences in the degree of integration.

Hence, this section offers extensive evidence as to whether implicit barriers matter for globalization in emerging markets. We use the integration index measures presented in Section 3 as dependent variables and relate them to a number of implicit barriers.

4.1 Analysis of implicit barriers

We focus our analysis on three broad determinants of implicit barriers, those that are due to the institutional environment, those that depend on corporate governance, and those related to the quality of information available to investors. The online appendix reports some summary statistics for the explanatory variables.

4.1.1 Institutional environment proxies. To capture the relevance of institutional environment, we use two variables. The first variable (POL) is the ratings provided by the Political Risk Services' International Country Risk Guide (ICRG) political risk index. These ratings, given as a figure between 0 and 1, are a composite of a number of elements, such as government stability, investment climate, corruption, law and order tradition, bureaucratic quality (see, for example, Erb, Harvey, and Viskanta 1996 for detailed description of the ICRG political risk index). All these aspects capture the extent to which the governments respect private property rights and are crucial for investors concerned about the transparency and fairness of the political and legal institutions of a country. A high rating indicates low political risk. For our sample of emerging markets, the average rating is 0.66.

The second variable is the origin of the legal system of the country (CIVIL). La Porta et al. (1998) were the first to point out the importance of legal origin in explaining the economic and financial institutions in a country. It is well established that English common law has over the past centuries provided better protection of individual rights against the state and has showed more ability to adapt to the dynamic nature of the environment. We construct CIVIL as a dummy variable equal to one if the country is of civil legal origin and zero if the country is of English legal origin. More than two-thirds of our sample countries are of civil legal origin. Since the English law origin would have a positive impact on integration process, we should expect a negative relation between CIVIL and our integration measure.

4.1.2 Governance environment proxies. Our next set of variables captures the corporate governance environment. We use a country-level proxy as well as a firm-level proxy aggregated to the country level. The country-level proxy, the anti-director rights index (A-DIR), is a measure of investor protection. This index varies between 0 and 6, with a higher score for those countries that show better protection of minority shareholders based on the evaluation of six areas of investor protection. We interpret this variable as an indicator of the strength of the corporate law of a country. The average of the scores in our sample of EM countries is 3.5, while the world average over seventy-two countries is 3.4 (Djankov et al. 2008).

As firm-level proxy we include a measure of ownership concentration, C-HELD. We collect data on ownership concentration from Worldscope. For each year, we construct the "closely held shares" variable (C-HELD), a value-weighted average of the shares held by insiders in each country. The average fraction of closely held shares over the period for our countries is 54%. As a comparison, this fraction was 15.68% for the United States in 2002 (Stulz 2005). Taiwan and Korea have the lowest value-weighted ownership concentration, at 29% and 37%, respectively, while Czech Republic, Indonesia, Pakistan, and Turkey have the highest values, at around 70%.

4.1.3 Information environment proxies. The impact of the information environment is conveyed by two measures. To capture the transparency and the quality of information in global financial markets, we collect firm-level data related to analysts following and construct the first variable (AN-F) at the country level.[8] AN-F is the mean number of analysts following each firm listed in I/B/E/S for a country in a specific year.[9] A high number indicates a large amount of information that is divulged in the economy through the analyst channel, which therefore should be linked to higher integration. For our group of countries, the analysts-per-firm variable has a mean of 4.65.

We also use the extent of cross-listing activity (CL-MC) as a proxy for the quality of the information environment.[10] Albeit an indirect measure, cross-listing is associated with a reduction in informational costs and a higher transparency. When cross-listing in mature markets, firms from emerging markets agree to reconcile their financial statements with generally accepted accounting principles, meet the disclosure requirements of the host country, and abide by the regulations set forth by a credible authority. Therefore, by partially acquiring the characteristics of the mature markets' information environment, the firms are likely to reduce the information asymmetry that has been shown to affect the portfolio composition of investors and discourage foreign investment. Ahearne, Griever, and Warnock (2004) use a similar measure as proxy for the reduction in information asymmetries.

Using firm-level data, we construct CL-MC as the ratio of the market capitalization of companies with an ADR program level II or III over the total country

8 Some papers argue that analyst coverage helps propagate firm-specific information (e.g., Hong, Lim, and Stein 2000), while other papers show that analysts do not have significant private information (see, for example, Piotroski and Roulstone 2004).

9 This variable has been used in other papers, most notably by Bushman, Piotroski, and Smith (2005). That paper also discussed some of the limitations of such data and the related assumptions. Some of those concerns are more limited in our case because we focus on a period after 1990 when I/B/E/S substantially extended its coverage.

10 The extent of cross-listing activity could also proxy for the quality of the corporate governance environment. Based on the bonding hypothesis of Coffee (1999) and Stulz (1999), cross-listing could serve as a substitute mechanism for weak governance structure because it makes it harder for insiders to expropriate the minority shareholders. For evidence on the bonding hypothesis, see Doidge, Karolyi, and Stulz (2004) and Hail and Leuz (2009).

capitalization in a given year. This measure accounts for de-listings. The average of the ratio for our countries is 15%, with large cross-country differences. Jordan, Malaysia, Pakistan, Poland, and Thailand have no level II or III ADRs, while for countries like Argentina, Israel and Mexico, CL-MC is in the range of 40%. A higher number is thus indicative of lower information asymmetry.

One concern is that the inclusion of cross-listed stock returns in the eligible set to construct the diversification portfolios might result in an upward bias in the relation between the integration index and CL-MC. However, the bias will not be severe because the increase in cross-listings will not contribute to the spanning of the EM indices beyond the very first few ADRs or country funds (see Bekaert and Harvey 2000, 578, Figure 1, for a similar finding). In other words, it is conceivable that increase in the cross-listing activity beyond the first ADRs or country fund will help lower information asymmetry in a country overall but will have no significant impact on the returns of the diversification portfolios and thus our integration indices.

Since economic and market development factors have been linked in the past to different integration measures, we want to make sure that our implicit barriers provide additional information in explaining what is associated with the globalization process. Thus, in our analysis, we include four control variables: trade to GDP (TR/GDP) as a measure of economic openness, the market capitalization to GDP (MC/GDP) to control for financial development, the value traded to GDP (VT/GDP) to account for the level of liquidity in financial markets, and private credit to GDP (PC/GDP) as a measure of banking development. More detailed explanation of all the variables and their sources is in Appendix A.

The online appendix presents the cross-sectional correlations among these proxies. There is evidence of high correlation in the dataset. This is not surprising, as the three dimensions are related; hence, some of the proxies for a specific dimension might also capture aspects of another dimension. Of the 91 pairwise correlations among the independent variables, 24 are significant at the 10% level or lower, and about half of all the coefficients are above 0.3. We also observe that high correlations are recorded within the set of variables used as controls. In general, the sign of the correlations indicates that across countries better institutions are related to a more transparent information environment and to a corporate environment that fosters diffused ownership and protection of minority shareholders.

The correlation coefficients for the integration indices of the investable and non-investable segments reveal a significant association with most of the proxies for implicit barriers, but not with the proxies for the explicit barriers (ICC) and economic and stock market development.

Overall, our data confirm the challenges of overlapping information and intercorrelation faced by most cross-country studies. In addition, some of the determinants are available only for a subset of the cross-section. As a whole, these challenges are likely to bias the results against our hypothesis.

4.2 Main results

Given the annual frequency of most of the independent variables, we time-aggregate the monthly integration measures for each country and then pool the cross-section and time series for panel estimation. As explained in Section 2, all the following results are based on a sample that excludes the non-investable integration indices of Czech Republic, Poland, South Africa, and Turkey.

4.2.1 Upper bound. We first estimate a model with both country and time fixed effects to determine an upper R-squares bound for our regressions. The fixed effect model accounts for unspecified country and time characteristics. As reported in model (1), Table 6, we can explain up to 85% of the total variation for both investable and non-investable integration indices. The country-only fixed effect models (not reported) have a much higher explanatory power than the time-only fixed effect models, and we conclude that the cross-sectional variation is more significant.

4.2.2 Explicit barriers. Before we relate our integration measure to implicit barriers, we first run a check to investigate the relation between the estimated integration indices and the explicit barriers. Hence, we estimate a model with a trend, controls, and a de jure measure of explicit barriers, the intensity of capital controls (ICC). This measure was first used by Bekaert (1995) and Edison and Warnock (2003) and is equal to one minus the fraction of market capitalization of the investable indices over the country's total market capitalization. When this measure is zero, the market capitalization of the investable indices is equal to that of the market-wide indices, indicating the lack of regulatory barriers to foreign investment. We report the results for this regression in Table 6, model (2). The coefficient on ICC is negative and insignificant for both indices, while the trend is significant only for the investable indices. This result is not surprising given that the computation of our integration measures is based on the theoretical asset pricing model that takes explicit barriers into account. We next examine whether our integration measures are associated with proxies for implicit barriers.

4.2.3 Implicit barriers. To evaluate the relationship between the different environments and the integration indices, we estimate the following regression equation,

$$II_{i,t} = c + \beta \times \text{ } implicit\ barriers\ proxies + \delta X_{i,t} + v_{i,t}, \tag{10}$$

where X_{it} is the set of four control variables discussed earlier. We report the estimated coefficients and their standard errors in Table 6. In all regressions, we cluster standard errors by country and period because some of the regressors, such as AN-F or C-HELD, exhibit both time and country effects while other regressors vary only by country (see Petersen 2009 and Thompson 2011). The

Table 6
Role of implicit barriers

Model	*(1) Upper R-squared bound*		*(2) Explicit barriers model (back-up check)*		*(3) Implicit barriers model with trend*		*(4) Implicit barriers model with no trend*	
dependent variable	*investable II (1a)*	*non-investable II (1b)*	*investable II (2a)*	*non-investable II (2b)*	*investable II (3a)*	*non-investable II (3b)*	*investable II (4a)*	*non-investable II (4b)*
ICC			−0.212	−0.070				
			(0.125)	(0.160)				
POL					0.118	0.319*	0.127	0.320*
					(0.169)	(0.186)	(0.167)	(0.182)
CIVIL					0.014	−0.024	0.015	−0.023
					(0.032)	(0.052)	(0.034)	(0.053)
C-HELD					−0.273***	−0.220***	−0.257***	−0.210***
					(0.075)	(0.072)	(0.070)	(0.071)
A-DIR					0.054***	0.142***	0.053***	0.142***
					(0.015)	(0.017)	(0.014)	(0.017)
CL-MC					0.356***	0.129	0.382***	0.150**
					(0.127)	(0.080)	(0.122)	(0.070)
AN-F					0.006*	0.013*	0.004	0.012
					(0.003)	(0.007)	(0.004)	(0.008)
Trend			0.005**	0.002	0.003	0.002		
			(0.003)	(0.005)	(0.002)	(0.003)		
TR/GDP			−0.003	0.133	0.036	0.096	0.053	0.108**
			(0.056)	(0.126)	(0.048)	(0.063)	(0.046)	(0.052)
MC/GDP			−0.014	−0.090	−0.012	−0.179***	−0.012	−0.181***
			(0.045)	(0.056)	(0.021)	(0.032)	(0.025)	(0.031)
VT/GDP			0.113**	0.231***	0.009	0.087**	0.023	0.096***
			(0.052)	(0.070)	(0.029)	(0.034)	(0.023)	(0.034)
PC/GDP			0.131*	−0.008	0.101*	0.013	0.094	0.009
			(0.067)	(0.164)	(0.054)	(0.074)	(0.052)	(0.073)
Country+year FE	yes	yes	no	no	no	no	no	no
Nobs	370	305	352	287	306	245	306	245
Adj. R^2	83.1%	84.8%	24.7%	15.6%	53.0%	63.8%	52.4%	63.8%

The table reports the estimated coefficients from pooled regressions of the integration indices on proxies for implicit barriers and other country characteristics. The estimated models are based on the general equation below,

$$II_{i,t} = c + \beta \times \textit{implicit barriers proxies} + \delta X_{i,t} + v_{i,t},$$

The dependent variable in models (1a) through (4a) is the integration index of IFCI. In models (1b) through (4b), the dependent variable is the integration index of IFCNI. The monthly integration indices are averaged to obtain yearly values. We run unbalanced regression as not all the explanatory variables are available for all the cross-sectional units. Standard errors in parentheses are clustered by country and time. The sample period is from 1989 to 2008. Estimates of the constant are not reported. Superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Definition of the variables and data source is in Appendix A.

use of the estimated integration indices as dependent variables in the panel yields consistent estimates of the coefficients. However, the reported standard errors ignore the sampling error associated with the asset pricing model and hence likely understate the true standard errors.

Models (3) and (4) of Table 6 report our main specifications with and without trend, respectively. Compared with model (2), the time trend for the investable segment loses its significance, and its inclusion has no explanatory power for both EM segments. For the institutional environment, political risk is not significant. However, it becomes significant when we use the same cross-section as with the non-investables, which excludes, among others, Czech Republic and Poland. The high scores (low political risk) for these two countries are at odds with the discussion in Glaeser, Johnson, and Shleifer (2001) that points to their relatively weak legal systems. The positive relation with the political risk variable indicates that countries with low political risk are more integrated. In our sample that includes only six countries from a common law origin, the coefficient CIVIL is insignificant for both integration indices. Both determinants of the governance environment are significant for investables and non-investables. The coefficient on C-HELD is negative and significant, indicating that countries with concentrated insider ownership are more exposed to local factors and less integrated with the world market. The coefficient on A-DIR is positive and significantly related to integration, suggesting that countries with better protection of minority shareholders exhibit higher levels of integration. The coefficients on information environment are positive as expected. They are also significant for investables, but the trend seems to affect the significance for the non-investables. The coefficients on AN-F and on CL-MC suggest that countries with higher transparency and lower information asymmetry are more integrated.

Our proxies for the market and economic development show mixed results. TR/GDP and PC/GDP are insignificant, but with the correct sign in most specifications, while the MC/GDP is negative. VT/GDP is positive in all specifications and significant for the non-investable integration indices. The high correlation among these controls seems to drive the results. However, it does not affect our findings with respect to implicit barriers. The evidence is robust to the removal of the controls.

For the investable integration indices, the adjusted R^2 of model (4) is 52% and is about 0.6 times the adjusted R^2 of the upper-bound in model (1). For the non-investable integration indices, the adjusted R^2 is 64% and is about 0.8 times the adjusted R^2 of the upper-bound in model (1). Not surprisingly, the proxies for implicit barriers cannot capture all of the variation in integration levels as well as country and time effects. Nonetheless, they substantially dominate market and economic development proxies in explaining the variation in the integration index measures. The adjusted R-squares of unreported regressions with only controls are 19% for investable integration indices and 15.4% for the non-investable integration indices. When we analyze the three environments separately, the information environment, followed by the governance variables, has the largest explanatory power for the investable integration indices. The adjusted R-squares are 39.75%, 34.20%, and 23.84% for the information, the governance, and the institutional environments, respectively. For the non-investable integration indices, the governance variables, followed by the institutional environment, have the largest explanatory power. The adjusted R-squares are 55.20%, 26.14%, and 17.13% for the governance, the institutional, and the information environments, respectively.

This analysis leads us to conclude that overall, market integration for investable and non-investable securities has a higher association with information, governance, and institutional factors than economic and stock market characteristics.

4.2.4 Economic importance. Our main specifications in models (4a) and (4b) of Table 6 help us shed light on the statistical significance. We also use the models' results to assess the economic value of implicit barriers on the two integration indices. We first discuss the impact from a cross-country, one-standard-deviation change in the independent variables, and then we show the joint effect to a cross-country move from the 25th percentile to the 75th percentile.

The marginal impact of our implicit barrier variables shows interesting differences between the two segments. We observe that a one-standard-deviation increase in C-HELD decreases the integration of investables (0.029) and that of non-investables (0.024) by a similar magnitude. However, increases in most of the other variables are associated with an economically larger impact for the non-investable segment. For example, a one-standard-deviation increase in A-DIR is associated with a rather sizable increase in integration of 0.171 for non-investables and only 0.065 for investables. The marginal effects on the non-investable segment are 0.028 for POL and 0.023 for AN-F, while the corresponding impacts on the investable segment are 0.011 and 0.007, respectively.

We then combine the estimated coefficients in models (4a) and (4b) with the cross-sectional distribution of the implicit barrier variables and assume a country move from the 25th percentile to the 75th percentile. As reported in Figure 3, we find that the investable integration index increases by about 19% as a result of a joint reduction in all implicit barriers, while the non-investable integration index increases by about 30%. In addition, most of the increase for the investable segment is associated with a reduction in the information asymmetry as well as an increase in the quality of corporate governance, while the increase for the non-investable segment is driven by stronger governance, better institutional environment, and reduction in the information asymmetry. The magnitude of the changes in the institutional factors is comparable across the two segments when we consider the same cross-section (see Panel B of Figure 3). This analysis suggests that substantial

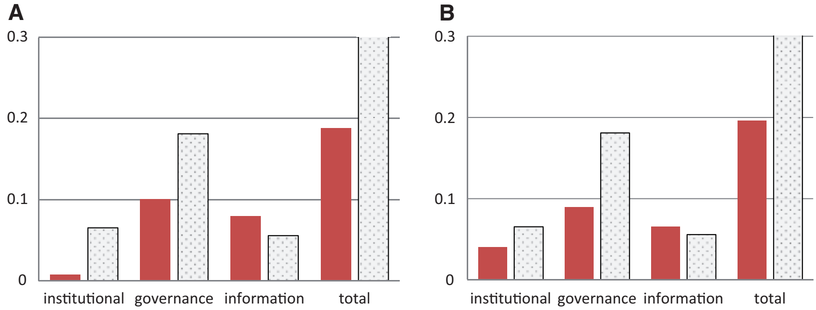

Figure 3
Economic impact of implicit variables
The figure plots the economic impact estimated as countries move from the 25th percentile to the 75th percentile. Solid bars are for investables, and dashed bars are for non-investables. Institutional envrionment is the sum of the political risk (POL) and legal origin variable (CIVIL). The corporate governance environment is the sum of ownership concentration (C-HELD) and anti-director rights index (A-DIR). The information environment is the sum of analyst coverage (AN-F) and cross-listing activity (CL-MC). Panel A is based on the estimation of model (4) in Table (6). The cross-section of investables includes twenty-two countries, while that of non-investables includes eighteen countries—that is, without Czech Republic, Poland, South Africa, and Turkey. Panel B is based on similar specification as in model (4), but the cross-section of countries is the same for investables and non-investables and excludes the four countries above. Definition of the variables and data source is in Appendix A.

lowering of implicit barriers can impact the degree of integration in a way that is economically very meaningful. Furthermore, it is particularly compelling since we find that implicit barriers are economically more important for the non-investable segment.

To summarize, our results show that the implicit barrier proxies dominate market and economic development proxies in explaining the variation in the integration index measures. The statistical and economic contribution of the different environments varies somewhat across the two segments. Overall, the implicit barriers have a greater economic impact in the cross-section of countries for the non-investable segment.

4.3 Robustness

We now address potential robustness concerns for our findings. In particular, we are concerned about omitted economic variables, alternative implicit variables, endogeneity issues, sample composition, and time dynamics. Models (5)–(8) of Table 7 include a set of estimations that extend the analysis from our main specifications of model (4) and provide support for the robustness of our main results.

4.3.1 Omitted variables. Model (5) of Table 7 adds the log of the number of firms (N-firms), the default spread, and the option volatility index (VIX) as additional controls. The log of the number of firms is another indicator for market development, and it is not significantly related to integration. The default spread and the VIX could be related to the level of integration if associated with

Table 7
Robustness

Model	*(5) Additional controls*		*(6) Additional implicit variables ACC and Z-RET*		*(7) Endogeneity: All variables lagged*		*(8) Interaction with ICC*	
dependent variable	*investable II (5a)*	*non-investable II (5b)*	*investable II (6a)*	*non-investable II (6b)*	*investable II (7a)*	*non-investable II (7b)*	*investable II (8a)*	*non-investable II (8b)*
ICC							−0.177	−0.099
							(0.242)	(0.358)
POL	0.137	0.328*	0.325**	0.010	0.152	0.360**	0.034	0.255
	(0.171)	(0.177)	(0.155)	(0.299)	(0.167)	(0.182)	(0.190)	(0.264)
CIVIL	0.008	−0.040	0.013	0.037	0.016	−0.014	0.021	0.013
	(0.044)	(0.055)	(0.045)	(0.059)	(0.032)	(0.056)	(0.038)	(0.057)
C-HELD	−0.251***	−0.181***	−0.203*	−0.186*	−0.290***	−0.292***	−0.312***	−0.151**
	(0.066)	(0.065)	(0.077)	(0.099)	(0.061)	(0.068)	(0.093)	(0.060)
A-DIR	0.055***	0.148***	0.047**	0.126***	0.052***	0.135***	0.071***	0.132***
	(0.012)	(0.017)	(0.023)	(0.033)	(0.013)	(0.020)	(0.025)	(0.027)
CL-MC	0.378**	0.152**	0.325**	−0.035	0.363***	0.065	0.349**	0.210**
	(0.124)	(0.070)	(0.112)	(0.135)	(0.123)	(0.069)	(0.143)	(0.085)
AN-F	0.004	0.015*	−0.001	0.000	0.005	0.009	0.001	0.004
	(0.004)	(0.008)	(0.006)	(0.007)	(0.004)	(0.009)	(0.003)	(0.007)
ACC			0.686**	0.108				
			(0.341)	(0.323)				
Z-RET			−0.169*	−0.441**				
			(0.095)	(0.187)				
ICC×POL							0.500	0.033
							(0.328)	(0.488)
ICC×CIVIL							−0.101	−0.069
							(0.075)	(0.108)
ICC×C-HELD							0.075	−0.241***
							(0.168)	(0.025)
ICC×A-DIR							−0.068	0.033
							(0.043)	(0.042)
ICC×CL-MC							0.050	0.054
							(0.308)	(0.189)
ICC×AN-F							0.013*	0.038***
							(0.007)	(0.011)
TR/GDP	0.040	0.077			0.034	0.085*	0.060	0.136***
	(0.045)	(0.050)			(0.044)	(0.048)	(0.051)	(0.049)

(*continued*)

Table 7
Continued

Model	*(5) Additional controls*		*(6) Additional implicit variables ACC and Z-RET*		*(7) Endogeneity: All variables lagged*		*(8) Interaction with ICC*	
dependent variable	*investable II (5a)*	*non-investable II (5b)*	*investable II (6a)*	*non-investable II (6b)*	*investable II (7a)*	*non-investable II (7b)*	*investable II (8a)*	*non-investable II (8b)*
MC/GDP	−0.012	−0.199***			−0.014	−0.164***	−0.016	−0.183***
	(0.024)	(0.036)			(0.021)	(0.042)	(0.025)	(0.029)
VT/GDP	0.027	0.114***			0.022	0.112***	0.018	0.111***
	(0.025)	(0.026)			(0.020)	(0.044)	(0.024)	(0.027)
PC/GDP	0.097	0.032			0.097**	−0.008	0.051	0.003
	(0.047)	(0.078)			(0.049)	(0.077)	(0.051)	(0.075)
N-firms (log)	−0.007	−0.015						
	(0.014)	(0.019)						
Default Spread	0.022	0.095**						
	(0.044)	(0.044)						
VIX	0.000	−0.004**						
	(0.001)	(0.001)						
Nobs	306	245	184	154	288	231	306	245
Adj. R^2	52.2%	64.7%	54.1%	50.4%	54.2%	62.5%	53.9%	65.5%

The table reports the estimated coefficients from pooled regressions of the integration indices on proxies for implicit barriers and other country characteristics. The dependent variable in models (5a) through (8a) is the integration index of IFCI. In models (5b) through (8b), the dependent variable is the integration index of IFCNI. The monthly integration indices are averaged to obtain yearly values. We run unbalanced regressions, as not all the explanatory variables are available for all the cross-sectional units. Standard errors in parentheses are clustered by country and time. The sample period is from 1989 to 2008. Estimates of the constant are not reported. Superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Definition of the variables and data source is in Appendix A.

flight to quality and could be interpreted as "push" factors. Since these factors would affect differential (global and local) risk aversion as well as covariance risk, it is difficult to a priori determine the net impact on the degree of integration in an asset pricing framework. Indeed, it is an empirical issue.

For the investable segment, neither the VIX nor the default spread is significant. For the non-investable segment, the two variables turn significant and are of opposite sign. Note that these variables are always insignificant for both investables and non-investables when used separately (in unreported regressions).

4.3.2 Additional implicit variables. Model (6) extends the analysis with other proxies for implicit barriers in a smaller cross-section due to data availability. Accounting practices are another important channel for dissemination of information in financial markets. Healy and Palepu (2001) show that disclosure helps to reduce information asymmetry between the firm and its investors, as well as among investors. Ammer et al. (2012) find that U.S. investors prefer firms with characteristics associated with greater information transparency, such as stronger home-country accounting standards. Thus we also include a measure of the disclosure practices in a country (ACC). This measure is an aggregation of the practices observed in the annual reports for the sample of domestic firms collected by the Center for International Financial Analysis and Research (CIFAR). The score attributed by CIFAR is based on the analysis of different categories up to a maximum value of 1 (see Hope 2003 for an extensive discussion of this index). We take the scores of the 1990 year to reduce potential endogeneity. As argued by Bushman and Smith (2001), analyst following and accounting practices could be either substitutes or complements. The high correlation of 0.56 between the two variables, ACC and AN-F, provides some evidence of substitutability. Since it is difficult to ex ante determine the net effect of the two variables, we use both to capture reduction in information asymmetry.

High transaction costs are another potential obstacle for investing in emerging markets. A measure of transaction costs is notoriously difficult to compute. No consensus exists on what would be the best proxy, and there is an additional challenge of data availability for emerging markets. We proxy transaction costs by the zero-return measure (Z-RET) that is used for emerging markets in Lesmond (2005) and Bekaert, Harvey, and Lundblad (2007) and kindly provided to us by Christian Lundblad. This measure is computed from the proportion of zero daily returns observed in a year, and a higher fraction of zero returns is an indication of a higher level of transaction costs.

We run a regression with the main implicit variables augmented with ACC and Z-RET and no controls because of the very high correlation between these two variables and the controls. For the investable index, the coefficient on ACC is positive and significant. For the non-investable segment, the evidence still confirms the lack of significance of the information variables. Z-RET is negative and significant for both segments, indicating that markets with lower transaction costs have a higher level of integration.

4.3.3 Endogeneity. We are aware that endogeneity issues and the direction of causality might be a concern for some of our variables. Changes in financial integration might spur improvement in the economic and political climate and also lead to changes in the ownership structure and the dissemination of information. The improvement in the economic environment could also be the result of concurrent changes in economic openness, financial markets, and institutions. As it is difficult to come up with convincing instruments to deal with these issues, we simply lag the explanatory variables. This may not fully resolve endogeneity biases, but it may alleviate some concerns. The results reported in model (7) are statistically and economically unchanged.

Further, it is possible that we uncover an association with integration because, for example, stocks with closely held ownership (C-HELD) are less likely to be investable. Starting from 2003, all strategic holdings greater than 10% have been excluded from the market capitalization of the IFC investable indices.[11] Therefore, we drop the time period over which the investable indices were adjusted for free float and find no change in results.

Some of our proxies for implicit barriers might be linked to the liberalization process. For example, as countries liberalize, the domestic institutions are also modernized and some of the proxies might actually be picking up the effect of the changes in liberalization. We thus include in our model the de jure measure of the degree of openness, ICC, as well as its interactions with the implicit barrier proxies. The results are reported in model (8). The explicit barrier variable is still insignificant, as in model (2) of Table 6. In general, the relationship between most of the implicit variables and integration is independent of the level of openness. Note that the association between the implicit variables and the integration measure conditioning on ICC being zero is similar to the evidence in model (4) of Table (6).[12] However, the results of model (8) do not convey the impact of implicit barriers when ICC is greater than zero. Since analyst following is the only implicit variable with consistent and significant interaction with ICC across the two segments, in the online appendix, we illustrate its marginal effect across possible range of openness as well as the 95% confidence intervals. There is a statistically significant effect whenever both bounds are above the zero line. AN-F is significantly related to market integration when ICC is higher than 0.3 for the non-investables—that

[11] Strategic holdings include government holdings, holdings by insiders (current or former officers and directors of the company, founders of the company, or family trusts of officers, directors, or founders), holdings by other publicly traded companies, and holdings by private equity firms.

[12] We should point out that the coefficients on the constitutive terms in the interaction model (8) cannot be interpreted as unconditional or average effect; see Brambor, Clark, and Golder (2006) for details on how to make inference from multiplicative interaction models.

is, when the market is less open. Therefore, the association we capture is not likely due to the endogeneity related to investability.

4.3.4 Sample analysis. We analyze period subsamples using a time dummy for 1998 and its interactions with the explanatory variables of Table 6. We use 1998 as a break because we observe a change in the time fixed effects at that year. The unreported evidence mitigates concerns that our variables are significant because they contribute to pick up a general trend in the data. We also run our main specifications of model (4) of Table 6 with region dummies for Latin America and Asia. The unreported regressions yield similar inferences.

The lack of a formal theoretical relationship between integration and implicit barriers over time precludes the development of a formal dynamic model. Nonetheless, as a final check on our main conclusions, we estimate a specification with a lagged dependent variable. (See, for example, Beck and Katz 2011 for use of OLS with lagged dependent variables and the ensuing tradeoff between bias and efficiency in the estimated coefficients.) We find that while the statistical significance is reduced, the sign of all our variables of interest is retained and their long-run economic impact is very similar to the specifications of Table 6.

5. Conclusion

Using a conditional version of the EL model under barriers to portfolio flows, we investigate the behavior of investable and non-investable assets for twenty-two emerging markets over a period characterized by increasing financial liberalization. The investable indices are a subset of EM assets that take into account technical and practical foreign investment restrictions, and as a result of this liberalization, they represent the segment of choice for institutional investors.

Our results suggest that in spite of reduction in explicit barriers on foreign investment, there is strong evidence that the local factor—the conditional market risk—is still relevant in pricing the returns of investable and non-investable assets. Indeed, their returns are determined by a combination of domestic and global factors. We show that the extent of globalization in our sample has not been uniform and that integration has not universally increased over time. When we compare the evidence on integration for EMs against the G6, it is clear that EMs are still different, despite the presence of index funds and ETFs widely available for both groups of countries.

The relevance of the local factor, especially in the pricing of securities that have been de jure liberalized, suggests that the persistent segmentation of emerging markets is associated with implicit barriers. Our results further show that implicit barriers related to the institutional environment, corporate governance, and the quality of information play a major role in explaining the extent of financial globalization. We estimate the economic impact from a joint change in the three environments to be as large as 30% in the case of the non-investable segment and about 20% for the investables. The economic significance of our results suggests that improvement in corporate governance, transparency, and institutions would complement market liberalization policies and can help in further integrating emerging markets.

Appendix A

Table A1
Variable definition

Variable	Description	Sources
Intensity of Capital Controls ICC	ICC = (1−Investability) where investability is defined as the ratio of the market capitalization of the IFCI index over the market capitalization of the IFCG index. Frequency: Annual from monthly data.	Standard and Poor's/International Finance Corporation's Emerging Stock Markets Factbook and authors' calculations
Political risk POL	Political risk ratings based on the sum of twelve weighted variables covering both political and social attributes. The index has 100 points, with higher scores indicating lower risk. Frequency: Annual.	International Country Risk Guide (ICRG)
Closely Held C-HELD	Value-weighted average fraction of firm stock market capitalization held by insiders (i.e., corporate officers, directors, immediate family members), by individual shareholder holdings representing more than 5%, by other corporations (except shares held in fiduciary capacity by financial institutions), and by pension/ benefit plans and trusts. Frequency: Annual.	WorldScope and authors' calculations
Anti-directors rights index A-DIR	Aggregate index of shareholder rights. The index ranges from 0 to 6 and it is formed by summing: (i) vote by mail; (ii) shares not blocked or deposited; (iii) cumulative voting; (iv) oppressed minority; (v) preemptive rights; and (vi) capital.	Djankov et al. (2008)
Analyst coverage AN-F	Mean number of analysts providing a forecast for a specific firm in a given calendar year. Frequency: Annual.	I/B/E/S and authors' calculations
Cross-listing activity CL-MC	Proportion of market capitalization for firms that are cross-listed on US markets in a given calendar year, or combined market capitalization of cross-listed firms/total market capitalization of the domestic market. Frequency: Annual.	Authors' calculations from Citibank, JP Morgan, the Bank of New York Mellon, Deutsche Bank, NYSE, AMEX, and NASDAQ for the cross-listings; Datastream, Compustat, and EMDB of S&P for the market capitalization
Trade to GDP TR/GDP	Sum of exports and imports of goods and services measured as a share of gross domestic product. Frequency: Annual.	World Bank Development Indicators
Mcap to GDP MC/GDP	Equity market capitalization divided by gross domestic product. Frequency: Annual.	S&P/IFC emerging market and World Bank Development Indicators

(*continued*)

Table A1
Continued

Variable	Description	Sources
Value traded to GDP VT/GDP	Equity market value traded divided by gross domestic product. Frequency: Annual.	S&P/IFC Emerging Stock Markets Factbook and World Bank Development Indicators
Private Credit to GDP PC/GDP	Private credit divided by gross domestic product. Frequency: Annual.	World Bank Development Indicators
N-firms (log)	Number of publicly traded firms used as the logarithm. Frequency: Annual.	World Bank Development Indicators
Accounting standards ACC	Index created by examining and rating companies' 1990 annual reports on their inclusion or omission of 90 items. These items fall into seven categories (general information, income statements, balance sheets, funds flow statement, accounting standard, stock data, and special items).	La Porta et al. (1998). International accounting and auditing trends, Center for International Financial Analysis and Research (CIFAR)
Zero returns Z-RET	Proportion of zero daily returns observed over the relevant year for each equity market, used as measure of transaction cost. Frequency: Annual.	Kindly provided by Christian Lundblad as used in Bekaert, Harvey, and Lundblad (2007)
Default Spread	US default premium measured by the yield difference between Moody's Baa- and Aaa- rated bonds. Frequency: Annual	Federal Reserve Board
VIX	The VIX option volatility index. The December value of each year is used. Frequency: Annual.	Chicago Board Option Exchange, www.cboe.com

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