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THE PRICING OF COUNTRY FUNDS FROM EMERGING MARKETS: THEORY AND EVIDENCE

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This paper provides a theoretical and empirical analysis of country funds focusing on emerging economies whose capital markets are not readily accessible to outside investors. We study country fund pricing and the associated policy implications under alternative variations of international market structure segmentation. We show that country funds traded in the developed capital markets can be beneficial in promoting the efficiency of pricing in the emerging capital markets and in enhancing capital mobilization by local firms. These efficiency gains vary depending upon the degree to which the emerging market securities are spanned by the core or advanced market securities, and cross-border arbitrage restrictions. A country fund premium or discount arises in our framework owing to access and substitution effects characterizing the relationship between the host and emerging markets. We present some empirical evidence supporting our principal predictions. In particular, we investigate the issues of country fund pricing, relative influences of the home market, the international market, the global closed-end fund factor, and the behavior of fund premia/discounts.

1. Introduction

Closed-end country funds primarily invest in the stocks of the originating countries, such as Spain, Germany, Japan, India, Korea, Brazil, and are typically traded on the organized exchanges of the US and the UK. Country funds (CFs) have expanded phenomenally over the recent past, but they beg important issues which are not sufficiently explored. For example, what drives the return on CFs or what are the determinants of fund premia? Are there efficiency gains, particularly to emerging markets, from the introduction of country funds?

Explanations for the behavior of closed-end domestic (US) funds, particularly for the persistence of discounts include, informational inefficiency, illiquidity, tax liability, transaction costs, or noise trading and they offer valuable insights regarding behavior of CFs.[a,b] However, in contrast to domestic closed-end funds, some CFs have consistently sold at a premium (e.g. Korea Fund), some have fluctuated between premium and discount over time (e.g. Malaysia and Germany Funds), and some have consistently sold at a discount (e.g. UK Fund). Thus, although factors that are important in pricing domestic (US) closed-end funds may also influence CF valuation, the structure of global capital market, in particular, the impact of barriers to international capital flows must be considered, since CF shares and their underlying portfolios are priced in different market segments.[c]

Our purpose here is to provide a theoretical and empirical analysis of country funds focusing on emerging economies whose capital markets are not readily accessible to outside investors. By utilizing a segmented markets framework, we link the pricing of country funds in the reference or core markets (say the US) with the pricing of the component underlying assets (or net asset valuation) in the originating securities markets. We study various scenarios of international capital market structure and draw important implications for valuation and premia on country funds, and their impact in enhancing pricing efficiency in the local securities markets. We allow for imperfect substitution between the country fund and the underlying assets based on the notion of excess price volatility that has received ample attention in finance. This is because the component assets traded in the originating countries are fundamental to country funds traded in the core market, and excess volatility is measured by price volatility relative to fundamental volatility. This notion of imperfect substitution is reinforced by the time series pattern of country funds prices and the corresponding net asset values (see Table 1). We show that the country fund will deliver premium or discount, depending on the access and substitution effects characterizing the core and the restricted markets.

If we allow country funds to serve as a perfect substitute for the component securities, the results depend on cross-border arbitrage restrictions. Specifically, under capital inflow controls and prohibitive restrictions on international arbitrage, resulting from such factors as absence of short sales opportunities, taxes, borrowing constraints, and other legal investment barriers, there will be a premium on the country fund, and the pricing of the country fund conforms to the core market rather than the originating country.[d] On the other hand, if local investors can engage in free cross-border arbitrage, there will be no premium or discount on the country fund.

[a]See [22] and [10] for literature on US closed-end funds.

[b]A noise trading approach argues that systematic variations in investor sentiment would render closed-end funds riskier and underpriced relative to fundamentals. See for example, [12, 7].

[c]In our framework, if price and underlying net asset value are determined in the same market segment (i.e. in a fully integrated market), no premium/discount would be observed, a result similar to that delivered by well-known asset pricing models.

[d]Since the legal restrictions are prohibitive and binding, we do not consider the impact of market frictions on the arbitrageur's behavior in the spirit of Tuckman and Vila [32].

Table 1. Country fund descriptive statistics.

	Premia/Discount					
	mean	max	min	var(r_p)	var(r_{nav})	$\frac{\text{var}(r_p)}{\text{var}(r_{nav})}$
Emerging Markets						
Argentina Fund	−.0918	1.3838	−.0727	.0525	.0337	1.5578
Brazil Fund	−.0765	.5514	−.5625	.0698	.0734	.9509
Brazilian Equity Fund	.0343	.3079	−.1489	.0737	.0705	1.0454
Chile Fund	−.0586	.1827	−.4772	.0591	.0408	1.4485
India Growth Fund	.0406	.5424	−.3124	.0537	.0385	1.3948
Indonesia Fund	.1428	.4789	−.2104	.0558	.0261	2.1379
Korea Fund	.4390	1.5658	−.0515	.0629	.0412	1.5266
Korea Investment Fund	.0724	.4418	−.1649	.0423	.0524	.8072
Malaysia Fund	−.0198	.7454	−.4143	.0636	.0325	1.9569
Mexico Equity and Income Fund	−.0599	1.6639	−.5137	.0722	.0614	−.1759
Mexico Fund	−.02622	.4311	−.2698	.0560	.0376	1.4893
Emerging Mexico Fund	−.0148	.3805	−.2035	.0617	.0478	1.2907
First Philippine Fund	−.1690	.6319	−.3359	.0497	.0241	2.0622
Portugal Fund	−.0491	.3980	−.2753	.0497	.0221	2.2488
Taiwan Fund	.2389	2.2955	−.2527	.0795	.0510	1.5588
ROC Taiwan Fund	−.0073	.3412	−.3155	.0575	.0382	1.5052
Thai Capital Fund	.0735	.8829	−.2177	.0544	.0362	1.5027
Thai Fund	−.0819	.1435	−.2401	.0499	.0378	1.3201
Turkey Fund	.0859	1.0025	−.3610	.0615	.0739	.8322
Developed Stock Markets						
Australia Fund	−.1117	.1968	−.2753	.0394	.0227	1.7356
France Growth Fund	−.1235	.1743	−.3324	.0422	.0214	1.9761
Germany Fund	.0231	1.00	−.2388	.0606	.0323	1.8761
Future Germany Fund	−.1319	.0782	−.2647	.0384	.0255	1.5058
New Germany Fund	−.1377	.0131	.2523	.0403	.0237	1.7004
Emerging Germany Fund	−.1066	.7293	−.2174	.0454	.0243	1.8683
Irish Investment Fund	−.1500	.0407	−.3341	.0353	.0224	1.5758
Italy Fund	−.0639	.3795	−.3368	.0501	.0283	1.7703
Japan Equity Fund	.0637	.4751	−.2619	.0532	.0363	1.4655
Japan OTC Equity Fund	.0116	.3169	−.1373	.0428	.0332	1.2891
Singapore Fund	−.0192	.3165	−.2753	.0436	.0251	1.7370
Spain Fund	−.1421	.0903	−.2805	.0343	.0272	1.2610
United Kingdom Fund	−.1219	.0457	−.2420	.0359	.02210	1.6244

Finally, we present empirical evidence supporting our principal findings. In particular, we investigate the issues of country fund pricing, relative influences of the home market, the international market, the global closed-end fund factor, and the behavior of fund premia/discounts.

The paper is organized as follows. In Sec. 2, we provide foundation for the pricing of country funds on the basis of recent theoretical advances on the pricing of assets in segmented markets. In Sec. 3, we present the model, draw implications for pricing and premia on country funds under alternate market structures and derive testable implications. In Sec. 4, data and empirical results are reported. Concluding remarks follow.

2. Foundations for Country Fund Pricing

We begin with the pricing of the underlying component assets traded in the originating countries. We characterize the price of a representative portfolio of assets in a restricted environment as a starting point and draw implications for CF pricing and premia under various international market segmentation and arbitrage conditions.

2.1. *Market setting for trading of country funds and their underlying securities*

The market setting follows the tradition of market segmentation as posited by Lintner [21], Rubinstein [26], Glenn [18] in the domestic context, and by Black [6], Stulz [29], Errunza and Senbet [16], Errunza and Losq [15] in an international context. More recently the structure has been used fruitfully by Merton [24] and Mauer and Senbet [23] to study the effects of limited followership (imperfect information) and the underpricing anomaly of initial public offerings, respectively.[e] In particular, we find it convenient to follow the approaches of EL [15] and MS [23], although their respective motivations are different from ours. This would then serve as a starting point in deriving relevant implications for country funds as we study them for alternative variations of market structure and arbitrage conditions.

In our setting, there are N country funds from N markets that trade in the advanced capital market. The advanced reference market is denoted as "core" which is costlessly accessed by all investors (T) in the universe. The originating markets are accessible only to local investors, and hence they are completely segmented from each other. However, there is partial segmentation between the core and each of the N markets in the sense that investors from the originating countries have access to the core.

For an analytical convenience we deal with only one restricted asset for the most part of our initial analysis, accessible only to $M (M < T)$ local investors in the restricted market. This representation of the market structure is simple and it captures the focal issues in a reasonable way. In fact, as we shall see later, it is rich enough to generate important implications regarding country funds. The implications for the country funds arise from the recognition that the model for an

[e]See also Errunza [14] for a similar application, A variation of this structure is used by Alexander, *et al.* [1] to price a dually listed security in an otherwise fully segmented two-country setting, whereby investors have access only to their respective markets.

individual restricted asset is applicable to a collection or a portfolio of restricted assets which can be viewed as component assets to the fund.

2.2. *Technology*

We treat the risky securities of the core market (say the US) as an aggregate index with the end-of-period cash flow specified in terms of multiple factors as follows:

$$Y_c = \overline{Y_c} + \sum_k \beta_{ck} F_k + \varepsilon_c \,, \tag{1}$$

where

Y_c = the core market's end-of-period cash flow,

$\overline{Y_c}$ = the expected value of Y_c,

F_k = the kth economic factor,

β_{ck} = the core market asset sensitivity to the kth economic factor,

ε_c = the residual core market cash flow.

We also invoke standard orthogonality conditions such that $E(F_k) = E(\varepsilon_c) = E(\varepsilon_c F_k) = E(F_k F_j)$ This is a two-date or single period framework in which the final date cash flows specified above include the liquidation proceeds. As a reference point we consider an asset in a restricted market which is accessed only by M local investors, but its cash flow has a stochastic technological relationship with the assets in the core market. In general, the relationship is such that the asset is not perfectly spanned by the core assets; that is, it does not have a perfect substitute in the core market. We posit the spanning relationship following MS [23], whereby the restricted asset's terminal cash flow can be stated as:

$$Y_F = \overline{Y_F} + \beta_F [Y_C - \overline{Y_C}] + \varepsilon_F \,, \tag{2}$$

or alternatively,

$$Y_F = \overline{Y_F} + \beta_F \sum_k \beta_{CK} F_K + \beta_F \varepsilon_C + \varepsilon_F \,, \tag{3}$$

where

$\beta_F \beta_{CK}$ = the sensitivity of the restricted market asset to the kth economic factor,

ε_F = the component of the restricted asset cash flow unspanned by the core market

$E(\varepsilon_F) = E(\varepsilon_C \varepsilon_F) = E(\varepsilon_F F_K) = 0.$

A similar spanning relationship follows for the remaining restricted assets from the other $N - 1$ countries; we can again think of them in an aggregate for the purpose of cash flow specification. Thus, the aggregate cash flows for the remaining group of restricted assets can be specified as:

$$Y_W = \overline{Y_W} + \beta_W \sum_K \beta_{CK} F_K + \beta_W \varepsilon_C + \varepsilon_W , \tag{4}$$

where

$\beta_W \beta_{CK}$ = the sensitivity of the aggregate cash flows for the assets of the rest of the restricted markets to the kth economic factor,

ε_W = the component of the restricted asset cash flows unspanned by the core market.

$E(\varepsilon_W) = E(\varepsilon_C \varepsilon_W) = E(\varepsilon_F F_K) = 0.$

For completeness, we also recognize a spanning relationship existing between the reference restricted security (F) and the aggregate (W) of the remaining restricted assets from $N - 1$ countries; recognizing this particular spanning relationship, we can restate the cash flows for the restricted asset:

$$Y_F = \left[\overline{Y_F^C} + \beta_F \left(\sum_k \beta_{CK} F_K + \varepsilon_C\right)\right] + \left[\overline{Y_F^*} + b_F \varepsilon_W + \varepsilon_F^*\right] . \tag{5}$$

The cash flows are split into those spanned by the core market (first square parenthesis) and those "core unspanned" or specific to the asset (second square parenthesis). The latter parenthesis recognizes that there is a spanning relationship between the "core-unspanned" and the remaining aggregate of restricted assets, with a factor of proportionality b_F and the unique residual ε_F^*.

2.3. *Portfolio and market equilibria*

While our motivation is specific to pricing of country funds, the technological specifications are adaptations of the frameworks utilized by MS [23] in the context of underpricing anomaly of initial public offerings and by EL [15] in the context of international asset pricing. Consequently, the initial valuation that we wish to use as a starter follows from these works, and we will state it without proof.[f] The approach is fairly standard in that individual investors are allowed to optimize their portfolio choices by picking fractional holdings in various categories of assets, depending upon accessibility of these assets. The efficient portfolio optimization is in a mean-variance paradigm, whereby individuals maximize their utility over current consumption, the expected value of portfolio wealth (or equivalently expected consumption) at a final date, and portfolio risk as reflected in the volatility of future consumption at a final date. Portfolio demands are then aggregated and equated

[f] The detailed proof is in Appendix I.

to aggregate existing supply of securities to derive a market equilibrium valuation. Note that the aggregation process takes explicit account of limited access, or alternatively as in Merton [24], the Lagrange multipliers are used to measure a shadow price of imperfect access. However, the model delivers the same structure under either treatment of access restrictions. Thus, the value of a restricted asset can be specified as:

$$V_F = (1 + r_f)^{-1}\left[\overline{Y_F} - \theta^{-1}(\beta_F Z) - (\theta^M)^{-1}(b_F^2\sigma^2(\varepsilon_W) + \sigma^2(\varepsilon_F^*))\right], \tag{6}$$

where

$$Z = (1 + \beta_F + \beta_W)\left[\Sigma\beta_{CK}^2\sigma^2(F_K) + \sigma^2(\varepsilon_C)\right].$$

The valuation in (6) recognizes that there is also risk-free lending and borrowing available to all participants at a rate equal to r_f.[g] The risk premium is of two forms:- (a) "complete pricing" risk premium which is a function of Z, and (b) the risk premium associated with limited risk sharing or "nationalistic risk" factor which is shared only by local investors. The complete pricing risk factor is subject to the universal price of risk, θ^{-1}, and the nationalistic risk factor is subject to $(\theta^M)^{-1}$.

The nationalistic risk factor is separately priced only due to limited risk sharing resulting from limited access. If access were complete, the model converges to the familiar capital asset pricing model, where the reference benchmark portfolio is the international portfolio. Also, if the restricted asset had a perfect substitute in the core market, it would be priced as an unrestricted asset with identical characteristics. The two important dimensions — access and substitution effects — can be dramatized if we make additional restrictions without much loss of generality. Following Merton [24] and MS [23], if we assume individuals everywhere have identical preferences and initial wealth, we can express the degree of access and substitution effects more explicitly as follows:

$$V_F = (1 + r_f)^{-1}\left\{\left[\overline{Y_F} - \left(\frac{\gamma}{T}\right)(\beta_F Z + b_F^2\sigma^2(\varepsilon_W) + \sigma^2(\varepsilon_F^*))\right] - \left(\frac{\gamma}{T}\right)(b_F^2\sigma^2(\varepsilon_W) + \sigma^2(\varepsilon_F^*))\frac{1-\alpha}{\alpha}\right\}. \tag{7}$$

The interaction between the degree of access and substitution effects are reflected in the last term of the model. The degree of access is now measured by (α) = the number of investors accessing the security (M)/ the number of all investors in the universe (T). The universal risk aversion measure or "price of risk" is given by $(\frac{\gamma}{T})$,

[g]This assumption may turn out to be important, because, as we remark later, the interest rate differential (in real terms) across national boundaries may alone generate premia/discounts on the country funds. This is particularly so if the interest rate markets are segmented, along with the stock markets which is the focus of this paper.

while the nationalistic price of risk is given by $(\frac{\gamma}{\alpha T})$. The latter is greater than the former to the extent that $\alpha < 1$, reflecting the extra risk premium demanded by local investors due to incomplete risk sharing. Note that if the "core-unspanned" risk (or the volatility of the unspanned cash flows in (5)) were zero, which is the case under the existence of perfect substitutes in the core, the last term would collapse to zero. In that case the effect of limited access is undone, because investors can achieve complete hedging by taking long and short positions in the core and restricted markets.

In the following section we shall link the pricing of the restricted assets in the originating countries with the pricing of country funds in the core market. Under alternative structures of market segmentation and arbitrage conditions, we derive various implications by using the model in (7) as a starting point.

3. Country Fund Pricing and Net Asset Valuation

The model in (7) can also be used to price a portfolio of restricted foreign assets. In the parlance of country funds, the price of such a portfolio is the net asset value of the fund. Hereinafter we reinterpret asset F as a portfolio of the component assets underlying the country fund. We can restate the net asset value in an implicit functional form:

$$V_F = f[\overline{Y}_F, Z, \alpha, \sigma^2(\varepsilon_F)]\,, \tag{8}$$

where

$\overline{Y}_F$ = expected portfolio cash flow at the final date,

Z = the complete pricing or spanning risk subject to the aggregate international price of risk $\left(\theta^{-1} = \frac{\gamma}{T}\right)$,

α = the degree of access, wherein $\alpha = 1$ denotes complete access,

$\sigma^2(\varepsilon_F)$ = the unspanned risk factor subject to the nationalistic price of risk $\left[(\theta^M)^{-1} = \frac{\gamma}{\alpha T}\right]$; also the degree of substitution, wherein $\sigma^2(\varepsilon_F) = 0$ denotes perfect substitution,

T = number of investors in the entire universe, including both the core and restricted local markets.

Now we are ready to value a country fund in the core (say the US) market in relation to its net asset value. Throughout we maintain a mildly segmented market structure in the sense that investors in the local, emerging economies are unrestricted, but investors from the advanced, core markets are restricted from holding securities in the emerging economies directly. Thus, restrictions are imposed on capital inflows, but not on outflows, into the emerging economies.

3.1. *The model*

Recognizing that a country fund is an unrestricted asset which was previously restricted, its risk is now subject to the universal price of risk ($\frac{\gamma}{T}$). In other words, it will be priced with complete access ($\alpha = 1$) so that

$$V_p = (1 + r_f)^{-1} \left[\overline{Y_F} - \frac{\gamma}{T} (\beta_F Z + b_F^2 \sigma^2(\varepsilon_W) + \sigma^2(\varepsilon_F^*)) \right], \tag{9}$$

where V_p is the price of a country fund. The pricing of a country fund in the core market, relative to its component assets traded in the local market, depends on the degree of its substitutability with the underlying assets and cross-border arbitrage between the two markets. In the usual models where the country fund serves as a perfect substitute for its underlying component assets (in a portfolio sense), there will be no differential between country fund pricing and net asset valuation, assuming unimpeded cross-border arbitrage.

Imperfect substitution between the country fund and the underlying assets traded in the emerging countries may arise from a number of factors, including but not limited to, (a) sovereign risk exposure for holders of country funds, such as the possibility of exchange control, (b) exchange risk arising from market conditions and the use of differential numeraire,[h] (c) noise trading and excess volatility.[i] As mentioned earlier, there is evidence that time series behavior of fund prices (and the associated volatility) differs from that of the net asset values (see Table 1). The volatility is higher for fund prices and this divergence appears larger for less developed economies. This gives credence to the notion of imperfect substitution.

Consider a new spanning (albeit imperfect substitution) relationship between the component assets and the country fund now in the core market:

$$\varepsilon_F = b_F^* \varepsilon_P + \varepsilon_F^{**}, \tag{10}$$

where

$\varepsilon_P =$ the component of the country fund cash flow unspanned by the core market,

$\varepsilon_F^{**} =$ the component of the underlying asset cash flow unspanned by the country fund.

Rewriting (9) to recognize the possibility of divergence in the volatilities of the country fund and the underlying assets:

$$V_p = (1 + r_f)^{-1} \left[\overline{Y} - \frac{\gamma}{T} (\beta_F Z + \sigma^2(\varepsilon_P)) \right], \tag{11}$$

[h] Under a different numeraire for translating cash flows holders of the country fund and the component assets may face divergent or heterogeneous expectations, resulting in differential valuations for the two classes of investments and hence premia or discount on the fund.

[i] The notion of excess volatility fits in well with such studies as Summers [31] and Shiller [28] who claim that observed price volatility is excessively high relative to its fundamental counterpart. Under our framework the component securities are *fundamental* to the country fund securities.

where it is assumed that complete pricing risk factor (Z) is unchanged, but there is divergence in the unspanned risks (i.e. there is differential in the component risks of the fund and its underlying assets unspanned by the core market).

It also follows that the net asset value of the component securities is:

$$V_F^* = (1+r_f)^{-1}\left[\overline{Y_F} - \frac{\gamma}{T}\left(\beta_F Z + b_F^{*2}\sigma^2(\varepsilon_P)\right) - \frac{\gamma}{\alpha T}\sigma^2(\varepsilon_F^{**})\right]. \qquad (12)$$

Comparing (12) with (7) or (8), we see that $V_F^* > V_F$, because only a component of the previously unspanned risk, $\sigma^2(\varepsilon_F^{**})$, is subject to the nationalistic price of risk upon the introduction of the country fund in the core market. Consequently, the net asset value increases in spite of imperfect substitution or imperfect spanning relationship between the country fund and its underlying assets traded in the emerging market. Comparing (12) with (11), though, $V_P - V_F^*$ can be positive or negative, or it is possible for the country fund to sell at either a discount or premium.

3.2. *Model implications and comparative statics*

We shall pursue the implications of the model by performing some simple comparative statics. These implications are all potentially testable, although due to limited data we are able to conduct tests on only part of them.

The first set of implications are related to the determinants of pricing efficiency gains to emerging markets from the introduction of a country fund into the core market. In general, the local security prices get bid up to reflect the fact that a larger component of the asset risks are subject to the universal price of risk.[j] The efficiency effect can be stated more explicitly as

$$Q = \frac{\gamma}{T}\left(\frac{1}{\alpha} - 1\right)\lambda\sigma^2(\varepsilon_F)$$

where

$$\lambda = b_F^{*2}\frac{\sigma^2(\varepsilon_P)}{\sigma^2(\varepsilon_F)}$$
$= $ the degree of substitution between the unspanned risks.

Thus, among the determinants of the efficiency gains are:

the degree of substitution:

$$\frac{\delta Q}{\delta\lambda} = \frac{\gamma}{T}\left(\frac{1}{\alpha} - 1\right)\sigma^2(\varepsilon_F) > 0$$

the degree of initial access:

$$\frac{\delta Q}{\delta\alpha} = -\frac{\gamma}{T}\sigma^2(\varepsilon_F)\frac{1}{\alpha^2} < 0$$

[j]This result is similar to Stulz and Wasserfallen [30].

the risk unspannable by the core:

$$\frac{\delta Q}{\delta\sigma^2(\varepsilon_F)} = \frac{\gamma}{T}\left(\frac{1}{\alpha} - 1\right)\lambda > 0$$

Discussion: Other things being equal, emerging countries with larger unspannable risk benefit more from the introduction of the country fund in the core (advanced) market. Such countries typically have idiosyncratic investment opportunities or unique natural resources. At the limit, of course, the effect is nil if either (a) $\lambda = 0$, or (b) $\alpha = 1$. Also, other things being equal, the gain is larger if the local price of risk is higher relative to the world or universal price of risk, which may be the case for small emerging markets with limited risk-sharing opportunities. This effect is reflected in α. Finally, a greater substitutability of the country fund and its underlying assets increases the efficiency gain. This effect increases with λ.

An additional testable implication can be drawn from imperfect substitution stemming from additional factors affecting country fund prices, in the sense that there is now an additional pricing factor common to certain segments of the country funds. In the language of the arbitrage pricing theory (APT), this factor conforms *neither* to the originating countries *nor* to the reference countries. The additional factor is analogous to the risk factors in (3), exclusive of the complete pricing risk, $\beta_P Z$. It is also possible to generate this additional factor through the spanning relationship that exists between restricted assets as suggested in Eq. (5) to the extent that these assets have become components of country funds traded in the core market. We pursue the existence of a "global fund index" in our empirical analysis.

Another set of implications relates to the country fund premium or discount. Among the determinants of the premium/discount are the degree of accessibility to the restricted market and the volatility ratio of the country fund to its net assets. From Eqs. (11) and (12), the premium/discount can be stated as

$$\Pi = (1 + r_f)^{-1}\left[\beta\sigma^2(\varepsilon_F)\left\{b_F^{*2} - 1\right\} + \frac{\sigma^2(\varepsilon_F^{**})}{\alpha}\right]\left(\frac{\gamma}{T}\right),$$

where β is defined from

$$\sigma^2(\varepsilon_P) = \beta\sigma^2(\varepsilon_F),$$

such that

Access:

$$\frac{\delta\Pi}{\delta\alpha} = -\frac{\sigma^2(\varepsilon_F^{**})}{\alpha^2}\frac{\gamma}{T}(1 + r_f)^{-1} < 0$$

Excess volatility:

$$\frac{\delta\Pi}{\delta\beta} = (1 + r_f)^{-1}\frac{\gamma}{T}\sigma^2(\varepsilon_F)\left\{b_F^{*2} - 1\right\} < 0 \text{ since } b_F^* < 1$$

Other things constant, the premium is smaller for emerging markets which have greater access. The premium is also smaller if the country fund becomes more volatile, relative to the underlying assets.

3.3. *Specialized cases*

3.3.1. *Perfect substitution and ban on cross-border arbitrage*

Consider a simple case of market segmentation, where investors in the emerging markets face a ban on cross-border arbitrage between the country fund and its component assets, although the country fund is presumed to be a perfect substitute in terms of cash flow (technological uncertainty) for the cash flows of the portfolio of the component securities. The sense in which there is restriction on arbitrage may arise from explicit legal restrictions, the absence of short-sales or differential tax penalties (e.g. Germany; see the appendix on taxes), or that there is limited supply of funds due to control considerations. In this case, investors in the emerging countries would be unable to undo the price differential between the country fund and its net asset value through arbitrage operations. The introduction of a country fund has no impact on the pricing of the component assets in the local market, but the country fund sells at a premium relative to its net asset value.

In the absence of cross-border arbitrage, the restricted asset will have its entire risk, including the spanning risk, subject to the nationalistic price of risk; the country fund and the portfolio of restricted component assets will have differential value, with the net asset value expressed as:

$$V_F^* = (1 + r_f)^{-1} \left[\overline{Y_F} - \frac{\gamma}{\alpha T} (\beta_F Z + b_F^2 \sigma^2(\varepsilon_W) + \sigma^2(\varepsilon_F^*)) \right] . \tag{13}$$

Comparing (9) with (13), the country fund price $= V_P > V_F^* =$ the net asset value, since $\frac{\gamma}{T} < \frac{\gamma}{\alpha T}$. The risk premium would be larger for the restricted security, as the cash flow uncertainty is identical for both the country fund and the component securities (by assumption of perfect substitution). Consequently, the country fund sells at a premium over the net asset value.

Under this market structure the introduction of the country fund in the core market is of no consequence to the pricing of the component assets in the restricted emerging market from which the fund originates, although there may be diversification gain to the core (international) investors through their holdings of the fund. Indeed, the country fund and its component assets will be priced as though they are completely segmented, where the price of risk for the country fund conforms to the price of risk in the core (host) market, whereas the price of risk for the underlying assets conforms to the market in the originating country. They plot on two different security market lines, so to speak. This is a subject of our empirical analysis, since this case establishes the possibility that prices of certain funds behave so as to "resemble" their hosts (e.g. the US) rather than their origins.

3.3.2. *Perfect substitution and unimpeded cross-border arbitrage*

As above, if we allow the country fund to be a perfect substitute for the underlying assets traded in the originating market and unrestricted cross-border arbitrage, the capital inflow restriction is inconsequential, because the pricing differential will be eliminated by virtue of unimpeded arbitrage by local investors from the originating countries.

The introduction of a country fund will enhance the value of the component assets (at a decreasing rate) in the originating country, but the fund trades at zero premium. Since the country fund is trading now in the core with complete access ($\alpha = 1$), the net asset value of the component underlying assets will be bid up to $V_F^* = V_P$, because of perfect substitution between the fund and the component assets and perfect cross-border arbitrage by local investors. Consequently, there will be no premium or discount on the fund.

There is pricing efficiency in the sense that the prices of the component securities in the originating countries (i.e. emerging economies) rise, on average, upon the introduction of the country fund. Thus, the country fund serves as a mechanism to complete the market. The efficiency gains come about as local investors are able to reduce, and as the core investors increase, their holdings of domestic risks. This is achieved in two ways: first, investors in the core market can now hold local risk by buying into the country fund. Second, local investors can short sell the fund and acquire core assets with the proceeds. The important point is that unrestricted trade in local risk becomes possible with the establishment of a country fund of any size when domestic investors are able to short sell the fund in the core market.

3.4. *Some possible extensions*

The preceding analysis has focused primarily on the risk dimension and incomplete risk sharing in an international environment characterized with investor restrictions. However, there are significant cases where country funds trade at a discount even when they do not originate from countries with limited capital and inflow restrictions. As a starter, this observation is consistent with long-standing anomaly that closed-end funds trade typically at a discount even when they trade in the domestic market (e.g. closed-end funds traded in the US). In this section, we wish to catalogue additional factors that have a bearing on the pricing of country funds relative to their net asset values.

3.4.1. *Interest rate differential*

The preceding analysis assumed that investors faced the same real rate of interest across national boundaries. This may not hold between pairs of countries with differential creditworthiness such that the induced interest rate differential between the core market and the originating emerging country may deliver discount or premium on the country fund originating from the latter country. Suppose that the core country is the US and the emerging country is Brazil with lower creditworthiness and higher real rate of interest. This may alone deliver a premium on the Brazilian fund, since the underlying securities traded in Brazil are presumably discounted by Brazilians at a higher rate than the rate applicable to the country fund by US investors.

The preceding argument is incomplete, though, because Brazilian investors may fully access the US risk-free government securities and hence face the same benchmark rate of interest as investors in the US for lending purposes. In addition, they may use the US asset investments as a collateral for borrowing purposes in the event that credit enforcement is an issue. Thus, in the absence of investor restrictions leading to segmentation in the international money markets, the interest rate differential alone may not deliver a price differential on the country fund relative to its net asset value. Moreover, the interest rate differential may reflect country risk differential, affecting the core market discount rate applicable to the country fund. While the interest rate differential between Brazil and the US may alone lead to a premium, the country risk factor leads to a discount that reflects the risk of expropriation of the foreign portfolio investors. When the probability of expropriation is low, which is likely when country funds are small, a premium may emerge. At any rate, it is difficult to determine the net effect of the interest rate differential on the price of the fund relative to its net asset value.

3.4.2. *Tax and regulatory factors*

Our analysis thus far has not explicitly considered the impact of the tax treatment of country funds, although implicit in our model is the possibility of differential tax treatment rendering imperfect substitution between the country fund and the component securities traded in the originating countries. A stylized description of the US tax treatment of country funds is provided in Appendix II. The impact of tax treatment can be appreciated just on the basis of the most straightforward case defined as follows:

(1) The fund qualifies as a Regulated Investment Co. (IRC) and hence subject to no *corporate taxation.*
(2) *All* distributions of net investment income (dividends, interest, net short-term capital gains, etc.) are taxable at an *ordinary personal tax rate.* [Note: Taxes are imposed even when income is reinvested.]
(3) Foreign withholding taxes and foreign income taxes paid by the fund are treated as *paid by shareholders* who then claim these as credits/deductions for US tax purposes (US is the host country here).

Under the above scenario the controlling tax rate on the fund income is the US income tax rate. If the controlling tax rate is identical to the foreign (originating country) tax rate, there will be no tax-induced differential between the fund price and its net asset value. Note that the net asset value is impacted only by the foreign taxes imposed on component assets in the originating country. Thus, the premium/discount = f(US/foreign income tax rate differential).[k]

4. Empirical Perspectives

This section provides an empirical investigation of country funds based on the principal theoretical predictions of our model. Specifically, we investigate the relative significance of the home market, host market and the global closed-end fund factors in CF pricing and their associated premia/discounts. The testable implications of our model regarding efficiency gains are left for future investigation pending availability of reliable local market data sets on component securities of the funds in our sample.

4.1. *The data and sample*

The study covers all closed-end single country funds publicly traded in New York by the end of 1993. Nineteen funds are from emerging markets (EMs) and thirteen are from developed markets (DMs). The data base contains weekly observations for each fund since its inception comprising Friday closing prices as reported in the NYSE records; net asset value (NAV) as obtained from fund managers and Wall Street Journal; dividends and distributions of capital gains. MSCI and IFCG total return indices are used to proxy local market returns for DMs and EMs respectively. Table 1 reports summary statistics on the sample funds. Unlike their domestic closed-end fund counterparts, in many instances closed-end country funds exhibit average premiums. Specifically, in 9 of 18 EMs and 3 of 13 DMs we find price exceeding NAV on average. Furthermore, we note extreme swings in country fund premia, with premiums at times in excess of 50% in 10 cases (9 EMs and 1 DM). We also find country fund discounts at times in excess of −50% in only 2 cases (both of which are EMs). Further, we report the unconditional variance of price and NAV returns. In all but three cases we find the variance of price returns to exceed that of NAV returns.

4.2. *Pricing of country funds*

The empirical evidence to date suggests that, although country funds provide substantial diversification benefits to US investors, the gains are smaller than if they had access to the originating market portfolios or if the funds had been designed to mimic the local index (i.e. a true national index fund).[l] On the other hand, Bekaert and Urias [5] find that country funds traded in the UK improve

[k]In some cases the tax treatment is complex (e.g. *Germany*), affecting the extent to which investors engage in arbitrage. Rather than treating regulatory and tax factors as separate predictors of pricing, one could view them as engendering imperfect substitution. That way the model can accommodate them in its current structural form. For instance, sovereign risk may impact the substitution effect negatively.

[l]See, for example, Bailey and Lim [3] and Diwan, Errunza and Senbet [13].

diversification gains while those which trade in the US do not. Furthermore, they find that diversification gains from passive IFC investible index position to be superior to that of country funds. This raises an important question as to the pricing of these funds. Specifically, do these funds behave like domestic US securities or follow the originating country returns? Bailey and Lim [3] conclude that country fund returns are often more like domestic US stock returns than returns from foreign stock portfolios. They consider intraday correlations and volatilities during trading and non-trading hours. Their tests follow the existing empirical literature on cross-border stock market relationships. Although they attempt to explain these results, we must study this issue further based on the insights of our theoretical model. Note that their conclusion is consistent with the prediction of the specialized case of our model which rests on perfect substitution and restricted arbitrage.

4.2.1. *Imperfect substitution*

As noted earlier, the return behavior of country funds in our sample does not qualify them as perfect substitutes for the underlying assets traded in the home market. As further evidence, consider the ratio of standard deviations of price returns and NAV returns for the sample funds as reported in Table 1. In all cases the price returns display substantially higher volatility compared to the NAV returns. The only exceptions are Turkey, Korea Investment and Brazil funds whose portfolios had substantial holdings of the US T-bills during the period studied. This leads us to consider the empirical implications of our model which admits imperfect substitution.

4.2.2. *Methodology*

To assess the relative importance of the domestic, US factor and global country fund factors in explaining country fund price returns we first compute the R-square from the regression of the country fund price return (r_c) on each of the factors in isolation, i.e. the return on the domestic market (r_d), the US factor (r_{us}), and the return on global country fund index (r_g). The global fund index is obtained by equally weighting the return on the oldest country fund from each of the markets in our total sample. Note that the tests using global fund factor, that conforms neither to the originating countries nor to the host countries, are based on the prediction of our model. As we argued, there are other factors unrelated to either the originating countries or the reference countries that affect country fund prices. With such "imperfect substitution", we postulate that there should be a factor (e.g. noise trading activity) common to all funds. We attempt to capture this factor through the construction of the global fund index.

Next, we compute first order partial correlation coefficients, i.e.

$$\rho(r_c, r_i | r_j) = \frac{\rho(r_c, r_i) - \rho(r_c, r_i)\rho(r_c, r_j)}{\sqrt{1-\rho(r_c, r_i)^2}\sqrt{1-\rho(r_c, r_j)^2}} \quad \text{for } i \neq j\,. \tag{14}$$

The square of the partial correlation represents the portion of country fund price return explained by factor i after controlling for factor j. These figures are reported in columns 2 and 3 of Tables 2, 3 and 4. Finally, we calculate the second order multiple correlation coefficients which provide a measure of how much of the variance of the country fund return that is explained by one factor that cannot be jointly accounted for by the other two factors. Essentially, the analysis nets out the effects of the other factors to isolate the extent to which each factor explains country fund pricing.

4.2.3. *Results*

The R-squares for the regressions of fund returns (r_c) on each of the three factors (r_d, r_{us} and r_g) are reported in the first column of Tables 2–4, respectively. The partial correlations are reported in columns 2 and 3, and the multiple correlations are reported in column 4 of the Tables 2–4. Several general conclusions are in order. First, with few exceptions (Brazilian Equity, Malaysia and Taiwan) the domestic factor alone, accounts for a larger fraction of the country fund return variance. Netting out the effects of the US factor has little or no effect on the degree to which the domestic factor explains the EM country fund pricing. This is consistent with the well-documented low degree of correlation between the US and emerging market indices. Somewhat surprising is the fact that this result also holds for the DM country funds. Netting out the effects of the global country fund factor has a far greater impact on the explanatory power of the domestic factor. For example, the explained variance of the Malaysia fund attributable to the domestic factor declines from 0.1605 to 0.039 once the global factor is accounted for. Other dramatic examples include Portugal, Mexico Equity and Income Fund, Thai Fund, Thai Capital Fund, Australia Fund, France Growth Fund and Germany Fund. Again, there appears to be no discernible difference in this dimension between DMs and EMs.

Second, for the majority of EM country funds (13 out of 19 cases), the global fund factor alone explains more of the country fund return than the domestic factor. A similar result is found for 10 of 13 DM country funds. This conclusion is not much affected once the domestic factor is netted out. Finally, comparing the last column across Tables 2, 3 and 4, we note that in 19 cases the global factor accounts for the largest portion of country fund price behavior after netting out the other two factors. The corresponding numbers for the domestic and the US factor are 12 and 1, respectively.

To summarize, the results of this subsection provide strong support for the theoretical predictions of our model which admits imperfect substitution. The presence of the additional factor common to all country funds is borne out by the importance of the global index factor in explaining returns of country funds from emerging and developed markets as reported in this subsection. This finding has important implications for the design of country funds and policies to reduce imperfect substitutability of the funds and their component assets traded in the home markets, as we remark later in the concluding section.

Table 2. The relative importance of the domestic factor.

The portion of the variance of the country fund price return explained by the domestic market factor alone is inferred from the squared correlation coefficient $\rho^2(r_c, r_d)$, where r_c is the country fund price return and r_d is the domestic market return. The squared first-order partial correlation coefficients $\rho^2(r_c, r_d|r_{us})$ reveal the fraction of country fund price attributable to the domestic factor net of the affects of the US factor. Similarly $\rho^2(r_c, r_d|r_{gl})$ reveals the fraction of the country fund price attributable to the domestic factor net of the global factor. The squared second-order partial correlation coefficients $\rho^2(r_c, r_d|r_{gl}, r_{us})$ reveal the fraction of country fund price return attributable to the domestic factor net of both the US factor and the global factor.

	Domestic Factor			
	$\rho^2(r_c, r_d)$	$\rho^2(r_c, r_d\|r_{us})$	$\rho^2(r_c, r_d\|r_{gl})$	$\rho^2(r_c, r_d\|r_{gl}, r_{us})$
Emerging Markets				
Argentina Fund	.2351	.2031	.1336	.1310
Brazil Fund	.2076	.1925	.1554	.1552
Brazilian Equity Fund	.0000	.0004	.0004	.0002
Chile Fund	.1533	.1495	.1140	.1158
India Growth Fund	.0916	.0954	.0976	.0938
Indonesia Fund	.1037	.1099	.0701	.0606
Korea Fund	.2411	.2309	.2045	.2049
Korea Investment Fund	.0877	.0874	.0710	.0664
Malaysia Fund	.1605	.1267	.0390	.0382
Mexico Fund	.0668	.0529	.0206	.0222
Mexico Equity and Income Fund	.1205	.1093	.0942	.0935
Emerging Mexico Fund	.3413	.3306	.2652	.2689
First Philippine Fund	.1972	.1841	.1059	.1056
Portugal Fund	.1032	.0827	.0254	.0253
Taiwan Fund	.0000	.0000	.0017	.0015
ROC Taiwan Fund	.2968	.2754	.2178	.2173
Thai Fund	.1861	.1527	.0629	.0621
Thai capital Fund	.2571	.2065	.0806	.0814
Turkey Fund	.1584	.1515	.1277	.1280
Developed Stock Markets				
Australia Fund	.1334	.1089	.0444	.0468
France Growth Fund	.2140	.1579	.0632	.0656
Germany Fund	.1425	.1111	.0245	.0245
New Germany Fund	.3062	.2555	.1498	.1486
Future Germany Fund	.2959	.2519	.1341	.1348
Emerging Germany Fund	.0003	.0003	.0018	.0016
Irish Investment Fund	.0061	.0038	.0000	.0001
Italy Fund	.1532	.1433	.0852	.0885
Japan OTC Fund	.2211	.1670	.1308	.1239
Japan Equity Fund	.2200	.2216	.2100	.2129
Singapore Fund	.0407	.0331	.0000	.0000
Spain Fund	.3332	.2402	.1483	.1375
United Kingdom Fund	.2279	.1495	.1231	.0988

Table 3. The relative importance of the US factor.

The portion of the variance of the country fund price return explained by the US market factor alone is inferred from the squared correlation coefficient $\rho^2(r_c, r_{us})$, where r_c is the country fund price return and r_{us} is the US market return. The squared first-order partial correlation coefficients $\rho^2(r_c, r_{us}|r_d)$ reveal the fraction of country fund price attributable to the US factor net of the affects of the domestic factor. Similarly $\rho^2(r_c, r_{us}|r_{gl})$ reveals the fraction of the country fund price attributable to the US factor net of the global factor. The squared second-order partial correlation coefficients $\rho^2(r_c, r_{us}|r_d, r_{gl})$ reveal the fraction of country fund price return attributable to the US factor net of both the domestic factor and the global factor.

	US Factor			
	$\rho^2(r_c, r_{us})$	$\rho^2(r_c, r_{us}\,|\,r_d)$	$\rho^2(r_c, r_{us}\,|\,r_{gl})$	$\rho^2(r_c, r_{us}\,|\,r_d, r_{gl})$
Emerging Markets				
Argentina Fund	.0398	.0063	.0030	.0003
Brazil Fund	.0595	.0446	.0062	.0058
Brazilian Equity Fund	.0188	.0193	.0329	.0326
Chile Fund	.0711	.0671	.0038	.0061
India Growth Fund	.0058	.0086	.0092	.0051
Indomesia Fund	.0338	.0213	.0197	.0109
Korea Fund	.0662	.0219	.0004	.0010
Korea Investment Fund	.0025	.0030	.0240	.0195
Malaysia Fund	.1625	.0954	.0109	.0101
Mexico Fund	.0179	.0101	.001	.003
Mexico Equity and Investment Fund	.0144	.0019	.0014	.0007
Emerging Mexico Fund	.01646	.0004	.0046	.0103
First Philippine Fund	.03975	.0241	.0009	.0005
Portugal Fund	.0626	.0411	.0001	.0000
Taiwan Fund	.0009	.0027	.0130	.0128
ROC Taiwan Fund	.0688	.0405	.0020	.0014
Thai Fund	.077	.0618	.0034	.0026
Thai Capital Fund	.1350	.077	.0051	.0060
Turkey Fund	.0282	.0205	.0014	.0020
Developed Stock Markets				
Australia Fund	.0456	.01946	.0025	.0051
France Growth Fund	.0903	.0269	.0003	.0028
Germany Fund	.0686	.0341	.0000	.1378
New Germany Fund	.1378	.0704	.0039	.0025
Future Germany Fund	.0936	.0375	.0005	.0012
Emerging Germany Fund	.0001	.0000	.0020	.0017
Irish Investment Fund	.0036	.0013	.0017	.0018
Italy Fund	.0156	.0043	.0128	.0163
Japan OTC Fund	.1693	.1106	.0464	.0387
Japan Equity Fund	.0506	.0491	.0188	.0235
Singapore Fund	.0088	.0009	.0114	.0114
Spain Fund	.1780	.0719	.0284	.0154
United Kingdom Fund	.1739	.0897	.0621	.0361

Table 4. The relative importance of the global factor.

The portion of the variance of the country fund price return explained by the country fund global factor alone is inferred from the squared correlation coefficient $\rho^2(r_c, r_{gl})$, where r_c is the country fund price return and r_{gl} is the global factor. The squared first-order partial correlation coefficients $\rho^2(r_c, r_{gl}|r_d)$ reveal the fraction of country fund price attributable to the global factor net of the affects of the domestic factor. Similarly $\rho^2(r_c, r_{gl}|r_{us})$ reveals the fraction of the country fund price attributable to the global factor net of the US factor. The squared second-order partial correlation coefficients $\rho^2(r_c, r_{gl}|r_d, r_{us})$ reveal the fraction of country fund price return attributable to the global factor net of both the US factor and the domestic.

	Global Fund Factor			
	$\rho^2(r_c, r_{gl})$	$\rho^2(r_c, r_{gl}\,|\,r_d)$	$\rho^2(r_c, r_{gl}\,|\,r_{us})$	$\rho^2(r_c, r_{gl}\,|\,r_d, r_{us})$
Emerging Markets				
Argentina Fund	.1325	.02936	.0989	.0251
Brazil Fund	.1672	.1124	.1172	.0763
Brazilian Equity Fund	.0045	.0050	.0188	.0186
Chile Fund	.2063	.1694	.1487	.1150
India Growth Fund	.1060	.119	.1103	.1087
Indonesia Fund	.2913	.2213	.2795	.2130
Korea Fund	.1934	.1544	.1651	.1363
Korea Investment Fund	.1773	.1594	.1951	.1752
Malaysia Fund	.4065	.3206	.3248	.2565
Mexico Fund	.1719	.1309	.1521	.1248
Mexico Equity and Income Fund	.0292	.0017	.0163	.0005
Emerging Mexico Fund	.1615	.0680	.1512	.0766
First Philippine Fund	.2562	.1718	.2261	.1517
Portugal Fund	.2986	.2376	.2519	.2049
Taiwan Fund	.01151	.0131	.0217	.0231
ROC Taiwan Fund	.2328	.146	.1776	.1117
Thai Fund	.3579	.2607	.2895	.2140
Thai Capital Fund	.3556	.2048	.2572	.1431
Turkey Fund	.20155	.1723	.1794	.1567
Developed Stock Markets				
Australia Fund	.3065	.2353	.2753	.2241
France Growth Fund	.3439	.2185	.2772	.1979
Germany Fund	.3265	.2338	.2769	.2064
New Germany Fund	.3891	.2509	.2926	.1905
Future Germany Fund	.3647	.2190	.2978	.1881
Emerging Germany Fund	.0033	.0047	.0052	.0063
Irish Investment Fund	.2226	.1602	.2204	.1703
Italy Fund	.0321	.02625	.0302	.0265
Japan OTC Fund	.2184	.1285	.1026	.0560
Japan Equity Fund	.0631	.0576	.0317	.0282
Singapore Fund	.1113	.0730	.1128	.0827
Spain Fund	.3428	.1635	.2225	.1122
United Kingdom Fund	.2430	.1403	.1406	.0893

4.3. *Determinants of country fund premia*

In this section we test theoretical predictions of the model with respect to fund premia. Our model highlights the impact of international market segmentation on country fund premia. Segmentation stems from two sources in our model: (1) market access, and (2) incomplete international risk sharing or spanning. The model suggests that neither source of segmentation is meaningful in the absence of the other. That is, limited access to a foreign market will have no impact on the country fund premia if foreign securities are perfectly spanned in the host market. Likewise, incomplete spanning is irrelevant if foreigners have full access to foreign markets. It is the interaction of both imperfect spanning and limited access which drives a wedge between a country fund price and net asset value. Although Bekaert and Harvey [4] have investigated their combined effect, an explicit decomposition of spanning and access has yet to be addressed in the empirical literature.

In addition to market segmentation, country fund premia are influenced by a multitude of other factors. Our model accounts for a generic lack of substitutability between price and its fundamental value as well as a common factor that may be attributed to noise trading. What follows is an attempt to proxy spanning, access, imperfect substitution, and the global factor, towards investigating the extent to which these factors affect country fund premia.

Spanning

A set of eligible securities $(R_1^e, \ldots, R_m^e)$ (returns on freely accessible securities in host market) is said to span restricted security R^i (e.g. country fund NAV return) if a vector δ can be found such that $R^i = \Sigma_1^m \delta_j R_j^e$. Partitioning R^i into a spanned and unspanned component can be accomplished by estimating the following regression:

$$R_t^i = \delta_1 R_{1,t}^e + \cdots + \delta_m R_{m,t}^e + \epsilon_{i,t}\,, \tag{15}$$

where the degree of spanning is inversely related to the variance of the unspanned component $\sigma^2(\epsilon_i)$. Theoretically, the spanning measure in our model $\sigma^2(\epsilon_F^{**})$ should be derived from the set of all eligible securities, including the country fund itself. Empirically, some operational assumptions must be made. We follow along the lines of Breedon, Gibbons and Litzenberger [9] and proxy the investible universe by constructing 12 US 2-digit SIC industry portfolios. In this spirit we construct a measure of spanning based on the following regression:

$$R_t^F = \beta_1 R_{1,t}^{II} + \cdots + \beta_{12} R_{12,t}^{II} + \beta_{13} R_t^P + \epsilon_{F,t}^{**}\,, \tag{16}$$

where $R_{j,t}^{II}$ is the return on jth industrial index, R_t^F is the net asset value return on country fund and R_t^P is the country fund price return. We account for time variation in $\sigma^2(\epsilon_F^{**})$ by estimating simple GARCH(1,1) models with mean equations as stated in (16). Our model suggests that an increase in the variance of the unspanned component of the NAV will lead to an increase in the country fund premium.

Access

Another testable implication of our model is that the premium is inversely related to the degree of access. Unfortunately, it is very difficult to systematically classify our sample by the degree of access. No study exists (to our knowledge) that would provide us with indicators or benchmarks to proxy access over time. However, the International Finance Corporation emerging markets database provides market information for a global set and an investible set. The investible set is defined over the population of securities for which foreigners have free access. The global set is defined over both accessible and inaccessible securities. Hence a reasonable proxy for market access can be constructed as the differential between market capitalizations of the global and investible sets. Thus,

$$\text{Access}_t = IFCG_t - IFCI_t \,, \tag{17}$$

where $IFCG_t$ and $IFCI_t$ are the global and investible market capitalizations, respectively.[m]

Imperfect substitution

As suggested in the theoretical model, we use the ratio of conditional volatilities of price and NAV returns as a reasonable proxy to capture the degree of imperfect substitution. Based on the model implications, we would expect a higher ratio to result in a lower premium. We estimate conditional volatilities based on simple GARCH(1,1) models with mean equations specified as follows:

$$R_t^F = \beta_1^F R_{1,t}^{II} + \cdots + \beta_{12}^F R_{12,t}^{II} + \epsilon_t^F \,, \tag{18}$$

$$R_t^P = \beta_1^P R_{1,t}^{II} + \cdots + \beta_{12}^P R_{12,t}^{II} + \epsilon_t^P \,. \tag{19}$$

Global country fund premia

Given the theoretical prediction of a common country fund factor and the results of the previous subsection that suggest the significance of the global factor, we incorporate the global premium/discount as an independent variable. We would expect a positive relationship between the individual fund premium/discount and the global premium/discount.

Country fund premia

The country fund premium/discount is defined as follows:

$$\text{PREM}_t^i = \frac{P_t^i - NAV_t^i}{NAV_t^i} \,. \tag{20}$$

Note that the premium is defined in terms of price levels and not returns. Hence stationarity issues are of great importance when undertaking empirical tests of

[m] In a similar vein, Bekaert and Urias [5] investigate the exposure of NAV and the country fund premia to the residuals from the regression of the global return index on the investible index.

country fund premia. Given that both the country fund price and its corresponding NAV are driven by fundamentals, it is plausible that these series are cointegrated and hence the premium a stationary variable. Chang, Eun, and Kolodny [11] find cointegration for 6 of 12 countries in their study. Alternatively, Hardoveleous, La Porta, and Wizman [19] conclude that for "most of the country funds" in their study, a unit root in country fund premia can be rejected. Our model offers key insights into the nature of the source of nonstationarity in country fund premia. Specifically, of the above-mentioned determinants of country fund premia, the most plausible source of nonstationarity is market access — all other determinants being a function of the second moments of the joint distribution of price returns and NAV returns.

4.3.1. *Model specification*

We estimate a linear approximation of the theoretical model as follows:

$$d(\text{PREM}_t) = \beta_0 + \beta_1 \text{Sub}_t + \beta_2 d(\text{Access}_t) + \beta_3 \text{ Span}_t + \beta_4 \text{ Global}_t + e_t\,, \quad (21)$$

where $d(\text{PREM}_t)$ denotes the first difference in the premium as a means of inducing stationarity, (Sub_t) refers to imperfect substitution which is proxied by the ratio of conditional volatilities of price return over NAV return. The model suggests that an *increase* in (Sub_t) will lead to a *decrease* in the premium, i.e. $\beta_1 < 0$. $d(\text{Access}_t)$ refers to the change in market access. The model predicts that as access increases (as proxied by a decline in the difference between the global and investible market caps) the country fund premia should decrease, hence we anticipate $\beta_2 > 0$. The access variable is differenced in order to induce stationarity, i.e.

$$d(\text{Access}_t) = \frac{IFCG_t}{IFCG_{t-1}} - \frac{IFCI_t}{IFCI_{t-1}}\,. \quad (22)$$

Since this data is only available for EM countries, the analysis for DMs will not include this variable. (Span_t) denotes the conditional variance of the NAV return series unspanned by eligibles and the country fund price return. The model predicts that an increase in the unspanned variance will lead to an increase in the premium, i.e. $\beta_3 > 0$. Finally, (Global_t) refers to the model prediction of a common country fund factor with $\beta_4 > 0$.

4.3.2. *Results*

Table 5 reports the time series results for EMs. Parameter estimates are based on simple ordinary least squares. The substitution parameter is significant/marginally significant in 6 of 19 cases. The sign is negative as anticipated in all cases except for one. The access variable is significant/marginally significant in 10 of 19 cases with the anticipated positive sign in all but 2 instances. The spanning factor is statistically significant in only 3 of the 19 cases with the anticipated positive sign.

Table 5. Time series regression results for EM country fund premia.

The change in EM country fund premia are regressed on proxies for substitution, spanning and the global factor. The proxy for substitution is the ratio of the conditional variance of price to NAV unspanned by the US market and estimated as GARCH(1,1) with mean specification as follows:

$$R_t^i = \beta_1^i R_{1,t}^{II} + \cdots + \beta_{12}^i R_{12,t}^{II} + \varepsilon_t^i \quad i = F, P\,.$$

R_t^i is the return of the country fund or NAV and $R_{1,t}^{II}$ refers to 1 of 12 US industrial portfolios. The proxy for access is the percentage change in the IFC Global market capitalization minus the percentage change in the IFC investible market capitalization. Spanning is proxied by the conditional variance of the NAV unspanned by the US market and the country fund and estimated as GARCH(1,1) with mean specification as follows:

$$R_t^F = \beta_1 R_{1,t}^{II} + \cdots + \beta_{12} R_{12,t}^{II} + \beta_{13} R_t^P + \varepsilon_t\,.$$

The global factor proxy is computed as the percentage change of the equally weighted country fund premia across both emerging and developed markets.

	Substitution		Access		Spanning		Global Factor		adj. R^2
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	
Argentina	.1025	1.2892	.0102	**2.0528	.1128	*1.6474	12.0644	.3417	.0376
Brazil	−.0215	−*1.6722	.1839	**6.1958	−.7029	−.8956	.0367	**3.2805	.1593
Brazil (Equity)	.0014	.7393	.3643	**2.9285	−3.875	−1.0432	.0566	**2.1519	.1070
Chile	−.1707	−1.1920	.0673	1.0228	.0626	.0047	.0521	**7.1204	.1961
Indonesia	.0300	.4320	−.0096	−.1218	8.8113	.2294	.0562	**5.1154	.1065
India	−24.32	−*1.8927	.1804	1.0988	87.83	*1.6872	.0585	**2.3264	.1325
Jakarta	−.0002	−.2795	.1576	*1.6869	5.3639	.2555	.0380	**3.6780	.0610
Korea	−.2296	−.7046	−.1417	−1.1740	13.9725	.1721	.0854	**5.0652	.1837
Korea (Investment)	1.8808	.9841	.2973	*1.8248	9.6546	**2.1187	.0056	.2292	.0586
Mexico	.0442	.4802	.0072	.7179	.2845	.2337	.0390	**5.8160	.1042
Mexico (Equity)	.0389	.6918	−.0024	-.0323	61.6828	1.2481	.0203	**2.0223	.0130
Mexico (Emerging)	−.0991	−.2237	−.1351	−*1.9358	−10.4906	−1.0945	.0369	**3.9975	.1096
Philippine	.0001	**2.8553	−.0701	−1.1121	−33.6962	−1.4324	.0302	**3.8351	.0901
Portugal	−.0846	−1.2058	.0911	1.2188	−5.9467	−0.4765	.0532	**7.4498	.2004
Taiwan	−.3146	−**1.9875	−.05472	−1.1245	−7.0588	−1.2983	.0225	1.4989	.0171
Taiwan (ROC)	.0216	1.1986	−.0586	−*1.7352	5.7791	.8668	.0260	**2.4811	.0415
Thai	−.1672	−*1.7254	.2483	**3.5930	−.1897	−.0509	.0723	**7.5032	.1978
Thai (Capital)	−.0009	−.0290	.1854	**4.0677	−7.2231	−.9578	.0426	**5.5243	.1734
Turkey	−1.6630	−**2.0610	.07939	**3.4973	9.3549	.1842	.0674	**6.6565	.2078

*Denotes 90% significance and ** denotes 95% significance.

Table 6. Time series regression results for DM country fund.

The change in DM country fund premia are regressed on proxies for substitution, access, spanning and the global factor. The proxy for substitution is the ratio of the conditional variance of price to NAV unspanned by the US market and estimated as GARCH(1,1) with mean specification as follows:

$$R_t^i = \beta_1^i R_{1,t}^{II} + \cdots + \beta_{12}^i R_{12,t}^{II} + \varepsilon_t^i \quad i = F, P\,.$$

R_t^i is the return of the country fund or NAV and $R_{1,t}^{II}$ refers to 1 of 12 US industrial portfolios. The proxy for access is the percentage change in the IFC Global market capitalization minus the percentage change in the IFC investible market capitalization. Spanning is proxied by the conditional variance of the NAV unspanned by the US market and the country fund and estimated as GARCH(1,1) with mean specification as follows:

$$R_t^F = \beta_1 R_{1,t}^{II} + \cdots + \beta_{12} R_{12,t}^{II} + \beta_{13} R_t^P + \varepsilon_t\,.$$

The global factor proxy is computed as the percentage change of the equally weighted country fund premia across both emerging and developed markets.

	Substitution		Spanning		Global Factor		
Country	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	adj. R^2
Ausralia	−.0024	.0405	11.0813	.7287	.0141	*1.7221	.0103
France	−.0030	−*1.7604	−26.2496	−1.0903	.04976	**4.8363	.1932
Germany	−.0045	−1.0605	−17.4057	−1.2611	.05844	**4.4147	.1838
Germany (New)	−.0145	−1.0434	124.695	*1.6487	.03645	**4.7267	.1887
Germany (Future)	.0010	.1372	17.5054	.8933	.0396	**4.0764	.1396
Germany (Emergin)	.00278	.4658	23.1003	.3826	−.0228	** − 2.0222	.0151
Irish Investment	−.0178	−.4260	−133.2228	−.0708	.0107	1.0441	−.008
Italy	−.0040	−1.2967	−15.6389	−.6898	.0212	1.4510	.0169
Japan (OTC)	−.0053	−.7604	−17.8545	−**2.2364	.0499	− − 3.5588	.1393
Japan (Equity)	−.0002	−.7087	−3.4315	−1.5445	.01526	1.2533	.0158
Singapore	.00572	1.4955	213.9122	*1.8171	.0630	**4.9141	.2343
Spain	.0011	.0921	−2.0755	−.2953	.01639	1.5572	−.003
United Kingdom	−.0075	−*1.8583	9.7833	.1552	.0304	**2.8366	.0057

*Denotes 90% significance and ** denotes 95% significance.

The global fund factor is significant and with the anticipated positive sign in 16 of 19 cases. Thus, we find significant evidence in support of the theoretical model in terms of the impact of global fund factor and market access on country fund premia.

Table 6 reports the evidence for DMs. In general the results are not as supportive for DMs. In only 2 of 13 cases is the substitution factor significant and of the right sign. Similarly, in only 1 case of 13 do we find the spanning variable to be significant and of the right sign. However, we do find evidence of a significant global factor in 7 out of 13 cases. The lower ability to predict country fund premia for DMs relative to EMs is not entirely inconsistent with our model since the primary focus of our analysis is on market segmentation factors which are more relevant for EMs than for DMs.[n]

Finally, we estimated the cross-sectional model for EM funds in our sample over the period January 89–December 93. The averages of weekly OLS coefficient estimates for the substitution, spanning and access variables are consistent with our theoretical expectations and the time-series results reported above. Specifically, the substitution factor is negative and marginally significant ($t = -1.60$), the spanning variable is positive but insignificant ($t = 0.16$) and the access variable is positive and highly significant ($t = 4.14$).

5. Conclusion and Policy Implications

We have provided a theoretical and empirical analysis of country funds focussing on emerging economics whose capital markets are not readily accessible to outside investors. We use a model structure that is based on imperfect substitution between the country fund returns (as generated in the advanced core market) and the underlying asset returns (as generated in the originating emerging market). This may stem from the notion of excess price volatility (or noise trading) relative to fundamental volatility. We emphasize that the component assets traded in the originating countries are fundamental to country funds traded in the core advanced market.

Under imperfect substitution between the country fund and its underlying assets, the fund sells at a discount or premium depending upon the degree of international investor access to the originating market, the degree to which the core market securities span the securities in the emerging markets, and the degree of comovement of the country fund universe.

Our analysis shows that country funds traded in the developed capital markets can be beneficial in promoting the efficiency of pricing in the emerging capital markets and in enhancing capital mobilization by local firms of the originating countries. The specific determinants of the pricing efficiency gains to emerging capital markets and resource mobilization by local firms are: (a) the risks of the local assets constituting the fund unspanned by the core developed financial market in which the fund is traded, (b) the differential between local price of risk and universal price of risk, and (c) the degree of substitution between the fund and the underlying assets traded in the originating (emerging) markets. Other things being equal, emerging countries with larger unspannable risk benefit more from the introduction of the country fund in the core (advanced) market. Such countries typically have idiosyncratic investment opportunities or unique natural resources.

[n]Based on suggestions of Geert Bekaert, we conducted two additional sets of time series tests of our model (Eq. (21)). In the first set, the local market (corresponding to the CF being tested) was purged from the construction of the global factor. In the second set, the global factor was completely excluded from the test specification. The results for both sets were similar to those reported in this paper and do not affect our conclusions. Results are available from the authors upon request.

Moreover, the gain is larger if the local price of risk is higher relative to the world or universal price of risk, which may be the case for thinly capitalized emerging markets with limited risk-sharing opportunities.

The empirical evidence supports the principal predictions of our theoretical model. The prediction of a common pricing factor is borne out by the importance of the global country fund factor in explaining the returns of CFs from emerging and developed markets. Further, the variables that proxy the degree of access (for EMs), spanning and substitution effects as well as the global country fund factor, show up as significant determinants of country fund premia.

The analysis leads to some policy implications relating to the composition of country funds, the desirability of price stabilization, and possible subsidization of creation of certain country funds. On the first issue, country funds should be targeted at those local assets with imperfect or no substitutes in the advanced core markets.[o] On the second issue, since imperfect substitution between the country fund and the component assets traded in the local markets mitigates the efficiency gains, policies for country fund price stabilization may deserve consideration by international agencies. Finally, when new issues of country funds are expected to trade at a discount, it would become unprofitable for underwriters to introduce the funds through public offerings, since the initial investors would stand to lose relative to waiting and buying when the funds are seasoned. When efficiency gains exist from new issues of country funds, even when they trade at a discount, the issue arises as to whether some institutions, particularly domestic public authorities or development agencies, take the initial loss so as to promote the fund into existence.

Appendix I. Portfolio Equilibrium

While our motivation is country fund pricing in the international context, the derivation of the portfolio equilibrium is a straightforward application of the Mauer–Senbet [23] framework for the pricing of initial public issues in the domestic market. The MS approach itself is a variation of earlier frameworks by Errunza and Senbet [16], EL [15], and Merton [24]. Although all of these models possess similar structure, they are set apart by their respective motivations and the implications that are drawn for the particular economic phenomena under study. The implications regarding country funds are studied for alternative variations of market structures in the text of the paper.

The investor's choice problem is to maximize his Von Neumann–Morgenstern utility, $U^i(\cdot)$, of current and expected future consumption by picking fractional holdings in the core market assets (α_C^i), in the restricted assets from emerging markets (α_F^i), in the aggregate restricted market assets (α_W^i), and riskless borrowing

[o] There is, however, some evidence suggesting that the actual choice of the underlying securities is too conservative with excessive usage of "blue chips". We reach this conclusion by comparing the residual volatilities of the component assets in the country funds and those of the assets in the local market.

or lending in the amount B^i at one-plus the riskless rate of interest, R.[p] If the investor lacks access to the restricted securities, $\alpha_F^i = \alpha_W^i = 0$. We shall explicitly include investor access restrictions at the demand aggregation stage.[q] In a mean-variance world, the investor faces the following objective function:

$$\text{Maximize } U^i\left(C_0^i, \overline{C_1^i}, \sigma^2\left(C_1^i\right)\right) \tag{A1}$$

with respect to α_C^i, α_F^i, α_W^i and B^i. Subject to

$$C_0^i = W_0^i = [B^i + \alpha_C^i V_C + \alpha_F^i (V_F^C + V_F^F) + \alpha_W^i (V_W^C + V_W^W)]\,, \tag{A2}$$

$$\overline{C_1^i} = RB^i + \alpha_C^i \overline{Y_C} + \alpha_F^i \left(\overline{Y_F^C} + \overline{Y_F^F}\right) + \alpha_W^i \left(\overline{Y_W^C} + \overline{Y_W^W}\right), \tag{A3}$$

$$\begin{aligned} \sigma^2(C_1^i) = {} & (\alpha_C^i)^2 \sigma^2(Y_C) + (\alpha_F^i)^2 [\sigma^2(Y_C^F) + \sigma^2(Y_F^F)] \\ & + (\alpha_W^i)^2 [\sigma^2(Y_W^C) + \sigma^2(Y_W^W)] + 2\alpha_C^i \alpha_F^i COV(Y_C, Y_F^C) \\ & + 2\alpha_C^i \alpha_W^i COV(Y_C, Y_W^C) + 2\alpha_W^i \alpha_F^i COV(Y_W, Y_F)\,, \end{aligned} \tag{A4}$$

where

W_0^i = the initial wealth of investor i,

C_0^i = the current consumption of investor i,

$\overline{C_1^i}$ = the expected future consumption of investor i,

$\sigma^2\left(C_1^i\right)$ = the variance of future consumption,

V_C = the current value of all securities in the core market,

$V_F = V_F^C + V_F^F$ = the current value of assets in the emerging market; decomposable into the core market spanned component, V_F^C, and the unspanned value, V_F^F;

$V_W = V_W^C + V_W^W$ = the current value of restricted assets in the aggregate of the rest of emerging markets; decomposable into spanned, V_W^C, and unspanned, V_W^W, components.

The constraints in (A2)–(A4) can be substituted into (A1), yielding the unconstrained objective function to be maximized with respect to the decision variables. The resulting first-order conditions are:

$$\frac{\delta U^i}{\delta B^i} = -U_0^i + \overline{U_1^i} R = 0\,, \tag{A5}$$

[p]The risk-free asset is assumed internal with zero net supply.

[q]Like Mauer and Senbet, we do not distinguish between those investors with access and those without access to emerging market securities when deriving first-order necessary conditions. Access restrictions are taken into account in the demand aggregation process. This differs, for example, from Merton [24] wherein Lagrange multipliers are utilized to measure the shadow price of imperfect accessibility.

$$\frac{\delta U^i}{\delta \alpha^i_C} = U^i_0(-V_C) + \overline{U^i_1} Y_C$$
$$+ 2U^i_\sigma[\alpha^i_C \sigma^2(Y_C) + \alpha^i_F COV(Y_C, Y^C_F) + \alpha^i_W COV(Y_C, Y^C_W)]$$
$$= 0\,, \tag{A6}$$

$$\frac{\delta U^i}{\delta \alpha^i_F} = U^i_0(-V_F) + \overline{U^i_1} Y_F$$
$$+ 2U^i_\sigma[\alpha^i_F \sigma^2(Y_F) + \alpha^i_C COV(Y_C, Y^C_F) + \alpha^i_W COV(Y_F, Y_W)]$$
$$= 0\,, \tag{A7}$$

$$\frac{\delta U^i}{\delta \alpha^i_W} = U^i_0(-V_W) + \overline{U^i_1} Y_W$$
$$+ 2U^i_\sigma[\alpha^i_W \sigma^2(Y_W) + \alpha^i_C COV(Y_C, Y^C_W) + \alpha^i_F COV(Y_F, Y_W)]$$
$$= 0\,, \tag{A8}$$

where

$$U^i_0 = \frac{\delta U^i}{\delta C^i_0} > 0\,; \quad \overline{U^i_0} = \frac{\delta U^i}{\delta \overline{C^i_0}} > 0\,; \quad U^i_\sigma = \frac{\delta U^i}{\delta \sigma(\overline{C^i_0})} < 0\,.$$

The foregoing inequalities follow the standard conditions of non-satiation and risk aversion.

We now explicitly recognize emerging market accessibility restrictions to derive asset demands. Let M and H denote the number of investors with exclusive access to the emerging market and the rest of the aggregate emerging markets, respectively. The two sets of investors, M and H, are disjoint. The remaining L investors are completely excluded from the primary markets, and invest only in the core market securities. We obtain the following implicit asset demand functions by rearranging the first-order conditions:

risk-free asset;

$$\frac{U^i_0}{\overline{U^i_1}} = R \quad i = 1, \ldots, L + M + H$$

core market asset;

$$COV(Y_C, \alpha^i_C Y_C + \alpha^i_F Y^C_F + \alpha^i_W Y^C_W) = \theta^i\left[\overline{Y_C} - RV_C\right] \quad i = L + M + H \tag{A9}$$

restricted emerging market asset;

$$COV(Y_F, \alpha^i_F Y_F + \alpha^i_C Y_C) = \theta^i\left[\overline{Y_F} - RV_F\right] \quad i = 1, \ldots M\,, \tag{A10}$$

the aggregate of the rest of emerging markets;

$$COV(Y_W, \alpha_W^i Y_W + \alpha_C^i Y_C) = \theta^i \left[\overline{Y_W} - RV_w\right] \quad i = 1, \ldots H\,, \tag{A11}$$

where θ^i is the marginal rate of substitution between expected future consumption and volatility (risk), or the inverse of the Pratt–Arrow absolute risk aversion coefficient.

Note that (A9)–(A11) explicitly recognize that emerging market investors can access the core market and only their *own* securities markets. As a consequence, in (A10) $\alpha_W^i = 0$ for $i = 1, \ldots, M$, and in (A11) $\alpha_F^i = 0$ for $i = 1, \ldots, H$.

In equilibrium, universal aggregate demand for all assets must equal universal aggregate supply. Consider first the demand for core market assets. Equation (A9), which is the demand function for the core market asset, must hold for all $L+M+H$ investors. Hence, summing (A9) over all investors yields:

$$\sum_{i=1}^{L+M+H} COV(Y_C, \alpha_C^i Y_C + \alpha_F^i Y_F^C + \alpha_W^i Y_W^C) = \left[\overline{Y_C} - RV_C\right] \sum_{i=1}^{L+M+H} \theta^i\,.$$

Market Clearing conditions require that

$$\sum_{i=1}^{L+M+H} \alpha_C^i = \sum_{i=1}^{M} \alpha_F^i = \sum_{i=1}^{H} \alpha_i^W = 1\,.$$

Therefore, letting

$$\sum_{i=1}^{L+M+H} \theta^i = \theta\,,$$

we have

$$COV(Y_C, Y_C + Y_F^C + Y_W^C) = \left[\overline{Y_C} - RV_C\right]\theta\,. \tag{A12}$$

Or equivalently, upon rearrangement

$$V_C = R^{-1}\left[\overline{Y_C} - \theta^{-1} COV(Y_C, Y_A^C)\right], \tag{A13}$$

where

$$Y_A^C = Y_C + (Y_F^C + Y_W^C)\,.$$

Equation (A13) is the certainty equivalent valuation of Y_C, where, Y_A^C is the aggregate of the core market cash flow and spannable emerging market cash flow components, and θ^{-1} is the aggregate "price" of risk.

Similarly, aggregation of the demand function (A10) and market clearing conditions, along with the factor structure for cash flows in (1)–(5) in the text, delivers the valuation for the restricted emerging market asset in (6) [see text], where

$$\theta^M = \sum_{i=1}^{M} \theta_i\,.$$

Appendix II. US Tax Treatment of the Investment Entity (Fund)

The fund may be able to obtain preferred tax treatment relative to other corporate forms by qualifying as a Regulated Investment Company (RIC). To qualify the following three conditions must be met:

(1) derive 90% of gross income from investment activities;
(2) derive less than 30% of gross income from short term investments of less than three months;
(3) meet certain diversification criteria.

Foreign tax credit: The fund can file an election with the IRS to pass-through to the fund's shareholders the amount of foreign taxes paid by the fund if more than 50% of the funds total assets are foreign. Subject to certain technicalities (see below) the foreign taxes paid can be used by shareholders as a credit or deduction of foreign taxes.

US tax rates:
(1) Income tax and all distributions: 0%
This is provided that the fund distributes at least 90% of net investment income (dividends and distributions received less operating expenses) and 90% of its net short-term capital gains (excess of net short-term capital gains over long-term capital losses, if any). If these requirements are not met, a non-deductible excise tax of 4% is incurred.
(2) Undistributed net long-term capital gains: 34%
Net long-term capital gains are net long-term capital gains less net short-term capital losses. If these are distributed, no tax is paid. If undistributed, a tax rate of 34% is imposed.
(3) Carrybacks and carryovers:
No carrybacks are permitted for an RIC but capital losses can be carried over for 8 years.

US tax treatment of individual investors
This is just an outline of tax treatment of US residents or citizens. Note also that foreigners with trade/business connections are treated as residents for tax purposes.

(1) Distributions of net investment income and net short-term capital gains are taxed at ordinary tax rates.
(2) Distributions of net long-term gains are taxed at ordinary tax rates. This includes a return of capital.
(3) Undistributed net long-term gains: These are included in a shareholder's income as long-term capital gains, and the tax paid by the company (34%) is credited to the shareholders US income tax payable. Therefore, the effect seems to have no effect on individual taxes paid. The tax basis of the shareholder's shares in the fund is increased by the net amount which is 66% of the undistributed capital gain.

(4) Foreign tax credit: The fund needs to qualify every year to pass through foreign taxes to its shareholders.

Foreign income is composed of distributions from foreign entities. Foreign capital gains and foreign exchange gains or losses are part of US operations.

US individuals typically receive credit for foreign taxes paid. Hence, the objective is to treat shareholders of the fund the same as individuals who receive foreign income.

Shareholders have two options: (a) to deduct their share of foreign income taxes paid by the fund, or (b) use them as a tax credit, but not a mixture. Deductions are available only to those shareholders who itemize deductions and have to exceed 2% of the individual's adjusted gross income. Deductions reduce the taxable income, and hence do not provide a one-for-one saving, unlike credit. On the other hand, the foreign tax credit cannot be used to diminish the tax liability from US sources.

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