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Emerging Market Bond Funds: A Comprehensive Analysis

Sirapat Polwitoon*

Susquehanna University

Oranee Tawatnuntachai

Penn State University at Harrisburg

Abstract

We analyze U.S.-based emerging market bond funds over a ten-year (1996–2005) complete cycle of ups and downs in the dominant emerging bond markets. Emerging market bond funds outperform comparable domestic and global bond funds. The results are robust across both conditional and unconditional models. The funds also provide international diversification benefits to U.S. and international bond and equity portfolios. The funds exhibit persistence in performance and seasonality. Active funds, large funds and funds with high minimum purchases perform better on a total return basis but not on a risk-adjusted basis.

Keywords: emerging markets, bond mutual funds, international diversification, international mutual funds, performance persistence

JEL Classifications: G11, G12, G15

**Corresponding author:* Sigmund Weis School of Business, Susquehanna University, Selinsgrove, PA 17870; Phone: (570) 372-4748; Fax: (570) 372-4419; E-mail: polwitoon@susqu.edu

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1. Introduction

The growth of emerging market debt has been explosive in recent years. The size of the market increased from $969 billion in 1995 to $4,479 billion in 2005. Early studies on emerging market bonds (e.g., Nemerever, 1996) suggest that the benefits of the bonds outweigh their risks. However, two subsequent studies by Erb, Harvey, and Viskanta (1999, 2000) show that the emerging bond market experienced numerous ups and downs during 1990s and conclude that the market's high idiosyncratic risk and high correlation with other asset classes make investment impractical. Yet, recent improvements in the credit ratings of emerging countries and the surge in bond issuance from these countries provide high-yield investors with renewed investment opportunities.

Emerging market bond mutual funds provide an alternative to U.S. investors who want to expose their portfolios to this market. The funds offer a relatively inexpensive and convenient way for investors to obtain potentially high returns from emerging market bonds while reducing idiosyncratic risk. Although the funds represent a small fraction of the U.S.-managed fund industry, their net assets grew by 262% from 1998 to 2005, compared to a 10.8% increase in U.S. high-yield bond funds. Despite significant public attention, emerging market bond funds have received little attention from academic research.

This study provides the first comprehensive analysis of U.S.-based emerging market bond funds from the perspective of U.S. investors. We compile a unique sample of 50 surviving and nonsurviving funds in 1996–2005. The sample period is significant because it covers a complete cycle of the emerging, submerging and reemerging of many dominant emerging bond markets. The cycle moves from the peak of capital inflow to emerging markets in 1996 to the downturn caused by the 1997 Asian crisis, the 1998 Russian crisis and the Brazilian and Argentinean crises of 1999 and 2000, followed by strong performance in 2003 and 2004. Erb, Harvey, and Viskanta (1999, 2000) and Goetzman and Jorion (1999) argue that evaluating the performance of emerging capital markets is difficult and unreliable because (a) the return characteristics of the emerging market assets vary according to market conditions and (b) the brevity of data might not cover all market conditions. Because our sample covers ten years, the data reflect all the ups and downs of the emerging market bond universe.

We examine the performance and characteristics of emerging bond funds in several ways. First, we evaluate the performance of the funds against the relevant benchmark indexes. Second, because indexes are not investable and their returns are not adjusted for trading expenses, we compare the performance of emerging funds with U.S. domestic bond funds with similar risk characteristics, such as high-yield bond funds. We also compare the performance of emerging funds with U.S.-based global bond funds. U.S. investors who want to invest in international bond markets can choose between emerging funds and global funds, whereas investors who want high-risk bonds can select emerging funds or high-yield bond funds. Third, because

emerging funds provide exposure to emerging market debt, we examine whether risk factors such as exchange-rate and other country-specific risks are priced. Fourth, we evaluate the diversification benefits of emerging funds. Because emerging market debt is highly correlated with other asset classes (Erb, Harvey, and Viskanta, 1999) and emerging funds charge relatively high management fees, we test whether emerging funds are a viable addition to existing portfolios of various asset classes. Finally, we examine persistence in performance, return seasonality, and the relation between fund performance and fund characteristics such as fee, load and turnover.

Controlling for risk, we find that emerging bond funds are a viable investment either to hold separately or to add to an existing portfolio. Although the funds underperform benchmark indexes, they outperform comparable U.S. domestic bond funds and global bond funds. The funds also provide additional diversification benefits to all major asset classes and to portfolios that already combine bonds and equities. Over the sample period, adding 20% of emerging funds into existing assets increases returns by 0.97% to 1.5% per year without increasing risk. Unlike other international securities and bond funds, exchange-rate shifts explain only 5% of the return difference between emerging and comparable domestic bond funds, whereas country-specific and liquidity risks explain about 80% of the difference. The exchange-rate shifts have low explanatory power for the return difference because more than one-half of the bonds in emerging funds are U.S.-dollar denominated.

Emerging bond funds exhibit short-term persistence. However, the persistence cannot be exploited when transaction costs are taken into account. The funds also exhibit seasonality. On average, fund returns are highest in November and December. Actively managed funds, large funds, and funds with high minimum purchases outperform on the basis of total returns but not risk-adjusted returns. The relation between return and minimum purchase supports the hypothesis of favoritism in fund families (Gaspar, Massa, and Matos, 2006). Within a fund family, funds with high minimum purchases receive favored treatment; as a result, these funds have higher returns than funds with low minimum purchases. Consistent with previous bond-fund studies such as Blake, Elton, and Gruber (1993), Detzler (1999) and Ferson, Henry, and Kisgen (2006), expenses and loads significantly reduce returns.

2. An overview of emerging bond markets

In recent years, emerging bond markets have expanded considerably. According to various IMF Reports, between 1995 and 2005 the amount outstanding doubled in size every five years, from about $1 trillion in 1995 to $4.5 trillion in 2005. As a percentage of the world bond markets, the proportion of emerging bond markets also doubled, from 3.17% in 1995 to 7.6% in 2005. Asia maintains the largest emerging bond markets with 50%, followed by Latin America, with about 30% of emerging bonds outstanding. However, Latin American bonds make up a high proportion of tradable emerging bonds, from 35% in 1997 to 44% in 1999 to 47% in 2001. The tradable percentage of total emerging bonds outstanding increased from 75% in 1995

to 80% in 2000. Assuming the same proportion as in 2000, tradable emerging market bonds are valued at approximately $3.58 trillion at the end of 2005.

After the Mexican peso crisis in 1994, emerging bond markets experienced three consecutive years of high growth, from 1995 to 1996, with the highest percentage growth (75%) in 1996. The growth period ended in 1997 with the regional turbulence caused by the Thai baht crisis and followed by the Russian crisis in 1998. Spurred by improved country credit quality and ample global liquidity, inflows to emerging bond markets surged again in 2003 and remained strong through 2006.[1]

3. Data

3.1. Emerging bond funds

We define emerging market bond funds as U.S.-based mutual funds that invest primarily in foreign bonds from developing countries. We obtain our sample from Morningstar's emerging market bond category, which starts in 1998. We collect 64 funds that appear in the category in at least one of the eight Morningstar Principia annual CDs from 1998 to 2005. We eliminate 11 funds with net assets as of 1998 or inception, whichever is later, of less than $1 million. To obtain sufficient returns to calculate standard deviations for the Sharpe ratios and to estimate Jensen alphas, we exclude three funds with fewer than 36 monthly returns in 1996–2005. (We begin the sample period in January 1996 so that the funds identified in the 1998 CD have at least 36 consecutive monthly returns.) The final sample consists of 50 funds.

Panel A of Table 1 presents characteristics of the sample funds. The average (median) maturity of the funds is 12.1 years (11.7 years), with the minimum (maximum) of 4.8 years (20.5 years). The highest and lowest average credit ratings are BBB (14%) and Below B (8%), respectively.[2] A majority of the funds (61%) have a BB rating; about 16% have a B rating. The earliest (latest) inception year is 1992 (2001). Panel B of Table 1 presents the sample funds' portfolio characteristics including credit rating, country and region of origin, type of issuers (i.e., sovereign or corporate) and currency. Over the sample period, the average portfolio holdings of the funds are 90% in bonds, 6.9% in cash and the remainder in other securities, such as equity. About 21% of the bond portfolios are investment grade bonds, and the remainder are junk bonds.

To identify country of origin, we examine portfolio holdings of each individual fund in detail using Morningstar's definition of emerging markets. On average, 89.6% of bonds are from emerging markets, 9.3% are from developed markets and 0.5% are unclassified. Of the 89.6% emerging bonds, 75% are government bonds and 14.2% are

[1] For example, in 2006, Standard & Poor's raised the debt rating of emerging countries such as Brazil due to the increased stability of these countries ("Latin American bonds", 2006). Also see IMF (2005) for an emerging market bond report.

[2] For funds with missing credit ratings, we estimate the ratings based on bonds held by the funds. We assume all nonrated bonds are below B rated.

Table 1

Sample fund characteristics and portfolio holdings

The sample contains 50 U.S.-based emerging, 382 domestic, and 146 global bond funds. Average credit rating, maturity and net assets are of 1998 or the fund inception date, whichever is later. Expense ratio averaged over 1998–2005. All data come from Morningstar.

	Emerging funds	Domestic funds	Global funds
Panel A: Fund characteristics			
% of funds classified by average credit rating:			
AAA	—	—	37.8
AA	—	—	36.4
A	—	—	13.3
BBB	14.0	15.2	3.5
BB	61.0	15.5	6.3
B	16.0	69.3	2.7
Below B	8.0	—	—
Maturity (years):			
Average	12.1	7.7	8.7
Minimum	4.8	4.8	1.6
Maximum	20.5	19.9	16.5
Net assets ($ million)	70.93	133.86	84.54
Expense ratio (%)	1.61	1.33	1.41
Panel B: Portfolio holdings (%)			
Portfolio holdings			
Bonds	90.00	89.36	84.85
Cash	6.94	5.10	9.69
Others, including stocks	3.06	5.54	5.45
Bonds classified by credit			
Investment grade bonds	21.47	16.30	82.02
Junk bonds	78.53	83.70	17.97
Bonds classified by markets			
Emerging market bonds	89.64	3.29	7.10
Government	75.42	0.86	5.78
Corporate	14.20	2.43	1.32
Latin America	57.88	2.40	4.05
Europe	21.17	0.30	0.57
Africa, Asia and Mid East	10.57	0.58	2.48
Developed market bonds	9.26	95.40	91.71
Government	0.54	0.36	73.13
Corporate	8.72	95.04	18.58
N/A	1.12	1.31	1.19
Bonds classified by currency denomination			
U.S. dollar	69.39	94.86	33.05
Others	5.99	0.91	56.15
N/A	24.62	4.23	10.79

corporate bonds. Based on region, of the 89.6% emerging bonds, 58% are from Latin America, 21% are from Eastern Europe, and the remainder are from Asia, Africa or the International Monetary Fund. The top six holding countries are Argentina, Brazil, Mexico, Philippines, Russia and Venezuela. About 69% of bonds are denominated in U.S. dollars and 6% are in other currencies; for the remainder, currency denomination information is not available.[3]

3.2. Comparable domestic bond funds

We use two dimensions of risk, maturity and credit rating, as the main criteria to select domestic bond funds with similar characteristics to the sample funds. The average credit rating of emerging bond funds is BB. To find domestic bond funds of which risk characteristics are similar to emerging funds, we first select bond funds from the high-yield bond category of Morningstar. The highest average credit rating of the funds in this category is BB, whereas the highest rating of the sample funds is BBB. Therefore, we also select bond funds from the general corporate bond category that have a credit rating of BBB or below. We eliminate funds with net assets as of 1998 or inception, whichever is later, of less than $1 million, a maturity of less than 4.8 years, an inception year before 1992 or after 2001, or fewer than 36 consecutive monthly returns over the sample period. The final domestic sample consists of 382 funds.

In Table 1, the average (median) maturity of the domestic bond funds is 7.7 years (7.1 years), with a range of 4.8 years to 19.9 years. About 69% of the funds have an average credit rating of B, 16% BBB and the rest BB. The net assets as of 1998 or inception, whichever is later, is $133.86 million. The average portfolio holdings are 89% bonds, 5% cash and 5% other assets. Classified by credit rating, 16% of bonds are investment grade. Almost all bonds held by domestic funds are U.S. corporate bonds.

3.3. Global bond funds

Following Polwitoon and Tawatnuntachai (2006), we define global bond funds as U.S.-based funds that invest in both U.S. and international bond markets. We select bond funds that state an objective of investing in worldwide bond markets and are classified as international or worldwide bond funds by Morningstar. Because the sample of emerging funds has inception years between 1992 and 2001, we exclude global bond funds that start before 1992 or after 2001. In addition, we exclude funds with net assets as of 1998 or inception, whichever is later, of less than $1 million or with fewer than 36 monthly returns between 1996 and 2005. Under these same

[3] From 1998 to 2005, the proportion of currency information available varies from 43% (lowest) in 2001 to 94% (highest) in 2004. Of all bonds with currency information available, 92% are denominated in U.S. dollars, and 8% are denominated in other currencies.

criteria used to select the domestic bond funds, we include 146 global bond funds in our sample.[4]

In Table 1, unlike the average credit ratings of emerging funds, the ratings of the majority of global funds are investment grade. About 38% are classified as AAA, 36% are AA, 13% are A and 4% are BBB; only 9% are below investment-grade status. The average maturity of global funds is 8.7 years, with a minimum (maximum) of 1.6 years (16.5 years). The average net assets as of 1998 or inception, whichever is later, is $84.54 million, and the average expense ratio is 1.41% of net assets. The portfolio holdings of the funds include 85% bonds, 9% cash and 5% other assets. About 82% of the bonds are investment grade. A majority of the bonds are government bonds from developed countries; emerging market bonds account for only 7%. About 56% of the bonds are denominated in foreign currencies and 33% are denominated in U.S. dollars; for the remainder, currency information is not available.

3.4. Monthly returns and serial correlations

We obtain monthly returns mainly from the Morningstar database. Because we have only December database editions, we fill in missing return data of funds that do not survive until year-end from the CRSP mutual fund database. Although CRSP calculates fund returns differently from Morningstar (Elton, Gruber, and Blake, 2001), the difference is not statistically significant in our sample.[5] In addition, the results are not sensitive to the exclusion of CRSP returns. The returns are total net returns in U.S. dollars, after all administrative and trading expenses but before loads and assuming reinvestment of income and capital gain distributions.

It is well known that bond markets are not as liquid as equity markets, and emerging market bonds are even less liquid. Returns of emerging bond funds may be smoothed because of nonactively traded emerging market bonds. Getmansky, Lo, and Makarov (2004) show that illiquidity and smoothed returns can cause an upward bias for observed returns and a downward bias for standard deviation. Therefore, the estimated Sharpe ratio can be biased upward. To examine liquidity of emerging bond funds, we calculate serial correlations of the funds at both portfolio and individual fund levels. For comparison purposes, we also calculate serial correlations of domestic and global bond funds.

At the portfolio level, we find no serial correlation for emerging funds as well as domestic and global funds. The Ljung and Box Q-statistics of the first six and 12 lags are not statistically significant for all portfolios. At the individual fund level, we find a serial correlation in only two emerging funds (4% of the sample), 18 domestic

[4] Because the credit rating of global funds is different from the rating of emerging bond funds, we do not restrict global funds to the same lowest maturity of 4.8 years as emerging funds so that the global fund sample is free of both credit and maturity restrictions.

[5] The average pairwise difference between CRSP and Morningstar returns is −0.0008% for emerging bond funds, −0.0006% for domestic bond funds, and −0.0012% for global bond funds, all of which are insignificantly different from zero. When we divide the data into two subperiods, we still find no significant return difference in either subperiod for all types of funds.

funds (4.71%) and 43 global funds (29.45%).[6] As a robustness check, we exclude the two emerging funds from the sample and rerun all tests. The results are consistent with the results of the full sample; therefore, we do not present them separately.

3.5. Survivorship bias, look-ahead bias and a small number of emerging funds

Although Morningstar reports only funds in operation, our sample is almost free of survivorship bias as we select funds that appear in at least one of the eight Morningstar annual CDs. However, our sample is not completely free of survivorship bias because we exclude three (5.7%) emerging funds, 20 (5%) domestic funds and seven (4.6%) global funds that have fewer than 36 monthly returns (i.e., are defunct within three years of inception). We estimate the effect of the 36-month restriction by calculating differences in total returns and risk-adjusted returns (Sharpe ratios) between the sample with and without the restriction. We find that the restriction causes an upward bias. On the total return basis (risk-adjusted return basis), the biases are 0.034% (0.0022%) per month for emerging funds, 0.0168% (0.0078%) for domestic funds and 0.0152% (0.0073%) for global funds.[7] We use these estimates to make adjustments to the results, and find that the conclusions remain the same after the adjustments. We also perform a robustness check of all tests using the sample without the 36-month restriction and obtain qualitatively similar results.

The sample consists of funds that appear in at least one Morningstar annual CD between 1998 and 2005. This allows both surviving and nonsurviving funds as well as new funds to be included in the sample, but on the other hand could create a look-ahead bias. To examine whether any such bias affects the results, we create another sample that is free from look-ahead bias and rerun all tests. From the sample of 50 emerging, 382 domestic and 146 global funds, we select the funds that exist before January 1999. We find 49 emerging, 328 domestic and 143 global funds, which we follow until they are defunct or until December 2005, whichever is earlier. We find that the results of the look-ahead bias-free sample are generally consistent with those of the full sample.

Although we are exhaustive in selecting the sample of emerging bond funds, the number of emerging funds ($n = 50$) in the sample is rather small, especially

[6] An explanation of almost no serial correlation of emerging funds is that the funds invest heavily in Latin America, which accounts for a higher percentage of emerging tradable bonds and, therefore, is more liquid than other emerging bond markets.

[7] Blake, Elton, and Gruber (1993) and Elton, Gruber, and Blake (1996b), among others, examine survivorship bias of mutual funds by comparing performance of funds that survive for a number of years with performance of funds that exist at the beginning of their sample periods. Blake, Elton, and Gruber (1993) report a return bias of 0.0027% per year for bond funds for 1979–1988, whereas Elton, Gruber, and Blake (1996b) report the bias of 1.8743% per year for equity funds for 1977–1993. Our sample is different because it includes both new funds and funds that survive less than the entire sample period but longer than three years. Any comparison of survivorship bias between their studies and ours must be drawn with caution.

when compared to domestic and global bond funds. To make it less likely that the results are caused by the small sample of emerging funds, we perform bootstraps for all tests. Specifically, for each test, we generate a resample of 50 emerging funds with replacement and calculate point estimates. We repeat these two steps 200 times and compute the bootstrapped estimates and test statistics. Overall, the bootstrapped results are essentially the same as the nonbootstrapped results.

4. Performance of emerging bond funds

4.1. Performance of emerging funds and benchmark indexes

To analyze the performance of emerging funds against broad-based benchmark indexes, we use two risk-adjusted return measures: Sharpe ratio and Jensen alpha. The Sharpe ratio is defined as the ratio of average monthly return in excess of the three-month U.S. T-bill rate divided by the standard deviation of monthly returns calculated over the entire sample period. Jensen alpha is estimated from the regression model of the excess returns (in excess of three-month T-bills) between the funds and indexes. The average monthly return of emerging funds over the sample period is 0.9968% (SD = 4.89%) and the average monthly Sharpe ratio is 0.1413.

Panel A of Table 2 presents the performance of Citigroup Global Emerging Market Sovereign–Capped Bond Index (ESBI), a widely used benchmark for emerging bond funds. The average return and Sharpe ratio of the ESBI are 1.09% and 0.21, respectively. The difference in Sharpe ratios between the funds and the index is −0.0723, which implies that, per one unit of risk, the funds underperform the index by 7.23 basis points per month (about 0.87% per year). Based on the regression model, the Jensen alpha of the funds against ESBI is −0.1707%, significant at the 1% level. The negative alpha suggests that the funds underperform the index by 0.17% per month (2.05% per year). The average adjusted R^2 is 84.22%. This high R^2 indicates that the ESBI tracks the portfolios of emerging funds well.

For the sample without the 36-month restriction, the average monthly Sharpe ratio of emerging funds is 0.1391, which is significantly below the ratio of the index. The difference in Sharpe ratios between the sample and the index is −0.07 per month (−0.89% per year). The average alpha of the sample is −0.1924, significant at the 1% level, suggesting that the funds underperform the index by 0.19% per month (2.3% per year). This amount is greater than the average expense ratio of 1.61% that the funds charge during the sample period. These findings indicate that emerging funds underperform ESBI on both raw returns and risk-adjusted returns and that the underperformance exceeds the expense ratio.

Panel A of Table 2 also presents the results using other broad-based benchmark indexes; Lehman Brothers (LB) Emerging Market World All Series (Emerging World), CSFB High Yield, LB Credit, LB Government/Credit and LB Aggregate. The returns of these indexes are significantly lower than the return of emerging funds, whereas the Sharpe ratios of most indexes are significantly higher. Using the

Table 2

Performance of emerging bond funds and indexes

Return (%) is mean monthly return. The Sharpe ratio is the ratio of average monthly return in excess of three-month T-bills divided by the standard deviation of monthly returns. The alpha is estimated from the model:

$$R_{i,t} = \alpha_i + \sum_{j=1}^{K} \beta_{i,j} I_{j,t} + \varepsilon_{i,t},$$

where $R_{i,t}$ = the return of fund i in excess of three-month T-bill at month t; α_i = Jensen alpha for fund i; $\beta_{i,j}$ = the sensitivity of fund i on index j; $I_{j,t}$ = the return of index j in excess of three-month T-bill at month t; K = the number of benchmark indexes in the model; and $\varepsilon_{i,t}$ = the residual term of fund i at month t. In Panel A, the indexes include Citigroup Global Emerging Market Sovereign–Capped Bond (ESBI), Lehman Brothers (LB) Emerging Market World All Series (Emerging World), CSFB High-yield, LB Credit, LB Government/Credit and Citigroup World Government (WGI) Bond indexes. In Panel B, the bond and stock model consists of five bond and stock factors: ESBI, High Yield, Credit, Citigroup World Government Bond and MSCI World Equity index. The bond model includes ESBI, High Yield and Credit. The region model includes five regional bond indexes: Africa, Asia, Europe, Latin America and the Middle East. The region and other bond model is the region benchmark plus High Yield and Credit. The country model consists of six country bond indexes including Argentina, Brazil, Mexico, Philippines, Russia and Venezuela. The country and other bond model is the country benchmark plus High Yield and Credit. The region and country model includes Europe index plus the country benchmark excluding Russia. The region, country and other bond model is the region and country benchmark plus High Yield and Credit. The differences in returns and Sharpe ratios are the differences between emerging funds and the indexes. All numbers except return and Sharpe ratio of the indexes are cross-sectional averages of all 50 emerging funds.

Panel A: Single index models of broad-based indexes

			Difference in		From the regression model		
	Return	Sharpe ratio	Returns	Sharpe ratios	α	β	Adj. R^2
ESBI	1.0860	0.2135	−0.0892*	−0.0723***	−0.1707***	1.1854***	0.8422
Emerging World	0.4931	0.0519	0.5037***	0.0893***	0.6038***	0.7466***	0.3198
High Yield	0.5931	0.1519	0.4037***	−0.0107	0.3759***	1.5692***	0.3847
Credit	0.5330	0.1642	0.4638***	−0.0229**	0.4865***	0.8738***	0.0554
Government/Credit	0.5093	0.1587	0.4875***	−0.0175*	0.6165***	0.2466***	0.0019
WGI	0.4247	0.0600	0.5721***	0.0812***	0.6573***	−0.0735*	−0.0012

Panel B: Multiindex models

Model	α	Adj. R^2
Bond and stock	−0.1445***	0.8778
Bond	−0.1359***	0.8773
Region	0.5792***	0.3256
Region and other bond	0.4215***	0.5238
Country	0.4742***	0.4710
Country and other bond	0.2119***	0.6249
Region and country	0.4525***	0.4619
Region, country and other bond	0.1893***	0.6244

***,**,* indicate statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

regression models, the adjusted R^2 is quite low for all of the indexes, especially compared with the R^2 of the ESBI. The low R^2 suggests that these broad-based indexes are not appropriate benchmarks for emerging funds.

Panel B of Table 2 reports evaluations of emerging bond funds against eight multifactor index models. Each model contains indexes representing a passive portfolio of different investment style. For example, the bond and stock model comprises five bond and stock factors: ESBI, High Yield, Credit, World Government index (WGI) and MSCI World Equity index. The alphas are significantly negative for the bond and stock model and the bond model, suggesting that emerging funds significantly underperform these two passive portfolios. The adjusted R^2 for both models is high (about 88%), with an R^2 higher than 84% for the ESBI alone (see Table 2, Panel A). The higher R^2 of these two models suggest that although emerging funds allocate most of their assets to emerging bonds, they also invest in U.S. high-yield and corporate bonds. For the rest of the models, the alphas are significantly positive; the adjusted R^2 is highest for the country and other bond model (62.49%).

Overall, the results in Table 2 suggest that emerging funds underperform the ESBI, a broad-based benchmark index, on both total returns and risk-adjusted returns. The funds also underperform two passive portfolios that include the ESBI. These findings are consistent with studies that examine bond funds in different countries, such as Detzler (1999) for U.S.-based international and global bond funds; Blake, Elton, and Gruber (1993) and Ferson, Henry, and Kisgen (2006) for U.S. domestic bond funds; and Dietze, Entrop, and Wilkens (2006) for European market bond funds.

4.2. Performance of emerging bond funds and domestic and global bond funds

Because the indexes are not investable and their returns do not account for trading costs that investors incur, we concentrate on comparing emerging bond funds to comparable domestic and global bond funds, to which U.S. investors might view the funds as alternatives.

4.2.1. Domestic bond funds

Table 3 presents returns and risk-adjusted returns of emerging and domestic bond funds and the differences between them. The overall mean return of domestic funds is 0.4094%, which is significantly less than the overall return of emerging funds of 0.9969%. The difference in the returns between emerging and domestic funds is about 0.59%. Although the standard deviation of domestic funds (2.18%) is less than one-half that of emerging funds (4.89%), the Sharpe ratio of emerging funds is significantly greater than the ratio of domestic funds. The difference in Sharpe ratios is 0.0765, suggesting that emerging funds outperform domestic funds by 7.65 basis points per month (0.92% per year) over the sample period.

Table 3

Return and Sharpe ratio of emerging, domestic and global bond funds and the ESBI and net flows of the funds

ESBI is Citigroup Global Emerging Market Sovereign–Capped Bond Index, widely used as the benchmark index for emerging bond funds. Return (%) is mean monthly return. The Sharpe ratio (in parenthesis) is the ratio of average monthly return in excess of three-month U.S. T-bills divided by the standard deviation of monthly returns. Net flow (in million U.S. dollars) is the growth in fund assets in excess of reinvested dividends. The number in square brackets is the net flow in percentage. Levels of significance are of *t*-statistics for the zero mean difference in returns and Sharpe ratios between emerging bond funds and the ESBI, domestic or global bond funds. All numbers except the return and Sharpe ratio of the ESBI are cross-sectional averages.

	Emerging funds			ESBI	Domestic funds			Global funds		
	N	Return (Sharpe ratio)	Net flow [% Net flow]	return (Sharpe ratio)	*N*	Return (Sharpe ratio)	Net flow [% Net flow]	*N*	Return (Sharpe ratio)	Net flow [% Net flow]
All	50	0.9968	3,059	1.0860*	382	0.4094***	37,273	146	0.4072***	7,908
		(0.1413)	[184.28]	(0.2135)***		(0.0648)***	[396.87]		(0.0421)***	[123.82]
1996–2000	50	0.8884	431	1.2558***	373	0.2347***	22,850	146	0.3397***	235
		(0.0915)	[25.96]	(0.2256)***		(−0.0877)***	[243.30]		(−0.0399)***	[3.67]
2001–2005	47	1.0961	2,628	0.9163***	365	0.6197***	14,423	124	0.4604***	7,673
		(0.1913)	[78.48]	(0.2014)		(0.2033)	[34.25]		(0.1404)**	[75.32]
1996	37	2.7596	−77	2.6296	188	1.0142***	6,504	129	0.7738***	−224
		(0.4636)	[−4.62]	(0.6053)***		(0.2641)***	[69.25]		(0.2207)***	[−3.51]
1997	42	0.9323	868	1.3791***	241	1.0002	10,980	137	0.2588***	835
		(0.0963)	[39.41]	(0.2604)***		(0.2758)***	[63.48]		(−0.0685)***	[11.42]
1998	49	−1.5912	178	−0.1378***	328	0.0768***	9,783	143	0.7277***	569
		(−0.3969)	[4.99]	(−1.500)***		(−0.1304)***	[31.49]		(0.2162)***	[6.59]
1999	50	1.9590	− 300	1.3686***	351	0.2849***	381	145	−0.2550***	−325
		(0.3166)	[−10.48]	(0.2672)***		(−0.0789)***	[0.94]		(−0.4154)***	[−3.26]
2000	50	0.7444	− 239	1.0393***	369	−0.4432***	−4,799	136	0.2157***	−620
		(0.0466)	[−7.13]	(0.1452)***		(−0.4008)***	[−11.40]		(−0.1362)***	[−6.08]
2001	47	0.8238	− 487	0.6290**	365	0.3488***	7,183	124	0.1712***	−598
		(0.1121)	[−14.29]	(0.0.904)		(0.0422)***	[21.23]		(−0.0476)***	[−5.87]
2002	46	0.8759	349	0.7622	350	−0.0039***	7,768	106	0.9821	−427
		(0.1520)	[10.74]	(0.1714)		(0.0352)***	[18.97]		(0.4886)***	[−4.47]
2003	43	2.2494	637	1.8378***	328	1.7210***	16,175	100	1.1060***	1,366
		(0.4581)	[15.84]	(0.4813)*		(0.7571)***	[34.71]		(0.5332)**	[13.44]
2004	37	0.9889	1,029	0.9104**	316	0.7537***	−7,986	94	0.6934***	4,441
		(0.1872)	[17.58]	(0.2178)***		(0.3070)***	[−10.99]		(0.3200)***	[35.26]
2005	37	0.9179	1,100	0.4419***	298	0.1805***	−8,717	92	−0.1647***	2,891
		(0.1391)	[14.22]	(0.0462)***		(0.0466)***	[−12.32]		(−0.2362)***	[14.55]

***, **, * indicate statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

For both the earlier and later periods, the returns of emerging funds are significantly higher than the returns of domestic funds. The differences in returns between emerging and domestic funds are 0.65% for 1996–2000 and 0.48% for 2001–2005. Compared to domestic funds, the Sharpe ratio of emerging funds is significantly higher in 1996–2000 but lower in 2001–2005. Annually, emerging funds significantly outperform domestic bond funds in eight of ten years in total returns. Not surprisingly, in 1998, emerging funds earn significantly lower returns (−1.61%) than domestic funds due to the Russian bond default. Considering risk-adjusted returns, emerging funds perform better than domestic funds in six of ten years.

For the sample without the 36-month restriction, the average monthly return of emerging funds is 0.57% higher than the return of domestic funds (results not tabulated). The average monthly Sharpe ratio of emerging funds is 0.1391, which is significantly higher than the ratio (0.057) of domestic funds. Overall, the results suggest that although emerging funds bear higher risk as measured by standard deviation, they also provide both higher total returns and risk-adjusted returns than domestic bond funds, which is consistent with the risk–return tradeoff. The higher Sharpe ratios of emerging funds suggest that investing in international sovereign bonds through emerging funds provides higher risk-adjusted returns than investing in high-yield domestic bond funds. Therefore, we conclude that emerging bond funds provide a viable alternative to U.S. domestic bonds.

4.2.2. Global bond funds

In Table 3, compared to emerging funds, global bond funds provide lower returns and standard deviations (1.78%). The difference in the returns is about 0.6%, significant at the 1% level. The lower standard deviation of global funds can be explained by the risk characteristics of the bonds in which the funds invest. As shown in Table 1, global funds mainly invest in government bonds from developed countries, whereas emerging funds hold bonds from developing countries. The Sharpe ratio of emerging funds is significantly higher than the ratio of global funds because of the higher returns of emerging funds, which earn about 0.1% higher return per one unit of risk than global funds over the sample period. Emerging funds also outperform global funds on both raw return and risk-adjusted return in the first and second subperiods.

For all years except 1998 and 2002, the returns of emerging funds are significantly higher than those of global funds. In 1998, when emerging funds suffer a significant loss of −1.59% due to the Russian default, global funds provide a positive return of 0.73%. The emerging and global funds provide about the same return in 2002. On a risk-adjusted basis, emerging funds significantly outperform global funds in six of ten years and underperform in four years. In three of the four years, emerging funds also underperform domestic bond funds.

For the sample without the 36-month restriction, the average monthly Sharpe ratio of the emerging fund sample is 0.1391, which is significantly higher than the ratio (0.0348) of global funds. The results are consistent with those of the full sample.

These findings, coupled with the results in Table 1, suggest that although emerging and global funds are often viewed as international bond funds, they should be considered separate asset classes due to different risk-return characteristics. Emerging funds invest in emerging bond markets and, therefore, provide high risks and high returns, whereas global funds focus on developed country bonds and, therefore, have low risks and low returns. Although the risk of emerging funds is higher than that of global funds, emerging funds outperform global funds on both total and risk-adjusted returns. These results lead us to conclude that, compared to global bond funds, emerging bond funds provide U.S. investors with a more favorable risk-return tradeoff.

Table 3 also presents net flows of emerging, domestic and global funds. Comparing performance with net flow, we find that the funds have large positive net flows after they experience strong performance and negative net flows following poor performance. For example, after a significant loss in 1998, emerging funds had negative net flows in 1999–2001. The net assets of emerging funds surged in 2004 and 2005 after strong performances in 2003. In these two years, net flows of domestic funds are negative with net outflows of 11% and 12% in 2004 and 2005, respectively.

4.3. Factors explaining performance differences between fund types

Hau and Rey (2006), among others, suggest that exchange-rate return is a major component of returns of international securities. To test whether exchange-rate shifts can explain the return difference between emerging and domestic or global bond funds, we regress the return difference on the difference in exchange-rate return.

In addition to the exchange-rate factors, we include four other basic risk factors: differences in credit quality, maturity and duration between the funds and the difference in risk characteristics such as liquidity and country-specific risk between the bond markets. The characteristics of emerging, domestic and global bond markets are measured by the ESBI, the domestic index and WGI in local currency, respectively. The domestic index, representing domestic bond funds, is a value-weighted average of Lehman Brothers Credit and CSFB High Yield indexes.

Table 4 presents the results. Regressions 1 through 4 are between emerging and domestic funds and Regressions 5 through 8 are for emerging and global funds. In Regression 1, the coefficient of exchange-rate return is −0.72 and significant at the 1% level. The negative coefficient suggests that emerging funds perform better when the U.S. dollar depreciates and vice versa. Although the model is significant (p-value = 0.016), the adjusted R^2 is only 0.0474. This result indicates that the exchange-rate return explains only about 5% of the return difference between emerging and domestic funds, which is much smaller than the explanatory power reported by prior studies on international securities. The low explanatory power of the exchange-rate return can be explained by the fact that a majority of emerging bonds are U.S.-dollar denominated.

In Regression 2, where the difference in market characteristics is included, the adjusted R^2 increases substantially to 0.8528, suggesting that the market-characteristic

Table 4

Regression explaining return differences between emerging and domestic bond funds and between emerging and global bond funds

The regression is:

$$r_{emg,t} - r_{j,t} = \alpha + \beta_1 r_{FX,t} + \beta_2 DIFF\_FX_t + \beta_3 DIFF\_CHAR_t + \beta_4 DIFF\_CREDIT_t + \beta_5 DIFF\_MAT_t + \beta_6 DIFF\_DUR_t + \varepsilon_t,$$

where $r_{emg,t} - r_{j,t}$ = the difference in returns between equally weighted portfolios of emerging and j funds at month t; $r_{FX,t}$ = the exchange-rate return of trade weighted average index of the other important trading partners (OITP) at month t; $DIFF\_FX_t$ = the difference in exchange-rate returns of trade weighted average indexes between OITP and major currencies at month t; $DIFF\_CHAR_t$ = difference in returns between Citigroup Global Emerging Market Sovereign–Capped Bond Index (ESBI) in local currency and the index for j funds at month t; $DIFF\_CREDIT_t$ = difference in credit quality between the portfolios of emerging and j funds at month t; $DIFF\_MAT_t$ = difference in maturity between the portfolios of emerging and j funds at month t; $DIFF\_DUR_t$ = difference in duration between the portfolios of emerging and j funds at month t. j is domestic or global bond funds. The index for domestic funds is the domestic bond index, which is value-weighted average of Lehman Brothers Credit and CSFB High Yield Indexes. The index for global funds is Citigroup World Government Bond Index in local currency. Both trade weighted average currency indexes are obtained from the Federal Reserve Web site. Credit quality, maturity and duration are obtained from Morningstar. Credit quality equals 1 for AAA rating, 2 for AA and so on. Regressions 1, 2, 5 and 6 are performed for the entire sample period. The remainder of the regressions is performed for 1998 to 2005 due to unavailability of duration. t-statistics are in parentheses.

	Difference between emerging funds and:							
	Domestic funds				Global funds			
Regression	1	2	3	4	5	6	7	8
Intercept	0.8420**	0.2634**	0.6003	0.1423	0.7984**	−0.0020	−3.0739	0.0338
	(2.5401)	(1.9915)	(0.7314)	(0.8542)	(2.1196)	(−0.0140)	(−1.4268)	(0.1805)
r_{FX}	−0.7220***	−1.5509***	−1.7738***	−1.7425***				
	(−2.6315)	(−13.7645)	(−12.5883)	(−12.5929)				
DIFF_FX					0.5233**	0.9128***	0.9727***	0.9541[a]
					(2.4562)	(11.5279)	(10.9789)	(10.7230)
DIFF_CHAR		1.0397***	1.1100***	1.1201***		0.9496***	1.0214***	1.0270[a]
		(25.4296)	(22.2642)	(23.0208)		(27.6626)	(25.3823)	(25.1921)
DIFF_CREDIT			−0.1827				1.3253*	
			(−0.1577)				(1.8622)	
DIFF_MAT			−0.0835				−0.3239	
			(−0.5091)				(−1.4655)	
DIFF_DUR				0.2135				0.0342
				(1.5022)				(0.0979)
Adj. R^2	0.0474	0.8528	0.8549	0.8595	0.0406	0.8738	0.8785	0.8747
N	120	120	96	96	120	120	96	96
F-statistics	6.92	345.74	140.92	194.66	6.03	405.16	172.74	222.02

***,**,* indicate statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

difference and exchange-rate return combined explain about 85% of the return difference. The positive coefficient of the market characteristic difference indicates a higher liquidity premium and other risk premiums such as country risk premium of emerging bond markets. In Regressions 3 through 5, the coefficients of credit, maturity and duration differences are insignificant. The adjusted R^2 in Regressions 3 through 5 increase only slightly from Regressions 1 and 2. These findings suggest that the return difference between emerging and domestic bond funds can be explained mainly by the difference in characteristics between emerging and U.S. bond markets.

Regressions 5 through 8 of Table 4 show the results of the return difference between emerging and global funds. As in Regression 1, the adjusted R^2 of the currency return difference in Regression 5 is low (0.0406). The adjusted R^2 of Regression 6 is 0.8738. The adjusted R^2 of the last two regressions increase only slightly from the R^2 of Regression 6. These results suggest that the characteristic difference between emerging and developed international bond markets is the major explanation of the difference in performance between emerging and global funds.

Overall, the results in Section 4 show that, consistent with prior bond and equity mutual fund literature, emerging funds underperform a broad-based benchmark index. The underperformance of emerging funds is greater than the expense ratio. Although the risk of emerging funds is greater than that of domestic and global funds, emerging funds outperform both domestic and global funds in both raw and risk-adjusted returns. The main factor explaining the return difference between emerging and domestic funds and between emerging and global funds is the differing characteristics of the markets.

5. Diversification benefits of emerging bond funds

The results thus far suggest that emerging bond funds are a viable alternative to domestic and global bond funds. Emerging funds provide higher total and risk-adjusted returns than domestic and global funds. In this section, we examine whether emerging funds provide diversification benefits to U.S. investors. We start with a simple scenario in which investors have only one type of assets in their portfolios. We test the benefits of adding emerging funds to existing assets using Elton, Gruber, and Rentzler's (1987) method. We expect the benefits to be greater for existing assets that have low correlations with emerging funds. We then use a mean-variance spanning test to examine whether the benefits persist if investors already have a mix of U.S. and international bonds and stocks in their portfolios.

Most studies that apply Elton, Gruber, and Rentzler's (1987) method (e.g., Ackermann, McEnally, and Ravenscraft, 1999) and a mean-variance spanning test (e.g., DeSantis, 1994; Harvey, 1995) use broad-based benchmark indexes as proxies for existing portfolios. Unlike these studies, we choose index funds to represent existing portfolios of U.S. investors because index funds are investable and their returns account for trading expenses. In addition, on average, passive portfolios perform as

well as or outperform active portfolios, implying that investors are better off simply holding index funds. We use six categories of index funds to represent major asset classes. The index funds consist of seven intermediate-term U.S. government bond funds, 34 U.S. aggregate bond funds, eight balanced funds, 116 S&P 500 funds, 96 world equity funds and 18 emerging equity funds. We also add the domestic bond fund sample (domestic bond funds) and the global bond fund sample (global bond funds) as part of existing portfolios of U.S. investors. Both domestic bond funds and aggregate bond funds invest in U.S. bonds. Aggregate bond funds, however, invest primarily in investment-graded corporate bonds, U.S. government and agency bonds and asset-backed securities, whereas domestic bond funds invest primarily in junk bonds. Both funds have different risk-return characteristics. The average monthly return and standard deviation of the equal-weighted portfolio of aggregate bond funds is 0.47% and 1.12%, compared to 0.48% and 1.85% of the portfolio of domestic bond funds. The return correlation between aggregate bond funds and domestic bond funds is only 0.139.

5.1. Elton, Gruber, and Rentzler (1987) method

Elton, Gruber, and Rentzler (1987) show that a gain occurs when a new asset is added to an existing asset if the Sharpe ratio of the new asset is greater than the product of the Sharpe ratio of the existing asset and the return correlation between the new and existing assets. An intuition of Elton, Gruber, and Rentzler's (1987) equation is that a new asset provides incremental diversification benefits to an existing asset if the return of the new asset (relative to the existing asset) is greater than the risk of the new asset (relative to the existing asset) or the relative reward-to-risk ratio is greater than one (Polwitoon and Tawatnuntachai, 2006). To test whether emerging bond funds provide incremental diversification benefits to existing assets, we calculate the difference between the Sharpe ratio of emerging funds (SHR_{emg}) and the product of the Sharpe ratio of an existing asset and the return correlation between emerging funds and the existing asset ($SHR_p \times \rho_{emg,p}$). The significantly positive difference suggests that emerging funds do provide benefits.

5.1.1. The benefits of adding emerging bond funds

In the last column of Table 5, the differences between SHR_{emg} and $SHR_p \times \rho_{emg,p}$ for all existing assets are positive and significant at the 1% level. The difference ranges from 0.14 (highest) for government bond funds to 0.07 (lowest) for emerging equity funds. The differences for domestic and global bond funds are about 0.10 and 0.12, respectively. The significantly positive differences suggest that emerging bond funds provide incremental diversification benefits to U.S. investors' existing assets. The greater benefits of emerging bond funds when added to U.S. government bond funds and aggregate bond funds are due to low correlations between the funds (shown in the second column). Although the correlations for equity funds and domestic bond

Table 5

Incremental diversification benefits of emerging bond funds

Domestic bond funds are the domestic bond fund sample consisting of U.S.-based bond funds that invest in U.S. bond markets and have comparable credit rating and maturity to the emerging fund sample. Global bond funds are the global fund sample consisting of U.S.-based bond funds that invest in both U.S. and international bond markets. Aggregate bond funds are funds that invest primarily in investment-graded corporate bonds, U.S. Government and agency bonds and asset-backed securities. SHR is the average Sharpe ratio. The correlation ($\rho_{emg,p}$) is the correlation of monthly portfolio returns between emerging bond funds and an existing asset. The number in the fourth column is the product of the Sharpe ratio of the existing asset and the return correlation. In the last column, the difference is the cross-sectional mean difference between the Sharpe ratio of emerging bond funds and the number in the fourth column. The average Sharpe ratio of emerging bond funds is 0.1413.

Existing assets	SHR_p	$\rho_{emg,p}$	$SHR_p \times \rho_{emg,p}$	Difference
Domestic bond funds	0.0648	0.6442	0.0417	0.0995***
Global bond funds	0.0421	0.3938	0.0166	0.1247***
Government bond funds	0.0919	0.0026	0.0002	0.1410***
Aggregate bond funds	0.1972	0.0913	0.0180	0.1232***
Balanced funds	0.0688	0.5844	0.0402	0.1011***
S&P 500 funds	0.0174	0.5643	0.0098	0.1314***
World equity funds	0.0859	0.5599	0.0481	0.0932***
Emerging equity funds	0.1096	0.6965	0.0763	0.0650***

***,**,* indicate statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

funds are high, emerging bond funds still provide diversification benefits due to their high Sharpe ratios during the period.

Prior research (e.g., Blake, Elton, and Gruber, 1993; Ferson, Henry, and Kisgen, 2006) show that fund performance is negatively related to expense ratio. We further examine whether emerging bond funds with high expense ratios still provide diversification benefits to U.S. investors. We find that the average differences between SHR_{emg} and $SHR_p \times \rho_{emg,p}$ of emerging bond funds with top-quartile expense ratio are still significantly positive for all existing assets except emerging equity funds (results not tabulated). However, the differences are smaller than those in Table 5 as a result of the lower Sharpe ratio of emerging bond funds with a high expense ratio (0.0999). These findings suggest that although emerging bond funds with a high expense ratio offer lower risk-adjusted returns than average emerging bond funds, they still provide incremental diversification benefits for the majority of existing assets.[8]

5.1.2. Combined portfolios of emerging bond funds and existing assets

To further examine the potential benefit from adding emerging bond funds to existing assets, we compare risk-adjusted returns of combined portfolios of emerging bond funds and existing assets with those of existing assets alone. For each existing

[8] Appendix A presents supporting conditional correlation tests that allow for time-varying volatility.

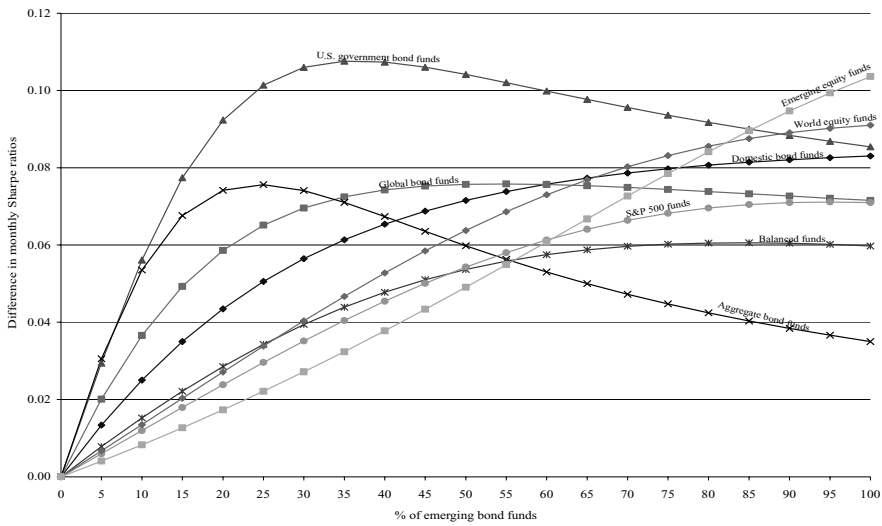


Figure 1

Differences in Sharpe ratios of combined portfolios and existing assets

The combined portfolios consist of emerging bond funds and existing assets. The existing assets include domestic and global bond funds, intermediate-term U.S. government, aggregate bond, balanced, S&P 500, world equity, and emerging equity index funds. Domestic bond funds are the domestic bond fund sample consisting of U.S.-based bond funds that invest in U.S. bond markets and have comparable credit rating and maturity to the emerging bond fund sample. Global bond funds are the global fund sample consisting of U.S.-based bond funds that invest in both U.S. and international bond markets. Aggregate bond funds are funds that invest primarily in investment-graded corporate bonds, U.S. Government and agency bonds and asset-backed securities.

asset, we create 21 combined portfolios with different weights of emerging bond funds in the portfolios. The weights of emerging bond funds range from 0% (i.e., 100% existing asset) to 100% (i.e., 100% emerging bond funds) in increments of 5%. We calculate the difference in Sharpe ratios between the combined portfolios and existing assets. The results are in Figure 1.[9]

For all existing assets, the differences in monthly Sharpe ratios between the combined portfolios and existing assets are positive for all proportions of emerging bond funds in the portfolios. These results support our earlier findings that emerging bond funds provide incremental diversification benefits for all existing assets. For all existing assets except government, aggregate and global bond funds, the gains increase at a decreasing rate as the percentage of emerging bond funds in the portfolios increases. For government, aggregate and global bond funds, the benefits increase

[9] Our estimates of diversification benefits of emerging bond funds in Figure 1 are conservative because we calculate the benefits at the portfolio level. The correlations at the portfolio level are lower than the cross-sectional averages of the individual funds.

when the percentage of emerging bond funds in the portfolios is low and decline when the percentage of emerging bond funds increases.

For combined portfolios with 20% emerging bond funds, as many financial advisors recommend, the increases in Sharpe ratios range from 0.0173 (lowest) for emerging equity funds to 0.0923 (highest) for U.S. government bond funds. This suggests that for every 1% of risk (as measured by standard deviation) investors can enhance the returns of their existing portfolios by about 1.73 to 9.23 basis points per month (0.21%–1.11% per year) by including 20% emerging bond funds.

To show the economic significance of the extra returns generated by adding emerging bond funds, we calculate *Modigliani-Modigliani*, M^2, defined as the return difference between (1) synthetic portfolios of the combined portfolios with risk equal to existing assets and (2) existing assets. Similar to the results in Figure 1, M^2 is positive for all existing assets, suggesting that by adding emerging bond funds to existing portfolios, investors can enhance returns without increasing risk. With 20% emerging bond funds in the portfolios, the annual gains are between 0.97% for domestic bond funds and 1.5% for emerging equity funds. These findings suggest that investors can increase annual returns by 0.97% to 1.5% without increasing risk by adding 20% emerging bond funds.

Overall, the results in this section support the findings that emerging bond funds provide incremental diversification benefits for all existing bond and equity portfolios. The benefits are both statistically and economically significant. The gains are especially large for the portfolios of government and aggregate bond funds due to low correlations with emerging bond funds.

5.2. Mean-variance spanning test

We use a mean-variance spanning test to examine whether the benefits still persist for U.S. investors already combining bonds and equities. If the mean-variance frontier of benchmark assets (consisting of two or more) coincides with the frontier of benchmark assets plus emerging bond funds (i.e., the frontier of benchmark assets spans emerging bond funds), then emerging bond funds provide no diversification benefits (DeRoon, Nijman, and Werker, 2001). We test the spanning hypothesis using the regression method proposed by Huberman and Kandel (1987). In our case, the test asset is emerging bond funds. Therefore, to test the spanning hypothesis is to test the joint hypothesis of zero intercept and the sum of coefficients equal one in the regression:

$$r_t = \alpha + \sum_{j=1}^{K} \beta_j I_j + \varepsilon_t, \tag{1}$$

where r_t is an equal-weight portfolio return of emerging bond funds at month t, I_j is the benchmark asset j and K is the number of benchmark assets.

Table 6

Mean-variance spanning tests of emerging bond funds

The test asset is emerging bond funds. The benchmark assets include four types of funds from four categories: U.S. and international bonds and equities. The U.S. bond category includes domestic bond funds (Domestic) and intermediate-term U.S. Government (Government) and aggregate bond index funds (Aggregate). The international bond category includes global bond funds (Global). The U.S. equity category includes S&P 500 and balanced index funds (Balanced). The international equity category includes world (World equity) and emerging (Emerging equity) equity index funds. Domestic bond funds are the domestic bond fund sample consisting of U.S.-based bond funds that invest in U.S. bond markets and have comparable credit rating and maturity to the emerging fund sample. Global bond funds are the global fund sample consisting of U.S.-based bond funds that invest in both U.S. and international bond markets. Aggregate bond funds are funds that invest primarily in investment-graded corporate bonds, U.S. Government and agency bonds and asset-backed securities. Chi-squared is Wald statistic of the spanning test.

	Benchmark assets					
	Bond category		Equity category		Chi-	*p*-
Portfolio	United States	International	United States	International	squared	value
1	Domestic	Global	S&P 500	World equity	17.8041	0.0001
2	Domestic	Global	S&P 500	Emerging equity	11.9157	0.0026
3	Domestic	Global		World equity, emerging equity	11.7763	0.0028
4	Domestic		S&P 500	World equity, emerging equity	5.9010	0.0523
5	Domestic, Government		S&P 500	Emerging equity	9.3503	0.0093
6	Domestic, Government		S&P 500	World equity	9.2621	0.0097
7	Domestic	Global	Balanced	World equity	18.3026	0.0001
8	Government	Global	S&P 500	World equity	3.2854	0.1935
9	Government	Global	S&P 500	Emerging equity	3.8009	0.1495
10	Aggregate	Global	S&P 500	World equity	3.3208	0.1901
11	Aggregate		S&P 500	World equity, emerging equity	4.0089	0.1347
12		Global	Balanced	World equity, emerging equity	4.8998	0.0863

The benchmark assets are a combination of two, three or four types of funds (as in Table 5) from four categories: (a) U.S. bonds, (b) international bonds, (c) U.S. stocks and (d) international stocks. These categories are major asset classes needed for diversification of U.S. investors. Because the results of two and three assets are similar to those of four assets, we present only the results of four assets in Table 6.

The Wald statistic is significant for portfolios one through seven and 12 but is not significant for portfolios eight through 11. The significance of the Wald statistics rejects the null hypothesis of spanning and indicates that emerging bond funds provide diversification benefits to existing portfolios. In general, the insignificance of the Wald statistics implies that investors who hold portfolios 8 through 11 cannot extend the efficient frontiers by adding emerging bond funds to existing portfolios. However,

Kan and Zhou (2001) show that while the spanning test has good power for test assets that lower the risk of global minimum variance portfolios, it has little power for test assets that enhance tangency portfolios. Because the statistical power of the spanning test heavily relies on the improvement (distance) of standard deviation of the minimum variance portfolios, it fails to reject the null hypothesis for test assets that improve only tangency portfolios (without reducing risk of global minimum variance portfolios). Consequently, Kan and Zhou (2001) argue that the spanning test has low power for economic significance because the improvement in tangency portfolios is more important economically.

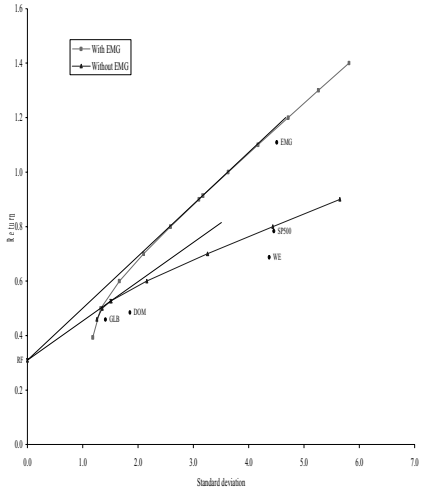
Kan and Zhou's (2001) finding is especially important to risky test assets like emerging bond funds. Due to high risk, emerging bond funds might not improve a global minimum variance portfolio but extend an efficient frontier of existing assets. This is evidently the case for portfolios 8 through 11 where the null hypothesis of spanning cannot be rejected. In Figure 2, we present the graphical plot of efficient frontiers to illustrate the argument of Kan and Zhou (2001). For brevity, we present only the plots of portfolios 1, 4 through 6 and portfolios 8 through 11 in Panel A through H, respectively. The plots of other portfolios yield similar results. We draw two conclusions from the graphs. First, the portfolio of emerging bond funds lies outside all of the efficient frontiers of benchmark assets. The location of emerging bond funds indicates that adding the funds improves tangency portfolios; the new efficient frontiers show the diversification benefits accordingly. Second, for the portfolios with insignificant Wald statistics, portfolios eight through 11, the global minimum variance portfolios with and without emerging bond funds are almost identical indicating no risk reduction, whereas the plots of portfolios one, four through six indicate otherwise. Taken together, these findings suggest that although emerging bond funds might not reduce the risk of global minimum variance portfolios of some existing assets, the funds enhance efficient frontiers of bond and equity portfolios and therefore provide diversification benefits at least economically.

Overall, the results in this section suggest that emerging bond funds are a viable asset to add to both bond and equity portfolios of U.S. investors. By adding 20% emerging bond funds into the existing portfolios, investors can enhance return by 0.97% to 1.5% per year without increasing risk. The diversification benefits still persist for diversified portfolios that mix bonds and stocks from both U.S. and overseas markets.

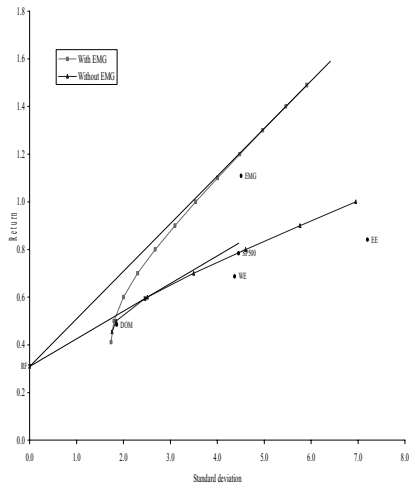
6. Persistence, seasonality and characteristics

6.1. Persistence

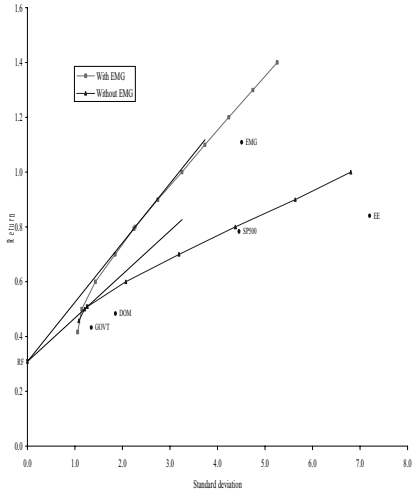
Unlike the extensive literature on equity funds, only a few studies (e.g., Blake, Elton, and Gruber, 1993; Huij and Derwall, 2007) examine the performance persistence of bond funds. These studies find some evidence of persistence among bond funds. We examine the persistence of emerging bond funds using Elton, Gruber, and



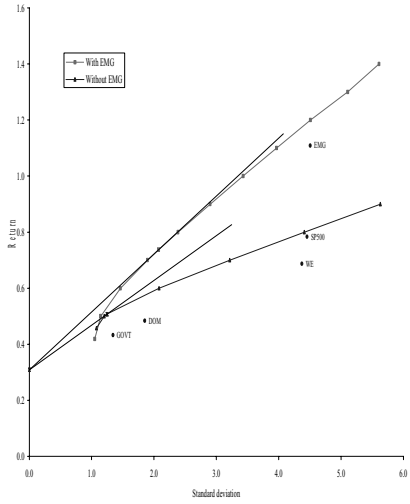
Panel A: Portfolio 1



Panel B: Portfolio 4



Panel C: Portfolio 5

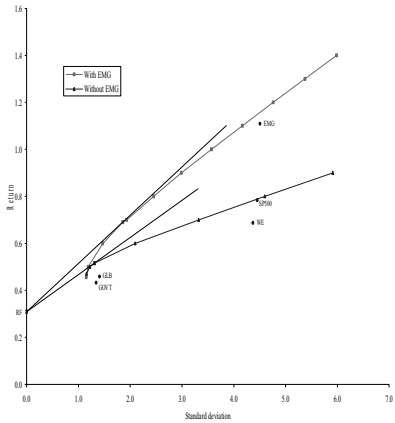


Panel D: Portfolio 6

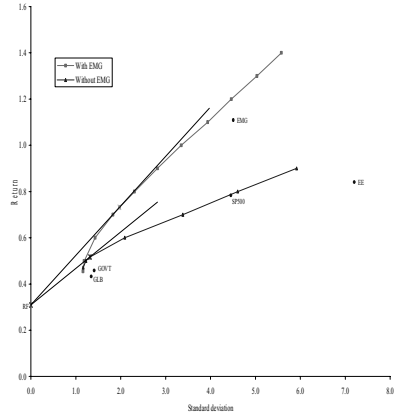
Figure 2

Efficient frontiers of benchmark assets with and without emerging bond funds

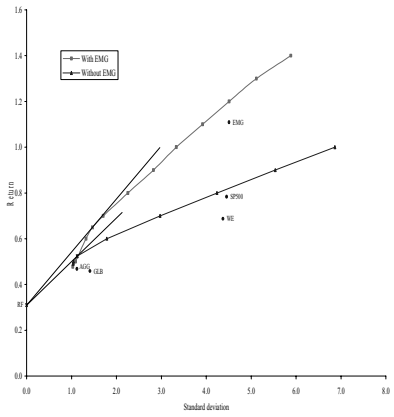
Efficient frontiers are plotted based on monthly return and standard deviation during the sample period of 1998–2005. AGG is aggregate bond funds, EMG is emerging bond funds, DOM is domestic bond funds, GLB is global bond funds, GOVT is U.S. government bond funds, SP500 is S&P 500 index funds, WE is world equity funds and EE is emerging equity funds.



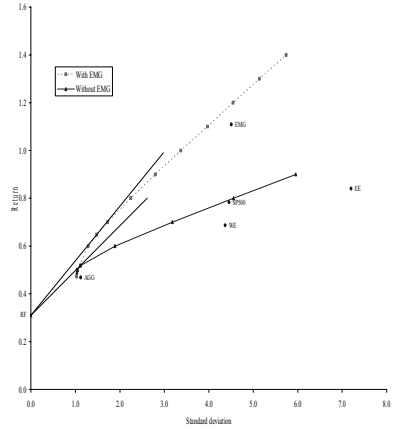
Panel E: Portfolio 8



Panel F: Portfolio 9



Panel G: Portfolio 10



Panel H: Portfolio 11

Figure 2

Continued

Blake (1996a) method, which involves performance rankings during two periods: (a) a measurement period and (b) an evaluation period. During the measurement period, we rank funds based on four performance measures: (a) a one-year holding period return (one-year HPR), (b) a three-year holding period return (three-year HPR), (c) the average monthly Sharpe ratio over a one-year period (one-year SHR) and (d) the average monthly Sharpe ratio over a three-year period (three-year SHR). During the evaluation period, we rank funds based on the average monthly Sharpe ratio

Table 7

Realized Sharpe ratios and ranking correlations for different ranking criteria

In Panel A, the realized Sharpe ratio is the average monthly ratio of emerging bond funds realized in the year following the selection periods. In the selection period, emerging funds are ranked and placed in deciles on the basis of one- and three-year holding period return (HPR) and one- and three-year Sharpe ratio (SHR). The ranking correlation is the correlation of performance rankings between two periods: selection period and evaluation period. The selection period is either a one- or three-year period. The evaluation period is one year subsequent to the selection period. The numbers in parentheses in Panel A are *p*-values testing for the zero ranking correlation, and the numbers in parentheses in Panel B are *p*-values testing for the zero difference.

	Deciles formed on the basis of:			
Deciles	One-year HPR	Three-year HPR	One-year SHR	Three-year SHR
Panel A: Realized Sharpe ratios and ranking correlations				
Top 1	0.1860	0.2755	0.2414	0.2761
2	0.2540	0.2273	0.2379	0.2632
3	0.2271	0.2010	0.2363	0.2175
4	0.1937	0.1998	0.2190	0.2175
5	0.2330	0.2181	0.2325	0.2028
6	0.1993	0.1818	0.1995	0.1792
7	0.1982	0.1861	0.1860	0.1947
8	0.2033	0.1839	0.1727	0.1765
9	0.1810	0.1456	0.1689	0.1280
Bottom 10	0.0988	0.1793	0.0880	0.1385
Rank correlation	0.2264	0.2999	0.4309	0.4856
	(< 0.0001)	(< 0.0001)	(< 0.0001)	(< 0.0001)
Panel B: Difference in Sharpe ratios between top and bottom deciles and between top decile and average funds				
Top vs. bottom	0.0872	0.0962	0.1535	0.1376
	(0.1020)	(0.0268)	(0.0024)	(0.0143)
Top vs. average	−0.0161	0.0733	0.0392	0.0739
	(0.2937)	(0.0003)	(0.0014)	(< 0.0001)

over a one-year period following the measurement period. A significantly positive correlation of rankings between the two periods indicates performance persistence and manager skill.

The results are at the bottom of Panel A in Table 7. The column headings show the criteria used to rank the funds during the measurement period. The correlations of all ranking criteria are significantly positive. The correlation based on three-year SHR is the highest (0.49) and the correlation based on one-year HPR is the lowest (0.23). The correlation for three-year HPR is 0.3 and the correlation for one-year SHR is 0.43. These results suggest that (a) information about past performance can

help earn higher risk-adjusted returns, (b) a three-year measurement period provides higher predictability than a one-year measurement period and (c) the Sharpe ratio is a better predictive measure of future performance than holding period return. The second finding differs from Polwitoon and Tawatnuntachai (2006), who report that the one-year measurement period has higher predictive power than the three-year measurement period for global bond funds. For all ranking criteria, the ranking correlations of emerging bond funds are greater than the correlations of global bond funds. For example, based on three-year SHR, the ranking correlation of emerging funds is about twice as much as the correlation of global funds (0.22). However, the ranking correlations of emerging bond funds are still lower than the correlations of equity funds (between 0.87 and 1.00) reported by Elton, Gruber, and Blake (1996a).

In Table 7, Panel B, we compare the performance of the top decile with that of the bottom decile and average funds to examine whether past performance can help earn higher risk-adjusted returns. For all ranking criteria except one-year HPR, the differences in Sharpe ratios between top and bottom deciles are significantly positive, ranging from 0.10 to 0.15 per month. Compared with the average, top decile funds significantly outperform (between 0.04 and 0.07) for all ranking criteria except one-year HPR. The results suggest that investors who select top decile funds based on three-year HPR, one-year SHR or three-year SHR earn significantly higher risk-adjusted return in the subsequent period than those who choose bottom decile or average funds.[10]

Next, we examine the usefulness of performance persistence in selecting emerging bond funds to combine with existing assets (see Section 5.1). We test whether investors who hold portfolios of average emerging funds and existing assets (called *benchmark portfolios*) can earn higher risk-adjusted returns by replacing average emerging funds with top quintile emerging funds ranked by three-year SHR (called *top portfolios*). We find that for all existing assets, the Sharpe ratios during the one-year period following the ranking period of the top portfolios are higher than those of the corresponding benchmark portfolios. As expected, the difference in Sharpe ratios between top and benchmark portfolios increases as the proportion of emerging funds in the portfolios increases. The gains are highest for the top portfolios with aggregate bond funds and lowest for the portfolios with emerging equity funds. However, given that 62% of emerging bond funds are load funds and the average load charged during the sample period is 1.72%, the gain of the top portfolios is offset by loads.

[10] Persistence in performance implies that managers have selection skills. Turnover is an indication that managers employ their skills by trading more frequently (see Gruber, 1996). We test whether emerging funds with high turnover earn higher risk-adjusted returns than those with low turnover. We find no support. A possible explanation of no relation between risk-adjusted returns and turnover is that turnover might not strictly be a function of active trading for bond funds due to some natural turnover. Managers of bond funds simply replace maturing bonds with new bonds. We thank a referee for suggesting this explanation.

Therefore, we conclude that, taking transaction costs into account, the average portfolio is well diversified and no diversification gain can be realized from the performance persistence of emerging bond funds.

6.2. Seasonality

Prior studies provide mixed results regarding seasonality of bonds and bond funds. Chang and Pinegar (1986) report a January effect for noninvestment-grade bonds. They explain a high return in January by year-end tax-loss selling. Wilson and Jones (1990) find a January effect of corporate bonds in early subperiods of their sample period but not in later subperiods. Polwitoon and Tawatnuntachai (2006) find no seasonality for global bond funds. To examine seasonality of emerging bond funds, we run regressions between the average monthly performance of the funds, total and risk-adjusted returns, and dummy variables for each calendar month except March, which we use as the comparison month because the average return (0.996%) in March is closet to the average return (0.997%) of all months for the funds. We also add three control variables: ESBI return and risk-adjusted return for the return and risk-adjusted return models, respectively and two dummy variables for the two declining periods of the Asian and Russian bond markets. If emerging funds exhibit seasonality patterns, we should observe significant coefficients on one or more calendar month variables.

The results are in Table 8. For Regression 1, where the dependent variable is total return, the coefficients for November and December are significantly positive at 0.98 and 1.22, respectively. The coefficients of November (0.21) and December (0.26) are also significantly positive in Regression 2, where the dependent variable is the Sharpe ratio. The coefficients of other calendar months, including January, are not significant in either regression. Positive coefficients for November and December indicate that emerging bond funds exhibit seasonality in November and December; namely, after controlling for the index's performance, the funds earn higher total returns and risk-adjusted returns in November and December than in other months.

Although not consistent with other studies, these findings resemble Wermers (2000) and Gallagher and Pinnuck (2006), who suggest that equity funds earn abnormally high returns in December. Wermers finds that equity fund returns resulting from managers' stock selection skills are larger in May, November and December, with the selectivity returns significantly largest in December. Gallagher and Pinnuck find that the returns of Australian equity funds are greater than normal in the month of December, possibly due to window dressing and the Christmas effect. We speculate that, similar to equity fund managers both in the United States and Australia, emerging bond fund managers in our sample concentrate their best trades or best efforts toward the end of the year, possibly in an effort to window dress the portfolios for the year-end disclosure.

Table 8

Seasonality regressions for emerging bond funds

In Regression 1, performance is measured by mean monthly returns of the funds. In Regression 2, performance is measured by mean Sharpe ratios of the funds. The Sharpe ratio is the ratio of monthly return in excess of three-month U.S. T-bills divided by standard deviation of monthly returns. The independent variables consist of monthly returns and Sharpe ratios of Citigroup Global Emerging Market Sovereign–Capped Bond (ESBI) and two sets of dummy variables that represent (a) the months of January to December except March and (b) two periods of volatile bond markets (i.e., July–September 1997 for 1997 Asian crisis and July–September 1998 for 1998 Russian default). The number of observations for both regressions is 120, the number of months during the sample period. *t*-statistics are in parentheses.

Variables	Regression 1: Return	Regression 2: Sharpe ratio
Intercept	−0.3792	−0.0704
	(−0.9219)	(−0.8138)
ESBI	1.1366***	0.8459***
	(33.1040)	(32.1471)
January	0.3682	0.0713
	(0.6361)	(0.5844)
February	0.8656	0.1888
	(1.4952)	(1.5477)
April	0.2763	0.0510
	(0.4774)	(0.4185)
May	0.2196	0.0493
	(0.3787)	(0.4038)
June	0.2634	0.0527
	(0.4550)	(0.4324)
July	0.0476	0.0018
	(0.0805)	(0.0142)
August	0.2566	0.0650
	(0.4337)	(0.5217)
September	−0.5113	−0.1098
	(−0.8613)	(−0.8776)
October	0.3336	0.0734
	(0.5762)	(0.6017)
November	0.9825*	0.2091*
	(1.6948)	(1.7126)
December	1.2177**	0.2647**
	(2.1038)	(2.1709)
Asian crisis	−0.4435	−0.0985
	(−0.5589)	(−0.5896)
Russian default	−3.8026***	−0.7449***
	(−4.6740)	(−4.3415)
Adj. R^2	0.9175	0.9129
F-statistics	95.56	90.95

***,**,* indicate statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

6.3. Relation between performance and fund characteristics

To test whether fund characteristics explain the performance of emerging bond funds, we run the regression:

$$\begin{aligned} Performance_i = {} & \alpha + \beta_1 \times Maturity_i + \beta_2 \times Country\ Risk_i \\ & + \beta_3 \times Expense_i + \beta_4 \times Load_i + \beta_5 \times Size_i + \beta_6 \times Tenure_i \\ & + \beta_7 \times Turnover_i + \beta_8 \times Minpurchase_i + \varepsilon_i. \end{aligned} \tag{2}$$

We estimate the regression at the fund level to reduce heteroskedasticity and the influence of the funds with longer survivorship. We measure performance using the average monthly return and the Sharpe ratio over the sample period. The independent variables are mean variables over the sample period. Two variables are used as controls: (a) maturity, which captures basic risk characteristic of the funds and (b) country risk, which measures the credit risk of the funds' portfolios.[11] The other variables in the regression, which measure operational characteristics, are used to explain the performance of equity funds. Because some funds require a high minimum initial purchase, they might be less accessible to the general public. To test the relation between limited access and fund performance, we include the Minpurchase variable, which is a dummy variable that takes a value of one for funds with minimum initial purchase of $1 million.[12]

Table 9 presents the results. Performance is measured by total return in the first three regressions and Sharpe ratio in the last three regressions. As expected, the maturity variable is significantly positive. The positive coefficient of maturity reflects maturity risk premium. Both return and the Sharpe ratio are positively related to the country risk variable, which suggests that emerging funds holding bonds from riskier countries earn higher returns and risk-adjusted returns. The coefficients of expense and load are negative in all regressions and significant in most regressions. The negative coefficients of both variables suggest that funds that charge a high expense ratio and load underperform those with low expense ratios and loads. The findings of negative coefficients of expense and load are consistent with prior equity fund literature such as Dellva and Olson (1998) and Chen, Hong, Ming, and Jeffrey (2004).

[11] We use country risk and average credit rating to capture credit risk of the funds. Country risk is a value-weighted average of the OECD credit risk of the countries from which bonds are issued. For average credit rating, we assign 1 for credit rating of BBB, 2 for BB, and so on. We find that the average credit rating variable is not significant. The insignificance of the credit variable could be because funds in the sample are of comparable credit quality. We thank a referee for suggesting the country risk factor.

[12] We also include age and family variables in the regression. Age is defined as number of months that a fund has been in operation until deceased or December 2005, whichever is later. Family is measured by natural log of net assets of all bond funds excluding the sample fund managed by a family. We include the family variable to capture the positive effect of size of family on performance of equity funds (Chen, Hong, Ming, and Jeffrey, 2004). Neither independent variable is significant (results not tabulated). Inconsistent with Chen, Hong, Ming, and Jeffrey (2004), the finding of insignificant coefficient of family variable indicates that size of fund family does not significantly affect performance of emerging bond funds.

Table 9

Regressions between fund performance and characteristics

In Regressions 1 through 3, performance is measured by the average monthly return. In Regressions 4 through 6, performance is measured by the average monthly Sharpe ratio. The Sharpe ratio is the ratio of monthly return in excess of three-month U.S. T-bills divided by the standard deviation of monthly returns. Maturity is average maturity of bonds in a fund. Country risk index is a value-weighted index of Organization for Economic Cooperation and Development's credit risk of countries where bonds are issued (the higher the index, the higher the credit risk). Expense is operating expenses and management fees including 12b-1 fees expressed as a percentage of net assets. Load is the total of initial and deferred sales charges. Size is natural log of one plus net assets (in million U.S. dollars) of a fund. Tenure is number of years that the current management team had been with the fund. Turnover is the ratio of the lesser of purchases or sales to average monthly net assets. Minpurchase is a dummy variable taking a value of one for funds with minimum initial purchase greater than $1 million and zero otherwise. Fund characteristics are obtained from CRSP and Morningstar. The independent variables for each fund are mean values across the sample period. The number of observations in Regressions 3 and 6 is 48 due to unavailability of portfolio holdings of two funds. For the rest of the regressions, the number of observations is 49 due to unavailability of maturity of one fund. *t*-statistics are in parentheses.

	Regression					
	Performance: Return			Performance: Sharpe ratio		
Variables	1	2	3	4	5	6
Intercept	0.1852	−0.0662	−0.5564*	−0.0123	−0.0462	−0.0701
	(0.7419)	(−0.2593)	(−1.9518)	(−0.2310)	(−0.8093)	(−1.0265)
Maturity	0.0609***	0.0684***	0.0525***	0.0154***	0.0164***	0.0147***
	(4.3748)	(5.0909)	(4.0997)	(5.1611)	(5.4477)	(4.8000)
Country risk			0.1869***			0.0215*
			(3.5567)			(1.7117)
Expense	−0.1516*	−0.0825	−0.1006	−0.0440***	−0.0347**	−0.0445**
	(−2.0023)	(−1.0808)	(−1.4181)	(−2.7191)	(−2.0328)	(−2.6231)
Load	−0.0522***	−0.0472***	−0.0351**	−0.0133***	−0.0127***	−0.0118***
	(−2.7858)	(−2.6589)	(−2.1620)	(−3.3300)	(−3.1912)	(−3.0255)
Size	0.0715***	0.0653***	0.0600**	0.0115**	0.0107*	0.0076
	(2.8008)	(2.7045)	(2.6743)	(2.1045)	(1.9728)	(1.4122)
Tenure	−0.0011	0.0078	0.0064	0.0015	0.0027	0.0000
	(−0.0451)	(0.3268)	(0.2879)	(0.2865)	(0.5132)	(0.0048)
Turnover	0.0557**	0.0514**	0.0230	0.0043	0.0037	0.0001
	(2.3481)	(2.2979)	(1.0757)	(0.8464)	(0.7435)	(0.0288)
Minpurchase		0.2836**	0.2428**		0.0382	0.0262
		(2.5215)	(2.3761)		(1.5194)	(1.0726)
Adj. R^2	0.5638	0.6130	0.6974	0.6004	0.6125	0.6462
F-statistics	11.33	11.86	14.54	13.02	11.84	11.73

***,**,* indicate statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

The finding of a negative expense ratio is also consistent with bond fund studies by Blake, Elton, and Gruber (1993), Detzler (1999) and Polwitoon and Tawatnuntachai (2006).

In all regressions except Regression 6, the size variable is significantly positively related to total return and risk-adjusted return, which contradicts the results for

equity funds (e.g., see Chen, Hong, Ming, and Jeffrey, 2004) but are consistent with Philpot, Hearth, Rimbey, and Schulman (1998) for investment-graded bond funds and Polwitoon and Tawatnuntachai (2006) for global bond funds. The positive relation of size indicates that large bond funds might benefit from economies of scale. Consistent with equity fund literature, total return is positively related to turnover in Regressions 1 and 2. However, the coefficient of turnover is insignificant in Regression 3 when the country risk factor is added and in Regressions 4, 5 and 6, in which the Sharpe ratio is used as a performance measure. These results suggest that although actively managed emerging funds earn higher total return, they do not perform better after adjusting for risk.

The dummy variable on minimum purchase is significant in the total return model but not in the risk-adjusted return. We interpret the result as possible evidence in support of favoritism in mutual fund families as proposed by Gaspar, Massa, and Matos (2006). We contend that, under the same fund family, funds with a high minimum purchase are likely to contribute the most to profits of the family and, hence, are treated favorably. Therefore, the funds might get more resources and generate better performance. Overall, the results in Table 9 suggest that, after controlling for maturity and country risk, low expense and low load funds perform well on a risk-adjusted basis during the sample period.

7. Conclusion

The improving economic stability of emerging countries together with an increase in debt financing of these countries creates a renewed investment opportunity for U.S. investors who seek high-yield and international exposure. Emerging market bond funds offer a convenient way for investors to realize the opportunity. In this study, we examine various aspects of U.S.-based emerging market bond funds from the perspective of U.S. investors, using a unique sample of both surviving and nonsurviving funds during the ten-year sample period from 1996 to 2005, which covers the complete cycle of ups and downs of dominant emerging bond markets.

Consistent with prior bond and equity fund literature, we find that emerging funds underperform benchmark indexes. However, the funds outperform not only comparable domestic bond funds but also global bond funds on both total and risk-adjusted returns. These results are robust to both conditional and unconditional models. Further analysis shows that country-specific and liquidity risks explain about 80% of the outperformance, whereas exchange-rate return explains only 5%. We also find that emerging funds are a viable asset to add to an existing portfolio of various asset classes. By including 20% emerging funds in their portfolios, U.S. investors can enhance the portfolio returns by 0.81% to 1.53% per year without increasing risk. The diversification benefits of emerging funds also persist for diversified portfolios that combine U.S. and international bonds and stocks.

Emerging funds exhibit persistence in performance, which can help investors pick future winners. Some fund characteristics are related to return. On a total

return basis, turnover and fund size (but not size of fund family) enhance returns. We also find evidence that fund families in our sample might favor high net worth investors and institutional investors. However, the effects of size, turnover and favoritism are insignificant on a risk-adjusted return basis. Consistent with previous research, investors should avoid funds with high expense ratios and loads.

Appendix A: Conditional test

To allow for time-varying volatility, we also calculate conditional Sharpe ratios of emerging, domestic and global bond funds from the conditional mean and volatility using Equations (A.1) and (A.2). Assuming that the return series follow GARCH(1,1) processes,

$$r_{i,t} = \alpha + \beta_1 r_{i,t-1} + \beta_2 SPREAD_{i,t-1} + \beta_3 EQRET_{i,t-1} + \beta_4 BONDRET_{i,t-1} + \varepsilon_{i,t} \quad \text{(A.1)}$$

$$h_{i,t} = \omega + \gamma \varepsilon_{i,t-1}^2 + \lambda h_{i,t-1}, \quad \text{(A.2)}$$

where $r_{i,t}$ = return of emerging, domestic and global bond funds at month t, $SPREAD_{i,t-1}$ = lag of term spread, measured by the return difference between long- and short-term Citigroup Non-U.S. World Government Bond Index for emerging funds, LB U.S. Government Bond Index for domestic funds and WGI for global funds at month $t-1$; $EQRET_{i,t-1}$ = lag of stock market return, measured by MSCI Emerging Equity Index return for emerging funds, S&P 500 Index return for domestic funds and MSCI World Equity Index return for global funds at month $t-1$; and $BONDRET_{i,t-1}$ = lag of cross-market bond return, measured by the domestic index return for emerging funds, and the ESBI return for domestic and global funds at month $t-1$. The independent variables in Equation (A.1) are used to estimate the conditional mean and volatility of the funds because prior studies (e.g., Ilmanen, 1995) find that these variables are useful in predicting domestic and international bond returns. The lags of these variables can be viewed as information available to fund managers prior to time t.

Over the full sample period, the conditional Sharpe ratio of emerging funds is 0.1455, which is significantly higher than the ratios of domestic funds (0.0625) and global funds (0.035). For the first (second) subperiod, the ratios are 0.1253 (0.1693) for emerging funds, 0.004 (0.0984) for domestic funds and −0.038 (0.1729) for global funds. The difference in Sharpe ratios between emerging and domestic funds is significant at 1% for both subperiods. The difference in Sharpe ratios between emerging and global funds is significant at 1% in the first subperiod, but insignificant in the second subperiod. These findings suggest that emerging funds outperform domestic and global funds and are consistent with the conclusion based on the unconditional Sharpe ratio previously presented.

We also calculate the incremental diversification benefit ($SHR_{emg} - SHR_p \times \rho_{emg,p}$) using conditional Sharpe ratios and a conditional correlation. To estimate the conditional correlation between emerging and domestic (global) bond funds, we use a bivariate system of equations. Following Bollerslev, Engle, and Wooldrige (1988), we assume a GARCH(1,1) structure of conditional variances between emerging and domestic fund returns:

$$r_{i,t} = \alpha + \beta_1 r_{i,t-1} + \beta_2 SPREAD_{i,t-1} + \beta_3 EQRET_{i,t-1} + \beta_4 r_{j,t-1} + \varepsilon_{i,t} \quad \text{(A.3)}$$

$$h_{ij,t} = \omega_{ij} + \gamma_{ij}\varepsilon_{i,t-1}\varepsilon_{j,t-1} + \lambda_{ij} h_{ij,t-1} \quad \text{(A.4)}$$

$$\rho_{ij,t} = h_{ij,t} \Big/ \sqrt{h_{ii,t} h_{jj,t}}, \quad \text{(A.5)}$$

where $r_{i,t}$ = portfolio return of emerging and domestic (global) funds at month t, $\rho_{ij,t}$ = conditional return correlation between emerging and domestic (global) fund portfolios at month t, and all other variables are defined the same as in Equations (A.1) and (A.2). The average conditional correlation between emerging and domestic (global) funds is 0.683 (0.3706). Using the conditional Sharpe ratios and a correlation, the incremental diversification benefit for domestic (global) funds is 0.1083 (0.1317), significantly different from zero at 1% level. This finding is consistent with the results in Table 5.

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