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# The performance of global bond mutual funds ☆

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**Abstract**

This paper studies the risk and return characteristics of global bond mutual funds during 1988–95. These actively managed funds did not demonstrate superior performance, net of expenses, against a wide range of benchmarks and performance was negatively related to fund expenses. During the sample period, returns on global bond funds were sensitive to exchange rate movements, even after controlling for local currency returns on country bond indices. The funds had high exposure to the European, the Canadian, and the US bond markets and were least sensitive to the Japanese Bond index and movements in Japanese Yen. The funds did not outperform a US Bond index, suggesting that expenses might have outweighed diversification benefits during the sample period. © 1999 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

The global bond market is the largest segment of the global financial markets, totaling $22.8 trillion in 1995, 28% larger than the global equity market (Levich, 1998). In addition to the substantial size of the global bond market, studies have shown that non-US bonds play a critical role in a diversified global portfolio. Solnik (1991) and Jorion (1989) show that adding global bonds to a portfolio of global stocks reduces the risk of the portfolio without lowering its return. They also show that a balanced global portfolio is superior to a balanced US portfolio. Eun and Resnick (1994) show that "For US investors, the international bond diversification with exchange risk hedging offers a superior risk–return trade-off than the international stock diversification, with or without hedging". Results from these studies suggest that US investors should include non-US bonds in a well-diversified portfolio.

Mutual funds provide a convenient method for investors to invest in non-US as well as domestic bonds. Funds that specialize in global bonds are a recent phenomenon. [1] The *Morningstar Mutual Fund Source Book*, a leading mutual fund publication, started a separate category for these funds in the Fall 1988 edition. As of today, global bond funds form a very small fraction of investors' portfolios. Global bond funds also provide an opportunity to investigate the impact of exchange rate movements on the performance of actively managed portfolios. Investors often consider the volatility of exchange rates an additional risk of foreign securities and many managers of global bond funds state in the prospectus that they may use currency options and futures to hedge against exchange rate risk. Eun and Resnick (1994) show that a portfolio of global bonds benefits the most from hedging exchange rate risk compared to a portfolio of global stocks and a balanced global portfolio. Glen and Jorion (1993), Levich and Thomas (1993), and Jorion (1994) show that different currency hedging strategies (including no hedge) lead to very different performance. Glen and Jorion (1993) also show that applying an optimum currency hedging strategy to a bond portfolio produces the largest improvement over an unhedged portfolio. Therefore, it is possible for managers of global bond funds to improve their performance by hedging currency risk effectively.

This is the first study to examine the risk and return characteristics of global bond mutual funds. Three main hypotheses are tested in this paper. First, I test whether global bond mutual funds have superior performance relative to

[1] Global and world bond funds usually invest in both US and non-US bonds. International bond funds usually invest exclusively in non-US bonds. For brevity and because the majority of the funds in the sample are global bond funds, the funds in this paper will be referred to as global bond funds. I thank an anonymous referee for suggesting the clarification.

various benchmarks. The sample includes global bond funds in existence since 1988 and their monthly returns from November 1988 through November 1995. One of the contributions of this study is to identify benchmarks for performance evaluation. Two single-index and three multi-index benchmarks are examined. These benchmarks contain US and non-US government bond indices, a World Bond Index, a corporate bond factor, and exchange rates. The five benchmarks also provide insights on the investment style of global bond fund managers. The multi-index benchmarks allow the funds' sensitivities to country bond indices and exchange rate movements to be estimated explicitly. Two of the multi-index benchmarks explain over 70% of the return variations in global bond funds. The explanatory power of these benchmarks is similar to that of the US bond index used by Blake et al. (1993) to study US bond funds.

In the second hypoethesis, I test whether global bond funds provide diversification benefits to US investors. Using market-value-weighted bond indices Levy and Lerman (1988) show that adding non-US bonds improves the performance of the US bond index. However, the benefits from diversifying globally may be offset if fund managers incur excessive expenses or charge high management fees. Therefore, whether US investors can actually obtain diversification benefits through mutual funds (after expenses) is an empirical question.

Since expenses affect returns on mutual funds, the third hypothesis tests the relationship between expenses and performance. Mutual fund expenses include management and administrative fees as well as trading costs. A common argument for high management fees is to retain good managers. If superior management produces higher returns that compensate for higher fees, there should be a positive or neutral relationship between expenses and performance.

This paper is organized as follows. Section 2 describes the mutual fund sample and the performance measure. Section 3 discusses the five benchmarks used for performance evaluation. Section 4 presents the empirical results and Section 5 examines the relationship between performance and fund expenses. Section 6 provides a brief summary and conclusions.

## 2. Sample and methodology

### *2.1. Global bond mutual funds*

Morningstar first began a category for mutual funds that specialize in global bonds in the Fall 1988 edition of *Mutual Fund Source Book*. Another popular mutual fund publication, The *Wiesenberger Investment Companies Yearbook*, started a classification for global bond funds in 1991. Both publications are

used to identify global bond funds for this sample. [2] Funds that invest primarily in short-term instruments or preferred stocks are excluded. The sample contains 19 global and international bond funds with inception dates before November 1988. The *Morningstar OnDisc* database provides monthly total returns on these funds from November 1988 through November 1995. [3] I cross check and supplement the *OnDisc* database using the *Mutual Funds Update/Weisenberger*, a monthly publication by Wiesenberger. Monthly total returns in US$ are computed as the percentage change in monthly net asset value, reinvesting all income and capital gain distributions during that month. The total returns do not adjust for load and redemption fees but are net of management, administrative, 12b-1 fees, and other costs automatically taken out of fund assets. [4] Excess monthly returns equal monthly total returns minus returns on the 30-day US Treasury Bill. Panel A in Table 1 lists the funds in the sample and their summary statistics. The average excess returns on the 19 funds range from 0.0834% to 0.3875%, averaging 0.2317% per month. The standard deviations of monthly excess returns are less dispersed, ranging from 1.4507% to 2.9838%.

The *Morningstar OnDisc* database and the *Mutual Funds Update/Weisenberger* contain monthly return data for funds that are in operation. These two databases began in 1992 and only annual returns are available for funds that were discontinued before 1992. Five funds were de-listed from the publications between 1990 and 1992 and two funds were liquidated in 1990. Returns on the discontinued funds during their existence average 0.02% per month below the 19 funds in the sample. [5] Therefore, the reported performance may be overstated because the sample does not include the discontinued funds. However, the average performance of the sample is negative, thus the conclusion that global bond funds do not outperform the benchmarks is unaffected by the discontinued funds. The next section discusses the models used to estimate performance.

[2] I search for funds in the 1989 *Investment Companies Yearbook* that have I (Income) as their primary objective, and "C&I" (Canadian and International) as their investment policy, and funds that have Bond as their investment policy and names with the words: "international", "world", "global", "foreign", and "bond" or "fixed income". The sample of global bond funds is chosen from this group based on the funds' descriptions.

[3] Smith Barney Shearson Global Bond B was merged with Smith Barney Short-term World B in December 1994 and TNE Global Government A was merged into TNE Bond Income A in March 1995. Monthly returns up to the month of the mergers were used when analyzing these two funds.

[4] Other costs include direct and indirect trading costs such as brokerage commissions and bid–ask spreads.

[5] The difference was computed using the average annual return on the discontinued funds and the funds in the sample. The annual return difference was converted to a monthly basis because other statistics reported in this paper are based on monthly returns.

Table 1
Summary Statistics: November 1988–November 1995

| | Average monthly excess return (%) | Standard deviation (%) |
|---|---|---|
| *Panel A: Global Bond Mutual Funds* | | |
| Anchor International Bond | 0.2863 | 2.9838 |
| Capital World Bond | 0.3067 | 1.6110 |
| Fidelity Global Bond | 0.0910 | 1.8608 |
| Franklin Global Governments Income I | 0.1685 | 1.7712 |
| G.T. Global Governments Income A | 0.2272 | 1.9740 |
| G.T. Global Strategic Income A | 0.2927 | 2.9293 |
| Hancock Global Income B | 0.1148 | 1.4507 |
| Keystone American World Bond A | 0.0876 | 1.7885 |
| Lord Abbett Global Income | 0.3075 | 1.7823 |
| Merrill Lynch Global Bond A | 0.3183 | 1.8750 |
| MFS World Governments A | 0.3198 | 2.0398 |
| PaineWebber Global Income B | 0.1942 | 1.4993 |
| Putnam Global Governments Income A | 0.2571 | 1.8565 |
| Scudder International Bond | 0.3875 | 2.1526 |
| T. Rowe Price International Bond | 0.3629 | 2.6689 |
| Templeton Income I | 0.2324 | 1.5354 |
| Van Eck Global Income A | 0.2705 | 2.0768 |
| Smith Barney Shear Global Bond B | 0.0949 | 1.5862 |
| TNE Global Government A | 0.0834 | 1.7280 |

*Panel B: Salomon Brothers Government Bond Indices*

| | Average monthly excess return (%) | | | Standard deviation (%) | | |
|---|---|---|---|---|---|---|
| | In US Dollars | In local currency | Currency-hedged | In US Dollars | In local currency | Currency-hedged |
| Canada | 0.3567 | 0.4680 | 0.2698 | 2.5400 | 1.8238 | 1.8168 |
| Germany | 0.4924 | 0.1866 | 0.0625 | 3.4793 | 1.0807 | 1.0234 |
| Japan | 0.4441 | 0.1337 | 0.2704 | 3.9341 | 1.4367 | 1.4450 |
| UK | 0.3433 | 0.4596 | 0.1128 | 3.7922 | 2.0133 | 1.9950 |
| US | 0.3278 | na | na | 1.2955 | na | na |
| World | 0.3719 | na | na[a] | 1.8700 | na | na[a] |
| Broad™ | 0.3399 | na | na | 1.2168 | na | na |

| | Average monthly return (%) | Standard deviation (%) |
|---|---|---|
| *US indices (in US$)* | | |
| 30-day US Treasury Bill[b] | 0.4398 | 0.1636 |
| Corporate Bond Factor[c] | 0.0000 | 0.3592 |
| *Exchange Rates*[d] | | |
| Canadian Dollar | −0.1185 | 1.2522 |
| German Mark | 0.3071 | 3.3926 |
| Japanese Yen | 0.2984 | 3.3038 |
| British Pound | −0.1062 | 3.4419 |

Table 1 (Continued)

| *Panel C: Correlation Coefficients of Salomon Brothers Government Bond Indices (in US$)* | | | | | |
|---|---|---|---|---|---|
| | Canada | Germany | Japan | UK | US |
| Canada | 1.0000 | | | | |
| Germany | 0.0778 | 1.0000 | | | |
| Japan | 0.0623 | 0.6111 | 1.0000 | | |
| UK | 0.3200 | 0.6750 | 0.5258 | 1.0000 | |
| US | 0.5038 | 0.2980 | 0.2117 | 0.3378 | 1.0000 |

[a] The average monthly return and standard deviation for the Currency Hedged World Bond Index from Salomon Brothers are 0.2463 and 1.0312, respectively.
[b] Statistics for the 30-day Treasury Bill are based on total return, not excess return.
[c] The Corporate Bond Factor is the regression residuals of the Lehman Brothers Corporate Bond Index on the Lehman Brothers US Government Bond Index. By construction, the regression residuals sum to zero.
[d] Exchange rate movements are computed as the difference in monthly spot rates divided by the spot rate at the beginning of the month.

### 2.2. Performance measure

The Jensen measure (Jensen, 1968) is the intercept in a regression of mutual fund excess returns on benchmark excess returns. Five benchmarks are used to estimate fund performance and each benchmark contains one or more indices. The general form of the models estimated is

$$a_{i,t} = b_{i,0} + \sum_{k=1}^{K} p_{k,t} b_{i,k} + e_{i,t}, \tag{1}$$

where $a_{i,t}$ is the one-month excess return on fund $i$ in month $t$, $p_{k,t}$ is the one-month excess return on index $k$ in month $t$, $K$ is the number of indices in the benchmark, $b_{i,0}$ the Jensen measure for fund $i$, $b_{i,k}$ is the sensitivity of fund $i$ to index $k$, $e_{i,t}$ is the residual for fund $i$ in month $t$.

If the benchmark contains a single index, $K=1$, then (1) is analogous to the market model for evaluating equity funds. If the benchmark contains more than one index, (1) can be interpreted as a multi-index model. The coefficients ($b_{i,k}$) are the sensitivities of the funds to the indices. Buying funds with positive Jensen measures ($b_{i,0}$) increases the Sharpe ratio (excess return-to-standard deviation ratio) of the benchmark portfolio, implying that the benchmark portfolio benefits from adding the mutual funds either through higher return or lower risk. Therefore, I associate superior performance with positive Jensen measures. The null hypothesis is that global bond mutual funds do not outperform the benchmarks.

The benchmarks can also be interpreted as a buy-and-hold strategy and the estimated sensitivities represent the weights of the indices over the sample period. The Jensen measures represent the average difference in excess returns

from investing in the actively managed funds versus holding the indices. For the multi-index benchmarks, the regression chooses the weights such that the risk of the buy-and-hold indexing strategy best mimics the risk of the mutual funds in the sample. In this characterization, positive Jensen measures imply that actively managed funds earn higher risk-adjusted returns.

Dybig and Ross (1985) and Grinblatt and Titman (1989) show that if fund and benchmark returns are not jointly normal or are nonlinear, the Jensen measure in (1) may be biased. As a check, I also compute the Positive Period Weight measure (Grinblatt and Titman, 1989), which is more robust and not biased by nonlinearity. Qualitative results from the Positive Period Weight (PPW) measures are very similar to the Jensen measures. Grinblatt and Titman (1994) use US equity funds to compare several performance measures, including the Jensen and the PPW measures. They also find that different performance measures all lead to similar qualitative conclusions. In the interest of brevity, the discussions in Section 4 on empirical results only report the Jensen measures.

While studies show that performance is generally robust to different measures, the effects of different benchmarks on performance are less clear. Grinblatt and Titman (1994) and Lehman and Modest (1987) find that the choice of benchmarks has a great impact on the performance of equity funds. On the other hand, Blake et al. (1993) find that the overall performance of domestic bond funds are robust to several US bond benchmarks. The next section discusses the benchmarks for global bond funds.

## 3. Benchmarks for global bond mutual funds

### *3.1. Global bond indices*

The US, Japan, Germany, Canada, and the UK are among the largest participants in the global bond market. Together, the five countries represent 79% of the world bond market during the sample period. Other European countries are highly correlated with Germany. For example, the Netherlands has a correlation coefficient of 0.9942 with Germany and France has a correlation coefficient of 0.9511. Therefore, other European countries are not included in the benchmarks.

Monthly total returns on the government bond indices from these five countries are computed by Salomon Brothers in local currencies. [6] Issues in

[6] All data series used in this study, including returns on global, US, non-US bond indexes, and T-bill, as well as exchange rates and forward rates are obtained through Ibbotson Associates.

these indices have at least one year until maturity and the weights are based on market capitalization. Local currency returns are translated into US Dollar returns using monthly spot exchange rates. [7] In addition to local currency returns, Salomon Brothers also provides currency-hedged indices for these five countries. The currency-hedged indices are constructed by rolling one-month forward contracts as hedging instruments. The amount of each forward contract equals the face value of the principal amount, plus the interest that has already accrued, and the interest that is expected to accrue during the one-month investment period. Returns on the currency-hedged indices are stated in US$. The hedging method used by Salomon Brothers is often referred to as fully hedged or a unitary hedge ratio. As shown in Panel B of Table 1, the standard deviations of currency-hedged returns are much smaller than those of US dollar returns, and very similar to those of local currency returns for all four countries. However, hedging can be a double-edged sword. The average currency-hedged return on the Japanese index is higher than the average local currency return but the average currency-hedged returns on the Canadian, German, and the UK bond indices are lower than the local currency returns. Glen and Jorion (1993) show that the unitary hedge ratio is not the best hedging strategy and that an optimum hedging strategy can reduce a portfolio's risk without lowering its return.

The US Dollar, local currency, and currency-hedged returns capture the sensitivities of returns on global bond fund to the five country indices from different perspectives. The US Dollar returns represent an unhedged strategy and the currency-hedged returns represent a fully hedged strategy. The local currency returns capture the funds' sensitivities to the government bond indices separately from the effects of exchange rate movements.

Corporate bonds usually have higher default risk and higher returns than government bonds. Thus using only government bond indices does not capture performance related to the risk–return characteristics of corporate bonds. Unfortunately, monthly returns on non-US corporate bond indices are not available. [8] The Lehman Brothers (LB) Corporate Bond Index and the LB US Government Bond Index are used to create a proxy for corporate bonds. Both indices include bond issues with at least one year until maturity and are constructed using market value weights. By regressing the LB Corporate Bond Index on the LB Government Bond Index, the regression residuals are orthogonal to the LB Government Bond Index and thus represent the portion of

[7] Returns on bond indexes in local currencies are translated to US Dollar returns using the following equation: Foreign index return in US$ = (1 + Foreign index return in local currency) (Spot rate at $t$/Spot rate at $t-1$)$-1$.

[8] Ibbotson and Associates only provides annual returns on foreign corporate bond indices.

returns on corporate bonds that is uncorrelated to returns on US government bonds. The residuals are used as a proxy for the risk–return characteristics of US and non-US corporate bonds.

Another potential important factor affecting returns on global bond funds is exchange rate movements. [9] Panel B in Table 1 shows that the standard deviations of non-US bond indices are much higher when excess returns are measured in US Dollars versus in local currencies. Fig. 1 decomposes the US Dollar return variance into an exchange rate and a local currency return component. [10] For all countries except Canada, the exchange rate variance is larger than the local currency return variance, implying that exchange rate is the dominant factor affecting the volatility of non-US bonds. These findings are consistent with those by Eun and Resnick (1994) and Odier and Solnik (1993). Exchange rates may not have the same impact on mutual fund returns because managers can hedge against exchange rate risk.

### 3.2. Single-index benchmarks

Two single-index and three multi-index benchmarks are examined in this paper. The first single-index benchmark is the Salomon Brothers World Government Bond Index (the World Bond Index), one of the most widely tracked global bond indices. This index weighs each bond issue according to its market capitalization. All issues in the World Bond Index have a minimum of one year to maturity and monthly returns are stated in US Dollars. The World Bond Index is a good candidate for the single-index benchmark because many US and non-US bond issues available to mutual fund managers are represented in this index. It is also a well established, market-value-weighted, broad-based index, that can be implemented by a buy-and-hold strategy. Since the World Bond Index is not hedged against exchange rate risk, funds can outperform this benchmark by selecting superior bond issues, over/under-weighing specific countries, or by hedging currency risk effectively.

The second single-index benchmark is the Salomon Brothers Broad™ Index, which includes bond issues from the US government and US corporations. The

[9] Exchange rate movements are computed as the monthly change in spot rates divided by the spot rate at the beginning of the month.

[10] The variance of US Dollar returns on a non-US bond can be decomposed into the variance of local currency returns, the variance of exchange rate movements, the variance of the cross-product between exchange rate movements and local currency returns, and the covariances of the three factors. The variance and covariances of the cross-product are virtually zero for all countries. The covariance between local currency returns and exchange rate movements is small relative to their variances. Therefore, Fig. 1 only presents the variances of local currency returns and exchange rate movements.

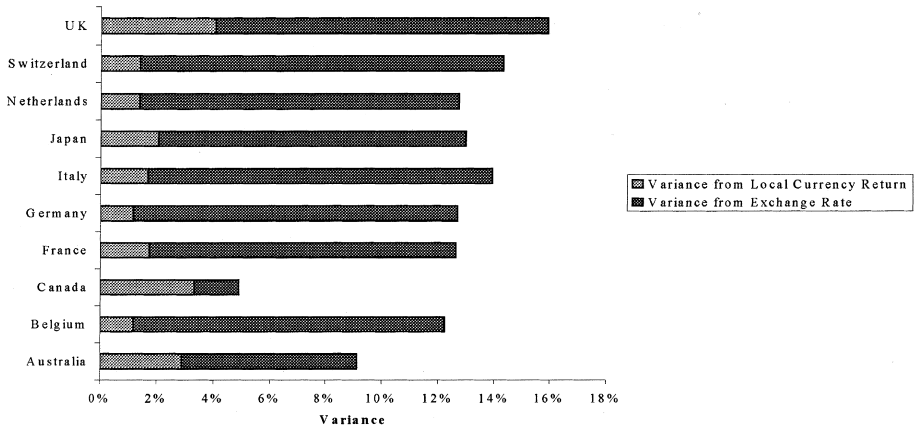


Fig. 1. Components of the variance of unhedged US$-denominated bond index returns, by country. Note: The sample period is from November 1988 through November 1995. The monthly returns in local currencies are computed by Salomon Brothers and the month-end exchange rates are provided by Ibbotson Associates. US$-denominated returns are computed as: $r_{\text{US\$}} = (1 + r_{\text{local currency}})(1 + r_{\text{exchange rate}}) - 1$. The variance of US$-denominated returns can be decomposed as: $\sigma^2_{\text{US}} = \sigma^2_{\text{local currency}} + \sigma^2_{\text{exchange rate}} + \sigma^2_{\text{local currency}\times\text{exchange rate}} + 2\,\sigma_{\text{local currency, exchange rate}} + 2\,\sigma_{\text{local currency, local currency}\times\text{exchange rate}} + 2\sigma_{\text{exchange rate, local currency}\times\text{exchange rate}}$. The variance and covariances of the cross-product ($\sigma^2_{\text{local currency}\times\text{exchange rate}}, \sigma_{\text{local currency, local currency}\times\text{exchange rate}}, \sigma_{\text{exchange rate, local currency}\times\text{exchange rate}}$) are virtually zero for all countries. $\sigma_{\text{local currency, exchange rate}}$ is small relative to $\sigma^2_{\text{local currency}}$ and $\sigma^2_{\text{exchange rate}}$. Therefore, Fig. 1 only presents $\sigma^2_{\text{local currency}}$ and $\sigma^2_{\text{exchange rate}}$.

Broad™ Index represents a well-diversified market value weighted US bond portfolio and is used to test whether global bond funds provide diversification benefits to US investors. If the funds outperform the Broad™ Index, then adding global bond funds can increase the Sharpe ratio of a domestic bond portfolio.

### *3.3. Multi-index benchmarks*

Three multi-index benchmarks are used to examine the effects of US and non-US bonds, exchange rate movements, and currency hedging on mutual fund returns and to gain some insight into managers' investment style. The first multi-index benchmark, the 10-Factor Benchmark, includes excess returns in local currencies on five government bond indices: Canada, Germany, Japan, the UK, and the US, the corporate bond factor, and exchange rate movements for the Canadian Dollar, German Mark, Japanese Yen, and British Pound. The estimated sensitivities represent the weights on the factors

chosen to best mimic the return characterisitcs of the mutual funds during the sample period. The 10-Factor Benchmark is difficult to beat. The implicit buy-and-hold strategy chooses the optimal weights on the bond indices and the exchange rates simultaneously. Glen and Jorion (1993) show that the best currency hedging strategy for a bond portfolio is to optimize the bond issues and the hedging instrument simultaneously. [11] The primary purpose of the 10-Factor Benchmark is to examine the return and risk characteristics of actively managed funds. In order to outperform the 10-Factor Benchmark, fund managers must be able to select superior bond issues within each country.

The second multi-index benchmark, the US$ Benchmark, has six factors, including the corporate bond factor and excess returns on five government bond indices in US Dollars: Canada, Germany, Japan, the UK, and the US. Since the US$ Benchmark is not hedged against exchange rate risk, this benchmark measures the unhedged exposure of the mutual funds to US and non-US bond indices. To outperform the US$ Benchmark, managers must select superior bond issues within each country or hedge exchange rate risk effectively.

The third multi-index benchmark, the Fully-hedged Benchmark, also has 6 factors, which are currency-hedged excess returns on the five government bond indices and the corporate bond factor. If fund managers employ a unitary hedge ratio, the Fully-hedged Benchmark will best capture the funds' return characteristics. Fund managers can outperform this benchmark by selecting superior bond issues within each country or by making superior hedging decisions. Glen and Jorion (1993) show that not hedging (the US$ Benchmark) and a unitary hedge ratio (the Fully-hedged Benchmark) are inferior currency hedging strategies. It is therefore feasible for fund managers to outperform these two benchmarks. The next section examines the performance of global bond mutual funds using these five benchmarks.

## 4. Empirical results

### *4.1. Performance of global bond mutual funds*

Table 2 presents the estimated Jensen measures for the 19 global bond mutual funds against the five benchmarks. As discussed earlier, fund returns

[11] Currency hedging instruments available to fund managers include options, futures, and forward contracts. I replace the exchange rate movements with payoffs from one-month forward contracts in the 10-Factor Benchmark and the results are very similar.

Table 2
Performance of Global Bond Mutual Funds[a]

| Global Bond Mutual Funds | World Bond Index | Estimated Jensen measures ($b_{i,0}$) | | | |
|---|---|---|---|---|---|
| | | 10-Factor Benchmark | US$ Benchmark | Fully-hedged Benchmark | Broad™ Index[b] |
| Anchor | −0.1780 | −0.0127 | −0.0494 | 0.0439 | 0.1481 |
| Capital World Bond | 0.0270 | 0.0086 | −0.0023 | 0.0514 | 0.0302 |
| Fidelity Global Bond | −0.1115 | −0.1531 | −0.1831 | −0.1347 | −0.1859 |
| Franklin Global Govt Income | 0.0198 | 0.0083 | −0.0402 | 0.0092 | −0.0491 |
| G.T. Global Govt Income A | −0.0184 | −0.1105 | −0.1213 | −0.0525 | −0.1163 |
| G.T. Global Strategic Inc A | −0.0148 | −0.1368 | −0.1973 | −0.1567 | −0.2150 |
| Hancock Freedom Global Inc B | −0.0782 | −0.1079 | −0.1136 | −0.0683 | −0.1047 |
| Keystone Amer World Bond A | −0.1823 | −0.2075 | −0.2316 | −0.1956 | −0.2164 |
| Lord Abbett Global Income | −0.0035 | −0.0888 | −0.0769 | −0.0210 | −0.0392 |
| Merrill Lynch Global Bond A | 0.0162 | −0.0061 | 0.0107 | 0.1050 | 0.0646 |
| MFS World Governments A | −0.0141 | 0.0197 | 0.0040 | 0.0738 | 0.0746 |
| PaineWebber Global Income B | −0.0121 | 0.0309 | −0.0120 | 0.0411 | 0.0060 |
| Putnam Global Govt Income A | −0.0002 | −0.0595 | −0.0619 | 0.0126 | −0.0357 |
| Scudder International Bond | 0.0672 | 0.0451 | 0.0662 | 0.1457 | 0.0990 |
| T. Rowe Price Intl Bond | −0.1365 | −0.0034 | −0.0411 | 0.0699 | 0.0946 |
| Templeton Income | 0.0523 | 0.0238 | −0.0057 | 0.0246 | −0.0142 |
| Van Eck World Income | −0.0434 | −0.0029 | −0.0340 | 0.0310 | 0.0288 |
| Smith Barney Shear Glob Bd B | −0.1072 | −0.1651 | −0.1367 | −0.0633 | −0.1129 |
| TNE Global Government A | −0.2345*** | −0.1994*** | −0.2393*** | −0.1306*** | −0.1628*** |
| Average Jensen measure | −0.0501 | −0.0588 | −0.0771 | −0.0113 | −0.0372 |

[a] The sample period is from November 1988 through November 1995. The model is $a_{i,t} = b_{i,0} + \sum_{k=1}^{K} p_{k,t} b_{i,k} + e_{i,t}$ where $a_{i,t}$ is the one-month excess return on fund $i$ in month $t$, $p_{k,t}$ the one-month excess return on index $k$ in month $t$, $K$ the number of indices in the benchmark, $b_{i,0}$ the Jensen measure for fund $i$, $b_{i,k}$ the sensitivity of fund $i$ to index $k$, and $e_{i,t}$ the residual for fund $i$ in month $t$. Significance levels: *** indicates 1%; ** indicates 5%; * indicates 10%.

[b] The World Bond Index is the Salomon Brothers World Government Bond Index. The 10-Factor Benchmark contains local currency returns on the Canadian, German, Japanese, UK, and US government indices, exchange rate movements on the Canadian Dollar, German Mark, Japanese Yen, and British Pound, and the corporate bond factor. The US$ Benchmark contains US dollar returns on the Canadian, German, Japanese, UK, and US government bond indices and the corporate bond factor. The Fully-hedged Benchmark contains currency-hedged returns on the Canadian, German, Japanese, UK, and US government bond indices and the corporate bond factor. The Broad™ Index is the Salomon Brothers Broad™ Index.

are net of expenses but benchmark returns do not account for trading costs needed to implement an indexing strategy. Therefore, the actual improvement in returns from investing in the mutual funds, versus holding the benchmarks, equals the Jensen measure plus the trading costs of index-

ing. [12] Table 2 shows that different benchmarks result in different estimated Jensen measures for individual funds. For example, the Anchor fund has a monthly Jensen measure of −0.1780% against the World Bond Index but a monthly Jensen measure of 0.1481% against the Broad™ Index. Lehmann and Modest (1987) and Grinblatt and Titman (1994) also find that different benchmarks produce different performance measure estimates.

Despite the benchmark-related variability in each fund's performance, the average Jensen measures are negative against all five benchmarks, ranging from −0.0113% to −0.0771% per month. The 1995 average monthly expense ratio for the funds in the sample is 0.1217%. Thus, it appears that global bond fund managers generate enough return to pay for most of their expenses. However, investors have not earned abnormal risk-adjusted return through these funds. The poor performance also suggests that investors would have been better off indexing one of the benchmarks if the trading costs of the buy-and-hold strategy are less than the Jensen measure (in absolute value).

As discussed in Section 3 the World Bond Index represents a simple buy-and-hold unhedged alternative to active management. With the World Bond Index as the benchmark, 14 funds have negative Jensen measures and five funds have positive measures. The Jensen measures range from −0.2345% to 0.0672%, averaging −0.0501% per month. Interestingly the only fund with significant negative performance is TNE Global Government A, which was merged into TNE Income Bond A in 1995. Many funds have lower Jensen measures against the 10-Factor Benchmark and the US$ Benchmark compared to the World Bond Index. The average Jensen measure against the 10-Factor Benchmark is −0.0588%, and the average Jensen measure against the US$ Benchmark is −0.0771%. The funds compare most favorably against the Fully-hedged Benchmark but the average Jensen measure is still negative at −0.0113%. Overall the funds as a group do not exhibit superior performance against any of the benchmarks.

The Adjusted *R*-squares in Table 3 indicate how well each model captures the investment style of fund managers. The World Bond Index has an average Adjusted *R*-square of 0.5549 whereas the 10-Factor Benchmark has an average

[12] *Morningstar* reports annual expense ratios on mutual funds. However, the *Morningstar* expense ratios do not include trading costs such as brokerage commissions and bid–ask spreads. The expense ratios include management, administrative, and 12b-1 fees. The monthly returns on mutual funds are computed net of all expenses. Unfortunately, information on trading costs for mutual funds cannot be extracted from the monthly return data.

Adjusted $R$-square of 0.7267. The higher explanatory power of the 10-Factor Benchmark suggests that fund managers probably deviate from the unhedged market-value weights in their country allocation and/or currency hedging

Table 3
Comparison of Benchmarks[a]

| | World Bond Index | 10-Factor Benchmark | US$ Benchmark | Fully-hedged Bench-mark | Broad™ Index[b] |
|---|---|---|---|---|---|
| Number of Best Fit | 0 | 15 | 4 | 0 | 0 |
| Average Adjusted $R^2$ | 0.5549 | 0.7267 | 0.7136 | 0.3812 | 0.2837 |
| Highest Adjusted $R^2$ | 0.8851 | 0.9306 | 0.9211 | 0.5608 | 0.4848 |
| Lowest Adjusted $R^2$ | 0.1782 | 0.4852 | 0.4776 | 0.1555 | 0.0275 |
| Global Bond Funds | $R^2$ | Adj. $R^2$ | Adj. $R^2$ | Adj. $R^2$ | $R^2$ |
| Anchor | 0.6121 | 0.9049 | 0.8797 | 0.1555 | 0.0275 |
| Capital World Bond | 0.7620 | 0.8682 | 0.8654 | 0.4651 | 0.3773 |
| Fidelity Global Bond | 0.2991 | 0.4852 | 0.4776 | 0.3347 | 0.2836 |
| Franklin Global Govt Income | 0.1782 | 0.5322 | 0.5009 | 0.3590 | 0.1935 |
| G.T. Global Govt Income A | 0.3914 | 0.6820 | 0.6293 | 0.5551 | 0.3880 |
| G.T. Global Strategic Inc A | 0.2785 | 0.5492 | 0.5280 | 0.4686 | 0.3848 |
| Hancock Freedom Global Inc B | 0.4473 | 0.6443 | 0.6541 | 0.3962 | 0.2934 |
| Keystone Amer World Bond A | 0.5758 | 0.7168 | 0.7042 | 0.4582 | 0.3701 |
| Lord Abbett Global Income | 0.7698 | 0.9118 | 0.9064 | 0.5608 | 0.4848 |
| Merrill Lynch Global Bond A | 0.6564 | 0.7642 | 0.7341 | 0.3467 | 0.2345 |
| MFS World Governments A | 0.6776 | 0.7614 | 0.7655 | 0.3080 | 0.1853 |
| PaineWebber Global Income B | 0.4786 | 0.7125 | 0.6944 | 0.2619 | 0.2019 |
| Putnam Global Govt Income A | 0.4859 | 0.6130 | 0.5880 | 0.4025 | 0.3187 |
| Scudder International Bond | 0.5598 | 0.6519 | 0.6484 | 0.2900 | 0.2301 |
| T. Rowe Price Intl Bond | 0.8851 | 0.9306 | 0.9211 | 0.2113 | 0.1295 |
| Templeton Income | 0.3478 | 0.7140 | 0.7161 | 0.4711 | 0.3306 |
| Van Eck World Income | 0.5776 | 0.6879 | 0.6907 | 0.1882 | 0.1736 |
| Smith Barney Shear Glob Bd B | 0.7292 | 0.7855 | 0.7756 | 0.5264 | 0.3666 |
| TNE Global Government A | 0.8313 | 0.8908 | 0.8794 | 0.4827 | 0.4168 |

[a] The sample period is from November 1988 through November 1995. The model is $a_{i,t} = b_{i,0} + \sum_{k=1}^{K} p_{k,t} b_{i,k} + e_{i,t}$ where $a_{i,t}$ is the one-month excess return on fund $i$ in month $t$, $p_{k,t}$ the one-month excess return on index $k$ in month $t$, $K$ the number of indices in the benchmark, $b_{i,0}$ the Jensen measure for fund $i$, $b_{i,k}$ the sensitivity of fund $i$ to index $k$, and $e_{i,t}$ the residual for fund $i$ in month $t$.

[b] The World Bond Index is the Salomon Brothers World Government Bond Index. The 10-Factor Benchmark contains local currency returns on the Canadian, German, Japanese, UK, and US government indices, exchange rate movements on the Canadian Dollar, German Mark, Japanese Yen, and British Pound, and the corporate bond factor. The US$ Benchmark contains US Dollar returns on the Canadian, German, Japanese, UK, and US government bond indices and the corporate bond factor. The Fully-hedged Benchmark contains currency-hedged returns on the Canadian, German, Japanese, UK, and US government bond indices and the corporate bond factor. The Broad™ Index is the Salomon Brothers Broad™ Index.

strategies. [13] At the same time, the Fully-hedged Benchmark has the lowest average Adjusted *R*-square of 0.3812, suggesting that fund managers probably do not fully hedge their currency exposures. Unfortunately, the active investment strategies of global bond funds do not seem to benefit investors as demonstrated by the funds' poor performance against all the benchmarks.

Even if global bond funds do not outperform the World Bond Index, they may still be a good investment for US investors seeking global diversification. Eun and Resnick (1994) find that when exchange rate risk is hedged, diversifying using international bonds provides a better risk–return trade-off than using international equity. Levy and Lerman (1988) show that adding non-US bonds to a US bond index can reduce its risk without lowering its return. Panel C of Table 1 shows that the correlation coefficients between non-US and US bond indices are very low, suggesting a great potential gain from diversification during the sample period. Surprisingly, 11 funds underperform the Broad™ Index with the Jensen measures ranging from −0.2164% to −0.1481%, averaging −0.0372% per month. The negative Jensen measures imply that adding those global bond funds to the Broad™ Index did not improve its Sharpe ratio. Since returns on the funds are net of expenses, one possible explanation for their poor performance against the Broad™ index is that fund expenses outweigh diversification benefits. The next section examines whether these benchmarks capture important attributes of the returns on global bond funds.

### *4.2. Determinants of returns on international bond mutual funds*

Table 3 compares the explanatory power of the five models based on their Adjusted *R*-squares. The 10-Factor Benchmark produces the highest Adjusted *R*-squares for 15 of the 19 funds, averaging 0.7267, and the US$ Benchmark has the second highest average Adjusted *R*-squares, at 0.7136. The explanatory power of these two benchmarks is similar to that of the US bond index used by Blake et al. (1993) to study domestic bond funds. This section examines the two multi-index benchmarks with the highest Adjusted *R*-squares in detail.

The regression coefficients on the corporate bond factor are insignificant for all funds. This result is not surprising because almost 25% of the funds in the sample restrict their investment to government bonds and the global government bond market is much larger than the global corporate bond market. Since the corporate bond factor appears to be relatively unimportant, the remaining tables do not report its coefficient estimates.

Table 4 contains the estimated sensitivities of returns on the global bond funds to exchange rate movements, and to returns on five government bond

[13] I thank an anonymous referee for pointing out the implied investment strategies of global bond mutual funds given the results in Table 3.

Table 4
Sensitivities of Global Bond Fund Returns to Government Bond Indices and Exchange Rate Movements[a]

| 10-Factor Benchmark | Canadian Dollar | | Canadian Bond Index | | German Mark | | German Bond Index | | Japanese Yen | |
|---|---|---|---|---|---|---|---|---|---|---|
| Global Bond Funds | $b_1$ | $t$ Statistics | $b_2$ | $t$ Statistics | $b_3$ | $t$ Statistics | $b_4$ | $t$ Statistics | $b_5$ | $t$ Statistics |
| Anchor | 0.0023 | 0.0250 | −0.0039 | −0.0410 | 0.8161 | 13.4440*** | 0.2979 | 2.2060** | 0.0199 | 0.4870 |
| Capital World Bond | 0.1715 | 2.9120*** | 0.1476 | 2.4400** | 0.0646 | 1.6730* | 0.2721 | 3.1700*** | 0.1011 | 3.8900*** |
| Fidelity Global Bond | 0.2888 | 2.1480** | 0.1798 | 1.3020 | −0.0161 | −0.1820 | 0.3913 | 1.9970** | −0.0202 | −0.3410 |
| Franklin Global Govt Income | 0.3711 | 3.0420*** | 0.3037 | 2.4240** | −0.0434 | −0.5420 | 0.4769 | 2.6820*** | −0.0680 | −1.2640 |
| G.T. Global Govt Income A | 0.3603 | 3.2140*** | 0.1787 | 1.5520 | −0.0616 | −0.8390 | 0.5102 | 3.1230*** | 0.0640 | 1.2930 |
| G.T. Global Strategic Inc A | 0.3807 | 1.9220* | 0.2738 | 1.3460 | −0.1296 | −0.9990 | 0.5770 | 1.9990** | −0.0440 | −0.5040 |
| Hancock Freedom Global Inc B | 0.1754 | 2.0140** | 0.1952 | 2.1820** | 0.0415 | 0.7270 | 0.2235 | 1.7600* | −0.0148 | −0.3860 |
| Keystone Amer World Bond A | 0.0920 | 0.9600 | 0.2048 | 2.0810** | −0.0281 | −0.4480 | 0.3389 | 2.4260** | 0.0440 | 1.0400 |
| Lord Abbett Global Income | 0.1976 | 3.7090*** | 0.0747 | 1.3660 | 0.2502 | 7.1650** | 0.1962 | 2.5270** | 0.0105 | 0.4470 |
| Merrill Lynch Global Bond A | 0.2696 | 2.9410*** | 0.1551 | 1.6470 | 0.2173 | 3.6160*** | 0.5327 | 3.9860*** | 0.0285 | 0.7050 |
| MFS World Governments A | 0.2101 | 2.0940** | 0.2556 | 2.4800** | 0.1813 | 2.7570*** | 0.3839 | 2.6260** | 0.0543 | 1.2260 |
| PaineWebber Global Income B | 0.2874 | 3.5500*** | 0.0829 | 0.9980 | 0.0372 | 0.7020 | 0.3426 | 2.9030*** | −0.0088 | −0.2470 |
| Putnam Global Govt Income A | 0.2844 | 2.4450** | 0.0663 | 0.5550 | 0.1430 | 1.8760* | 0.4721 | 2.7850*** | −0.0223 | −0.4350 |
| Scudder International Bond | 0.1014 | 0.7930 | 0.1758 | 1.3390 | 0.1312 | 1.5650 | 0.4551 | 2.4420** | 0.0115 | 0.2030 |
| T. Rowe Price Intl Bond | 0.1995 | 2.8180*** | −0.0048 | −0.0660 | 0.3089 | 6.6570 | 0.6833 | 6.6200*** | 0.2284 | 7.3090*** |
| Templeton Income | 0.2545 | 3.0780*** | 0.3143 | 3.7010*** | −0.0232 | −0.4280 | 0.0942 | 0.7820 | −0.0109 | −0.2980 |
| Van Eck World Income | 0.1899 | 1.6250 | 0.2297 | 1.9140* | 0.2855 | 3.7300*** | 0.1807 | 1.0610 | −0.0089 | −0.1720 |
| Smith Barney Shear Glob Bd B | 0.0163 | 0.2030 | 0.2281 | 2.7400*** | 0.1745 | 3.3540 | 0.3754 | 3.2990*** | 0.0503 | 1.2640 |
| TNE Global Government A | 0.1848 | 2.9600*** | 0.0268 | 0.4290 | 0.1218 | 3.1510*** | 0.3665 | 4.1780*** | 0.0780 | 2.7310*** |

Table 4 (Continued)

| 10-Factor Benchmark | Japanese Bond Index | | British Pound | | UK Bond Index | | US Bond Index | |
|---|---|---|---|---|---|---|---|---|
| Global Bond Funds | $b_6$ | $t$ Statistics | $b_7$ | $t$ Statistics | $b_8$ | $t$ Statistics | $b_9$ | $t$ Statistics |
| Anchor | 0.0623 | 0.7530 | 0.0162 | 0.3030 | −0.0335 | −0.4300 | −0.0069 | −0.0590 |
| Capital World Bond | 0.0946 | 1.7960 | 0.1798 | 5.2940 | 0.1180 | 2.3800 | 0.3074 | 4.1240*** |
| Fidelity Global Bond | 0.0327 | 0.2720 | 0.2077 | 2.6800*** | 0.1020 | 0.9010 | 0.3137 | 1.8430* |
| Franklin Global Govt Income | 0.0364 | 0.3340 | 0.2259 | 3.2120*** | 0.0244 | 0.2380 | 0.0446 | 0.2890 |
| G.T. Global Govt Income A | 0.0491 | 0.4890 | 0.1758 | 2.7200*** | 0.1467 | 1.5540 | 0.4458 | 3.1420*** |
| G.T. Global Strategic Inc A | 0.1643 | 0.9280 | 0.3132 | 2.7430*** | 0.0733 | 0.4400 | 0.8215 | 3.2780*** |
| Hancock Freedom Global Inc B | 0.0043 | 0.0550 | 0.1882 | 3.7470*** | 0.1260 | 1.7180 | 0.1939 | 1.7580* |
| Keystone Amer World Bond A | 0.1144 | 1.3350 | 0.2621 | 4.7430*** | 0.0616 | 0.7640 | 0.3862 | 3.1840*** |
| Lord Abbett Global Income | 0.0794 | 1.6670* | 0.0822 | 2.6760*** | 0.2029 | 4.5220 | 0.5279 | 7.8280*** |
| Merrill Lynch Global Bond A | 0.0230 | 0.2800 | 0.1437 | 2.7190*** | 0.2090 | 2.7070 | 0.0771 | 0.6650 |
| MFS World Governments A | 0.1133 | 1.2630 | 0.2210 | 3.8200*** | 0.1126 | 1.3330 | 0.0562 | 0.4430 |
| PaineWebber Global Income B | −0.0018 | −0.0240 | 0.2532 | 5.4240*** | 0.1610 | 2.3620 | 0.1186 | 1.1580 |
| Putnam Global Govt Income A | −0.0132 | −0.1270 | 0.1321 | 1.9700* | 0.1890 | 1.9310 | 0.3749 | 2.5470** |
| Scudder International Bond | −0.0222 | −0.1940 | 0.2726 | 3.6980*** | 0.2380 | 2.2110 | 0.2014 | 1.2440 |
| T. Rowe Price Intl Bond | 0.1992 | 3.1450*** | 0.2499 | 6.1200*** | 0.1578 | 2.6480 | 0.0884 | 0.9860 |
| Templeton Income | 0.0158 | 0.2130 | 0.2228 | 4.6730*** | 0.0707 | 1.0160 | 0.2242 | 2.1430** |
| Van Eck World Income | −0.0138 | −0.1320 | 0.2009 | 2.9830*** | 0.0793 | 0.8060 | 0.1721 | 1.1640 |
| Smith Barney Shear Glob Bd B | 0.0542 | 0.7400 | 0.0582 | 1.2520 | 0.0261 | 0.4060 | 0.3142 | 3.1490*** |
| TNE Global Government A | 0.1090 | 1.9880* | 0.1603 | 4.7230*** | 0.1293 | 2.6100 | 0.3955 | 5.1690*** |

[a] The sample period is from November 1988 through November 1995. The model is $a_{i,t} = b_{i,0} + \sum_{k=1}^{1} 0p_{k,t}b_{i,k} + e_{i,t}$ where $a_{i,t}$ is the one-month excess return on fund $i$ in month $t$. $p_{k,t}$ is the one-month excess return on factor $k$. The 10 factors include local currency returns on the Canadian, German, Japanese, UK, and US government bond indices, exchange rate movements on the Canadian Dollar, German Mark, Japanese Yen, and British Pound, and the corporate bond factor. $b_{i,0}$ is the Jensen measure for fund $i$. $b_{i,k}$ is the sensitivity of fund $i$ to factor $k$ and $e_{i,t}$ is the residual for fund $i$ in month $t$. Significance levels: *** indicates 1%; ** indicates 5%; * indicates 10%.

indices in local currencies. The coefficients on the Canadian Dollar and British Pound are positive for all 19 funds and many are statistically significant; with 16 at 1% for the British Pound, and 9 at 1%, and 4 at 5% for the Canadian Dollar. For the German Mark, 13 coefficients are positive and 8 are significant at 1%. None of the 6 negative coefficients on the German Mark is significant. Only three funds have significant coefficients on the Japanese Yen. In total, 44 coefficients on exchange rate movements are statistically significant. Exchange rate movements appear to be an important factor explaining returns on global bond funds. Although fund managers do not disclose their currency hedging strategies, the low Adjusted *R*-squares of the Fully-hedged Benchmark and the large number of significant coefficients on exchange rate movements suggest that they probably do not fully hedge their currency exposure. [14] At the same time, the funds' poor performance against the benchmarks, including the unhedged World Bond Index, casts doubt on whether managers hedge against exchange rate risk effectively.

The coefficients for local currency returns on the government bond indices in Table 4 represent the funds' exposure to different countries. All 19 funds have positive coefficients on the German Bond index, and 9 are significant at 1%, and 7 at 5%. As noted earlier, the German Bond index is highly correlated with bond indices of other European countries. The regression results suggest that most funds have investment in European bonds. The coefficients on the UK and US Bond indices are positive for 18 funds and about half of the coefficients are statistically significant. The coefficients on the Canadian Bond index are positive for 17 funds and 8 are significant. The funds are least sensitive to the Japanese Bond index. The regression coefficients can also be interpreted as the weights on the indices for a buy-and-hold strategy that mimics the funds' risk and return characteristics. Since funds generally do not short sell bonds, the weights on the bond indices should be positive. The empirical results show that more than 90% of the coefficients on the bond indices are positive and the few negative coefficients are not statistically significant. Weights on the exchange rates are unrestricted because managers can enter into long or short positions easily in currency contracts. In general, the implied investment policies captured by the indices are feasible for mutual funds.

Table 5 contains coefficient estimates for US Dollar returns on the five government bond indices. The coefficients for the Canadian Bond index are positive and significant at 1% for 18 funds. All 19 funds have positive coeffi-

[14] Failure to fully hedge against exchange rate risk is not the only possible explanation for the significant coefficients on exchange rate movements. The results could be due to omitted variables that are highly correlated with the four currencies. However, as discussed in Section 2, the 10-Factor Benchmark is a very comprehensive model, including indices that comprise over 76% of the world bond market and a corporate bond factor, in addition to exchange rate movements.

Table 5
Sensitivities of Global Bond Fund Returns to Government Bond Indices (in US$)[a]

| US$ Benchmark | Canada | | Germany | | Japan | | UK | | US | |
|---|---|---|---|---|---|---|---|---|---|---|
| Global Bond Funds | $b_1$ | $t$ Statistics | $b_2$ | $t$ Statistics | $b_3$ | $t$ Statistics | $b_4$ | $t$ Statistics | $b_5$ | $t$ Statistics |
| Anchor | −0.0106 | −0.1920*** | 0.8214 | 16.1250*** | −0.0104 | −0.2800 | 0.0106 | 0.2390 | −0.1952 | −1.8440* |
| Capital World Bond | 0.1632 | 5.1410*** | 0.0930 | 3.1980*** | 0.1054 | 4.9830*** | 0.1507 | 5.9660*** | 0.3246 | 5.3670*** |
| Fidelity Global Bond | 0.2451 | 3.3930*** | 0.0368 | 0.5550 | 0.0054 | 0.1120 | 0.1494 | 2.5990** | 0.3501 | 2.5450** |
| Franklin Global Govt Income | 0.3524 | 5.0997*** | 0.0423 | 0.8190 | −0.0303 | −0.7459 | 0.1323 | 2.5012** | 0.0923 | 0.7515 |
| G.T. Global Govt Income A | 0.2831 | 4.3870*** | −0.0263 | −0.4450 | 0.0901 | 2.0950** | 0.1386 | 2.6980*** | 0.5277 | 4.2910*** |
| G.T. Global Strategic Inc A | 0.3525 | 3.2620*** | −0.0283 | −0.2860 | 0.0264 | 0.3660 | 0.1910 | 2.2210** | 0.9178 | 4.4580*** |
| Hancock Freedom Global Inc B | 0.1901 | 4.1490*** | 0.0652 | 1.5520 | −0.0033 | −0.1080 | 0.1603 | 4.3970*** | 0.2284 | 2.6170** |
| Keystone Amer World Bond A | 0.1576 | 3.0170*** | 0.0433 | 0.9050 | 0.0680 | 1.9520* | 0.1834 | 4.4130*** | 0.4530 | 4.5520*** |
| Lord Abbett Global Income | 0.1444 | 4.9310*** | 0.2045 | 7.6210*** | 0.0349 | 1.7880* | 0.1102 | 4.7310*** | 0.5456 | 9.7810*** |
| Merrill Lynch Global Bond A | 0.2247 | 4.3280*** | 0.2040 | 4.2870*** | 0.0531 | 1.5330 | 0.1456 | 3.5230*** | 0.1631 | 1.6490 |
| MFS World Governments A | 0.2397 | 4.5190*** | 0.2189 | 4.5020*** | 0.0739 | 2.0910** | 0.1730 | 4.0980*** | 0.0926 | 0.9170 |
| PaineWebber Global Income B | 0.1932 | 4.3400*** | 0.0919 | 2.2520** | −0.0018 | −0.0610 | 0.1992 | 5.6230*** | 0.0747 | 0.8810 |
| Putnam Global Govt Income A | 0.1901 | 2.9700*** | 0.1425 | 2.4300** | 0.0032 | 0.0750 | 0.1229 | 2.4130** | 0.4192 | 3.4390*** |
| Scudder International Bond | 0.1464 | 2.1350** | 0.1456 | 2.3180** | 0.0252 | 0.5510 | 0.2504 | 4.5900*** | 0.3059 | 2.3430** |
| T. Rowe Price Intl Bond | 0.1043 | 2.5910** | 0.3651 | 9.8960*** | 0.2289 | 8.5310*** | 0.1969 | 6.1460*** | 0.0544 | 0.7090 |
| Templeton Income | 0.2851 | 6.4900*** | 0.0327 | 0.8120 | −0.0113 | −0.3850 | 0.1680 | 4.8060*** | 0.2065 | 2.4680** |
| Van Eck World Income | 0.2025 | 3.2650*** | 0.3261 | 5.7370*** | −0.0273 | −0.6590 | 0.1644 | 3.3300*** | 0.0836 | 0.7070 |
| Smith Barney Shear Glob Bd B | 0.1312 | 3.0180*** | 0.1767 | 4.4300*** | 0.0795 | 2.3480** | 0.0422 | 1.2020 | 0.4441 | 5.3510*** |
| TNE Global Government A | 0.1138 | 3.3900*** | 0.1455 | 4.7780*** | 0.1009 | 4.2460*** | 0.1262 | 4.8060*** | 0.3925 | 5.9940*** |

[a] The sample period is from November 1988 through November 1995. The model is $a_{i,t} = b_{i,0} + \sum_{k=1}^{6} p_{k,t} b_{i,k} + e_{i,t}$ where $a_{i,t}$ is the one-month excess return on fund $i$ in month $t$. $p_{k,t}$ is the one-month excess return on factor $k$. The six factors include US$ returns on the Canadian, German, Japanese, UK, and US government bond indices and the corporate bond factor. $b_{i,0}$ is the Jensen measure for fund $i$. $b_{i,k}$ is the sensitivity of fund $i$ to factor $k$ and $e_{i,t}$ is the residual for fund $i$ in month $t$.
Significance levels: *** indicates 1%; ** indicates 5%; * indicates 10%.

cients for the UK Bond index and 13 are significant at 1%, and 4 at 5%. The German and US Bond indices both have 12 coefficients that are positive and significant. The US Dollar denominated bond indices capture the effects of both exchange rate movements and local currency returns. Therefore, these indices cannot discriminate between exchange rate related returns versus bond index related returns but the results confirm that bond fund returns are sensitive to the European, Canadian, and US Bond indices. The next section examines whether performance is related to fund expenses.

## 5. Performance and expenses

Blake et al. (1993) find that performance of US bond funds is sensitive to their expense ratios. I regress the Jensen measures of the global bond funds against the funds' expense ratios using the following model:

$$b_{i,0} = d_0 + d_1 \text{ expense}_i + e_i \tag{2}$$

where $i = 1, 2, \ldots 19$, $b_{i,0}$ is the estimated monthly Jensen measure from (1) and $\text{expense}_i$ is the average monthly expense ratio for fund $i$ during the sample period. The coefficient, $d_1$, represents the sensitivity of performance to the fund's expense ratio.

In Table 6, the estimates for $d_1$ are negative and significant for all five models, ranging from $-0.9180$ to $-1.2895$. The results imply that each 1% increase in expense typically reduces performance by more than 1 percentage

Table 6
Expense ratio and performance[a]

| Benchmarks[b] | Expense ratio coefficient ($d_1$) | $t$ Statistics | $R^2$ |
|---|---|---|---|
| The World Bond Index | −0.9180 | −2.1940** | 0.2207 |
| The 10-Factor Benchmark | −1.1211 | −2.9940*** | 0.3452 |
| The US$ Benchmark | −1.0617 | −2.5909** | 0.2831 |
| The Fully-hedged Benchmark | −1.1167 | −2.5274** | 0.2731 |
| The Broad™ Index | −1.2895 | −2.4351** | 0.2586 |

[a] The sample period is November 1988 through November 1995. The model is $b_{i,0} = d_0 + d_1 \text{ expense}_i + e_i$ where $b_{i,0}$ is the Jensen measure for fund $i$ and $\text{expense}_i$ the average monthly expense ratio for fund $i$.

[b] The World Bond Index is the Salomon Brothers World Government Bond Index. The 10-Factor Benchmark contains local currency returns on the Canadian, German, Japanese, UK, and US government indices, exchange rate movements on the Canadian Dollar, German Mark, Japanese Yen, and British Pound, and the corporate bond factor. The US$ Benchmark contains US dollar returns on the Canadian, German, Japanese, UK, and US government bond indices and the corporate bond factor. The Fully-hedged Benchmark contains currency-hedged returns on the Canadian, German, Japanese, UK, and US government bond indices and the corporate bond factor. The Broad™ Index is the Salomon Brothers Broad™ Index.

Significance levels: *** indicates 1%; ** indicates 5%; * indicates 10%.

point. In other words, lowering expenses may be an effective way to improve performance. Blake et al. (1993) also find a significant negative relationship between domestic bond fund performance and expense ratios, and their coefficient estimates are consistent with the findings in Table 6. The expense ratio for the Vanguard Total Bond Index Bond, an index fund that tracks the Broad™ index, is only 0.015% in 1995, a saving of 0.075% per month compared to the actively managed domestic bond funds in Blake et al. (1993). [15] The average monthly expense ratio for the global bond funds is 0.122% and their average performance against the World Bond Index is −0.050%. If the operating and trading costs of indexing the World Bond Index is less than 0.050%, a world bond index fund would be a good alternative for investors. To keep the total expenses of the indexing strategy to be less than 0.050% requires a saving of 0.072% compared to the activley managed funds. Given the saving demonstrated by the Vanguard Total Bond Index Bond fund, a world bond index fund may be feasible.

## 6. Summary and conclusion

This is the first study on global bond mutual funds. The sample contains 19 funds with monthly returns from November 1988 through November 1995. Two single-index and three multi-index benchmarks are used to evaluate the performance of these funds. A single-index benchmark represents a simple buy-and-hold strategy and a multi-index benchmark provides more insight on the funds' return characteristics. Two of the multi-index benchmarks have average Adjusted $R$-squares over 0.7 and their explanatory power is similar to that of the benchmark for domestic bond funds. The 10-Factor Benchmark has much higher explanatory power than the unhedged World Bond Index, suggesting that managers probably deviate from unhedged market-value weights in their country allocation and/or currency hedging strategies. The Fully-hedged Benchmark has the lowest explanatory power for returns on the global bond funds. This result is inconsistent with managers adopting a fully hedge currency strategy.

On average, the funds did not outperform any of the five benchmarks, suggesting that the active investment strategies did not benefit mutual fund investors during the sample period. The regression of the funds' performance on their expense ratios shows a significant negative relationship. For 4 of the 5 benchmarks, every $1 of expense typically reduces performance by more than $1. These results are consistent with findings from domestic bond fund studies.

[15] Blake et al. (1993) show that the average monthly expense ratio for domestic bonds funds is 0.086%.

The global bond funds' mediocre performance against the Broad™ Index implies that a US investor holding a market-value-weighted domestic bond portfolio could not improve its Sharpe ratio by adding these funds, suggesting that global bond funds did not provide diversifcation benefits, net of expenses, during the sample period.

The multi-index benchmarks show that the global bond funds have high exposure to the European, Canadian, and US bond markets and are least sensitive to the Japanese Bond index and movements in Japanese Yen during the sample period. Exchange rate movements appear to be an important factor explaining returns on global bond mutual funds even after controlling for returns on country bond indices in local currencies. Exchange rate movements also contribute largely to the volatility of passive government bond indices. These results demonstrate the importance of exchange rate movements in a global portfolio, especially for non-US bonds.

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