NATIONAL RISK IN GLOBAL FIXED-INCOME ALLOCATION

CLAUDE B. ERB, CAMPBELL R. HARVEY, AND TADAS E. VISKANTA

While national equity market returns have received considerable attention in the tactical global asset allocation decision, relatively little is known about national fixed-income returns. Our goal is to explore measures of global fixed-income risk that let us explain why expected fixed-income returns differ across national markets. An understanding of the risk and expected return relation is critical for successful allocation decisions.

Interestingly, the attractiveness of global fixed-income as an active asset class is somewhat in dispute. Some authors, such as Burik and Ennis [1990], argue that investors derive little benefit from including foreign bonds in their portfolios. Others, such as Levy and Lerman [1988], argue that unhedged foreign bonds belong in diversified portfolios. Eaker and Grant [1991] state that the empirical failure of uncovered interest rate parity and the success of naive currency strategies suggest that international diversification of fixed-income portfolios is potentially beneficial.

We take it as a given that global bonds should be an active investment class. But how do we measure the risk/expected return relation?

There is an extensive literature on the domestic side that identifies bond attributes that explain the cross-section of expected returns. For example, Litterman and Scheinkman [1991] and Scheinkman and Weiss [1991] propose a factor model for U.S. Treasury bonds. They interpret their factor loadings as proxies for interest rate sensitivity, term structure sensitivity, and volatility. But in looking at bonds within the U.S., they hold country risk constant.

In their examination of corporate bonds in the U.S., Bennett, Esser, and Roth [1994] document a pos-

CLAUDE B. ERB is director of asset allocation for First Chicago Corporation in Chicago.

CAMPBELL R. HARVEY is associate professor of finance at Duke University's Fuqua School of Business in Durham, North Carolina, and a research associate at the National Bureau of Economic Research in Cambridge, Massachusetts.

TADAS E. VISKANTA is an asset allocation analyst for First Chicago Corporation.

itive relation between corporate credit risk and return. In a global context, Sims [1993] suggests that using expected real bond yields (interest rates less a measure of expected inflation) can help investment managers forecast expected bond returns. None of these studies, however, attempts to relate the cross-section of expected national bond returns to global risk measures.

We investigate the use of a simple, publicly available, and forward-looking measure of national risk: country credit ratings. We show that this risk measure is meaningfully correlated with future fixed-income returns and with market volatility. Portfolio simulations based on lagged credit ratings show how this measure can be directly used to enhance global fixed-income performance. On an out-of-sample basis, differences in country credit ratings can explain up to 50% of the cross-sectional variation in expected bond returns.

How do credit ratings translate into perceived risk, and where do country ratings come from? Most globally oriented banks have credit analysis staffs. Their charter is to estimate the probability of default on their bank's loans. One dimension of this analysis is the estimation of sovereign credit risk. The higher the perceived credit risk of a borrower's home country, the higher the rate of interest the borrower will have to pay.

There are many factors that simultaneously influence a country's credit rating: political and other expropriation risk, inflation, exchange rate volatility and controls, the nation's industrial portfolio, its economic viability, and its sensitivity to global economic shocks, to name some of the most important.

The credit rating, because it is survey-based, may proxy for many of these fundamental risks. Through time, the importance of each of these fundamental components may vary. Most importantly, lenders are concerned with future risk. In contrast to traditional measurement methodologies, which look back in history, a credit rating is forward-looking.

I. COUNTRY CREDIT INVESTING: DATA AND METHODOLOGY

We examine a number of hypothetical investment strategies over a period beginning in December 1985 and ending in March 1994. Our country credit rating source is *Institutional Investor*'s semiannual survey of bankers. *Institutional Investor* has published this survey in its March and September issues every year since 1979. The survey represents the responses of 75 to 100 bankers. Respondents rank each country on a scale of 0 to 100, with 100 representing the smallest risk of default. The responses are weighted by *Institutional Investor*'s perception of each bank's level of global prominence and credit analysis sophistication (see Shapiro [1994] and Erb, Harvey, and Viskanta [1994]).

We investigate the performance of fourteen national fixed-income indexes. J.P. Morgan publishes thirteen of these indexes, and Salomon Brothers publishes the other one (Switzerland). In order to ensure approximately equal durations across the fixed-income markets surveyed, we look at indexes with maturities of between three and five years.

Eleven of the country indexes existed at the beginning of this analysis. Three of the indexes, Italy, Spain, and Sweden, were added to the analysis in December 1987.

The J.P. Morgan Government Bond Indexes and the Salomon Brothers World Government Bond Indexes are constructed in somewhat different ways. The J.P. Morgan indexes consist of bonds that have fixed coupons, are tradable and redeemable for cash, do not appeal exclusively to domestic investors for local tax or regulatory reasons, and are available for investment and regularly traded in size at acceptable bid-offer spreads. The Salomon Brothers indexes consist of all bonds in a national market that have fixed coupons and meet country-specific minimum size requirements. Both indexes use only issues with maturities of at least one year.

The Salomon Brothers indexes consist of a greater number of bonds because, unlike the J.P. Morgan indexes, they do not require a minimum level of tradability. This issue of tradability might suggest that the Salomon indexes would exhibit higher returns due to a liquidity premium. During the time period of this study, no premium was evident.

Exhibit 1 reports a number of summary statistics. Highest average local currency returns are found in Australia and Italy (15.3% per year). The lowest average returns were found for Switzerland (5.1%) and Japan (6.4%).

The next-to-the-last column in Exhibit 1 lists average country credit ratings. The lowest average rating is found for Australia (71.8); Japan has the highest average rating (94.0). The U.S. rating over the sample is 90.7. Interestingly, Australia and Italy (high average returns) have two of the three lowest country ratings. Switzerland and Japan (low average returns) have the two highest credit ratings.

EXHIBIT 1 ■ Risk and Return Characteristics in U.S. Dollars and Local Currency ■ Inclusion Date to March 1994

Country	Data Source	Inclusion Date	Compound Annual Rate of Return (local) (%)	Compound Annual Rate of Return (U.S.$) (%)	Annualized Volatility (local) (%)	Annualized Volatility (U.S.$) (%)	Average Credit Rating	Average Inflation Rate (%)
Australia	J.P. Morgan	Dec. 85	15.3	15.7	6.2	11.6	71.8	5.7
Belgium	J.P. Morgan	Dec. 85	9.5	14.0	3.1	15.4	78.3	2.4
Canada	J.P. Morgan	Dec. 85	10.6	10.7	5.9	8.5	85.0	3.9
Denmark	J.P. Morgan	Dec. 85	10.8	15.0	4.2	13.5	73.0	3.2
France	J.P. Morgan	Dec. 85	10.5	14.3	4.3	13.5	85.5	2.9
Germany	J.P. Morgan	Dec. 85	7.0	12.1	2.9	15.1	92.5	2.3
Italy	J.P. Morgan	Dec. 87	15.3	9.3	5.7	15.0	77.9	5.5
Japan	J.P. Morgan	Dec. 85	6.4	15.4	4.9	15.8	94.0	1.8
Netherlands	J.P. Morgan	Dec. 85	7.5	12.7	3.0	14.9	87.5	1.7
Spain	J.P. Morgan	Dec. 87	13.8	9.5	7.0	13.2	75.2	6.1
Sweden	J.P. Morgan	Dec. 87	11.7	6.4	5.5	13.5	79.0	5.9
Switzerland	Salomon	Dec. 85	5.1	10.1	3.4	16.1	93.6	3.2
United Kingdom	J.P. Morgan	Dec. 85	11.5	11.9	5.9	16.0	86.3	5.1
United States	J.P. Morgan	Dec. 85	9.0	9.0	4.8	4.8	90.7	3.8

Note: All bond return indexes represent three- to five-year government bonds.

Of course, for a U.S. dollar investor, currency risk plays an important role in the bond return profile. This is evident in Exhibit 1. The U.S. dollar returns are over 400 basis points higher in Belgium, Denmark, Germany, Japan, The Netherlands, and Switzerland, reflecting the appreciation of these currencies against the U.S. dollar. The currency fluctuations also have a great impact on the return volatilities. The U.S. dollar return volatility is often three times greater than the local return volatility.

II. VOLATILITY AND CREDIT RATING

Exhibit 2 characterizes relationships between country credit rating and bond return volatility. To provide a consistent sample of bond returns and credit ratings, the sample from December 1987-March 1994 is presented. There is a weak negative relation between credit rating and volatility (low credit rating implies high volatility) when returns are measured in local currency terms. Indeed, 23% of the cross-sectional dispersion in average volatility can be explained by the average credit ratings.

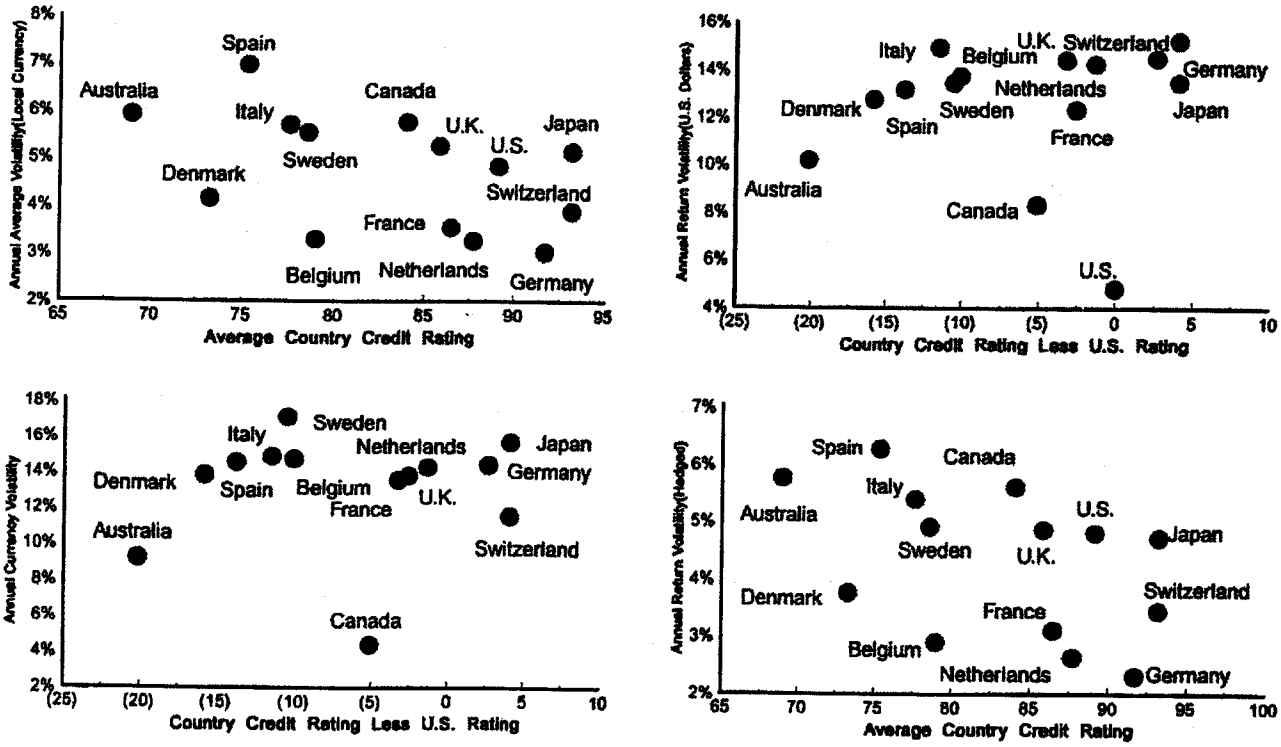
Introduction of the currency factor eliminates the relation between volatility and credit rating. When returns are calculated in U.S. dollar terms, there is no significant relation between the average volatilities and the difference between the country credit rating and the U.S. rating. This is mainly because there is not a significant relation between the currency volatility and the country rating (presented in the third panel of Exhibit 2).

The final panel examines the relation between credit rating and volatility of currency-hedged bond returns. The hedged return involves the sale of a forward contract each quarter equal to the amount invested in the foreign bond. The currency hedge, of course, is not perfect because of unexpected fluctuations in the principal value of the bond. Calculating the volatility of the currency-hedged returns preserves the negative relation with credit risk found with the local return volatilities. The credit risk measure explains 23% of the cross-section of the currency-hedged bond volatility.

III. CREDIT RATING AND EXPECTED BOND RETURNS

We are, however, more interested in the cross-section of average returns. Exhibit 3 shows a sharply

EXHIBIT 2 ■ Average Country Credit Ratings and Bond and Currency Volatility ■ December 1987-March 1994



negative relation between local currency bond returns and country credit ratings. Indeed, the credit risk variable can explain 72% of the cross-section of average local bond returns. Similar to the volatility analysis, the relation between credit rating and U.S. dollar-based returns is weaker.

In contrast to Exhibit 2, there is a distinct relation between currency appreciation and credit rating. The country with the highest credit rating, Japan, shows the largest appreciation in currency value. Other countries with relatively strong currencies, such as Switzerland and Germany, also have some of the highest credit ratings. The country credit rating spread can explain 38% of the cross-sectional variation in the currency changes.

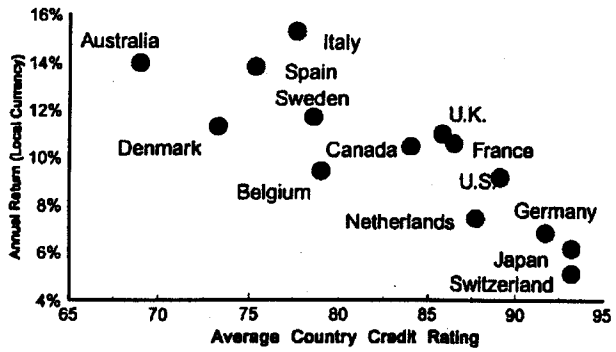
The U.S. dollar returns show a somewhat weaker negative relation between returns and credit ratings because of the foreign exchange return. To get the U.S. returns in panel B, take the local returns in panel A and subtract the foreign currency depreciation in panel C. For example, Spain had a 14% local return, but the currency depreciated 4% against the dollar, resulting in a 10% U.S. dollar return. While the ability to explain the cross-section of U.S. dollar returns is weaker, an impressive 42% of the variation can be accounted for during this time period.*

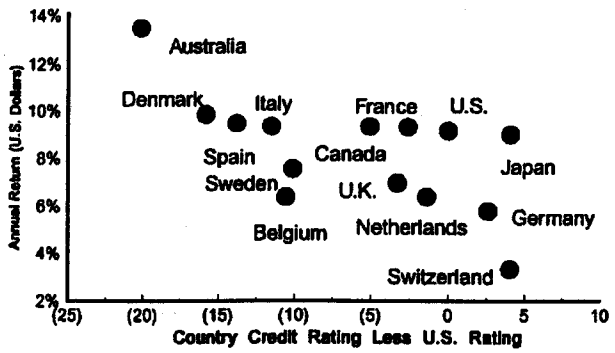
The final panel of Exhibit 3 details the relation between the currency-hedged returns and the average country credit rating. The negative relation between the returns and credit ratings is weakened when the currencies are hedged. When we go from local returns to U.S. dollar returns, the cross-sectional relation is weakened because of the positive relation between the credit ratings and currency appreciation. Moving from local returns to hedged returns requires the use of forward rates — rather than pure exchange rate changes.

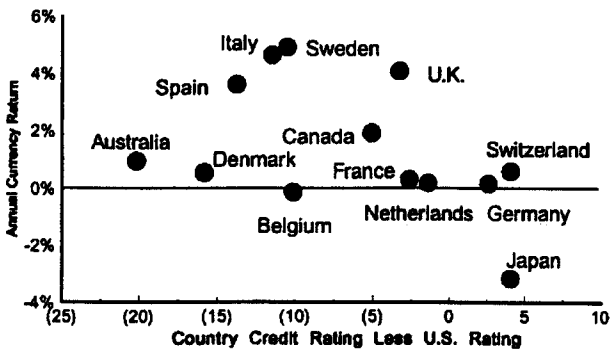
IV. DOES CREDIT RATING PROXY FOR EXPECTED INFLATION?

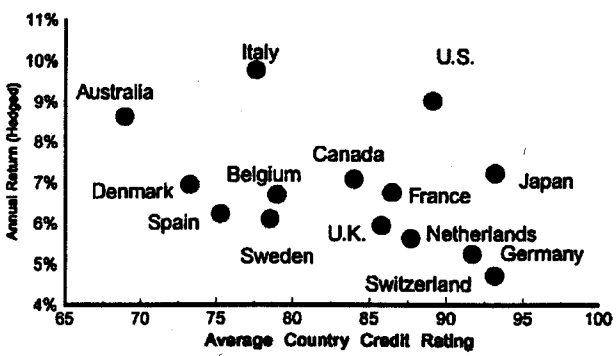
Exhibit 3 shows a distinctly positive relation between credit rating and currency *appreciation*. That is, the currencies that appreciate the most versus the U.S. dollar, Germany, Japan, and Switzerland, have some of the highest credit ratings. Some countries with lower credit ratings, such as Italy, Spain, and Sweden, have

EXHIBIT 3 ■ Average Country Credit Ratings and Bond and Currency Returns ■ December 1987-March 1994









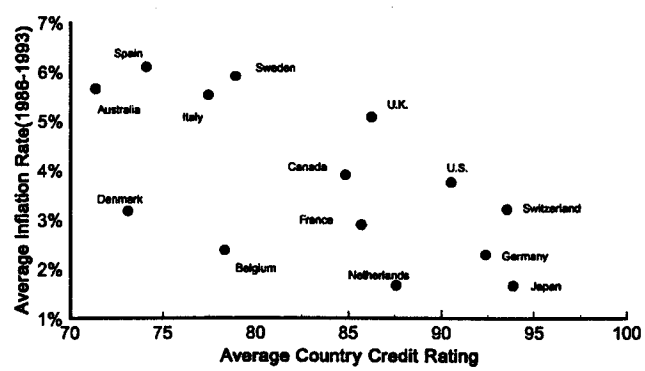
substantial erosion in the value of their currencies versus the U.S. dollar. It is likely that an important component of perceived credit risk is the expected rate of inflation.

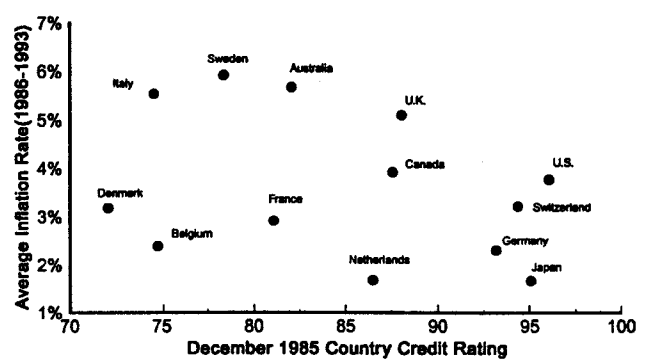
Exhibit 4 explores relationships between inflation and country ratings. The first panel shows a negative relation between average inflation and credit rating. The credit rating variable can explain 33% of the cross-sectional variance in inflation rates in the fourteen countries. This relation, to a large extent, accounts for the positive relation between credit rating and currency appreciation. High credit rating is associated with low expected inflation, which, in turn, is associated with currency appreciation versus the U.S. dollar.

Of course, the first panel of Exhibit 4 tells us that the historical average inflation rates are correlated with the historical average credit rating. It does not give us any direct evidence that credit rating is able to predict the cross-section of inflation rates.

The second panel of the exhibit does suggest a predictive relation. The credit ratings of December 1985 are plotted against the average inflation rates in the 1986-1993 period. The negative relation obtained

EXHIBIT 4 ■ Country Credit Ratings and Inflation





using the historical averages is maintained. The December 1985 credit ratings are able to explain 22% of the subsequent cross-sectional variation in inflation across the fourteen countries.

V. EXPLAINING THE CROSS-SECTION OF FORWARD PREMIUMS

Country credit risk likely represents many sources of uncertainty, including inflation, probability of default, political instability, and so on. The final piece of the puzzle (why credit ratings explain the cross-section of U.S. dollar-based bond returns but not the hedged returns) has to do with the relation between the forward rates and country credit risk.

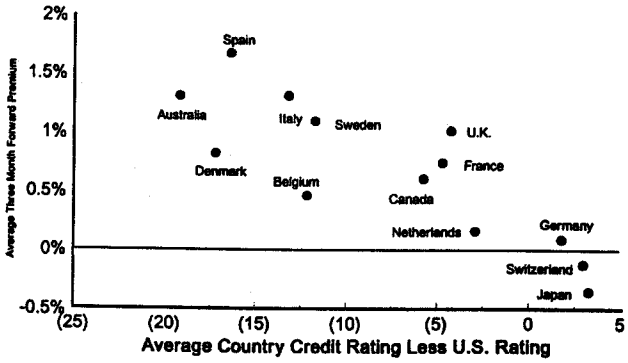
There is a considerable literature that explores the information in forward currency rates (see, for example, Hodrick [1981], Wolff [1987], Mark [1988], and Frankel and Froot [1989]). It is often argued that the forward rate contains an expectation of the currency appreciation plus a risk premium. We find that the cross-section of forward premiums (forward rate divided by the spot exchange rate) is strongly correlated with country credit ratings.

Exhibit 5 shows a graph of the forward premium (calculated in foreign units per U.S. dollar terms) against the country credit rating. There is a distinctly negative relation. Higher credit ratings are associated with lower forward premiums. Indeed, the credit ratings can explain 71% of the cross-sectional variation in the forward premiums.

As an additional observation, higher forward premiums are associated with larger local currency declines against the U.S. dollar. The forward premium explains 68% of the variation in currency movements. Can this help us better understand the patterns in the bond returns in Exhibit 3?

Remember that there is a strong negative relation between local returns and country credit ratings. Roughly speaking, to capitalize on this relation, one would buy low credit-rating countries' bonds and sell high credit-rating bonds. The forward premium is large for low rating countries and small for high rating countries. This cross-sectional pattern in the forward premiums limits the profitability of a strategy of buying low credit-rating and selling high credit-rating bonds. In other words, the hedging is sufficiently expensive for low credit-rating countries to diminish the cross-sectional relation.

EXHIBIT 5 ■ Forward Premiums and Differential Country Credit Ratings



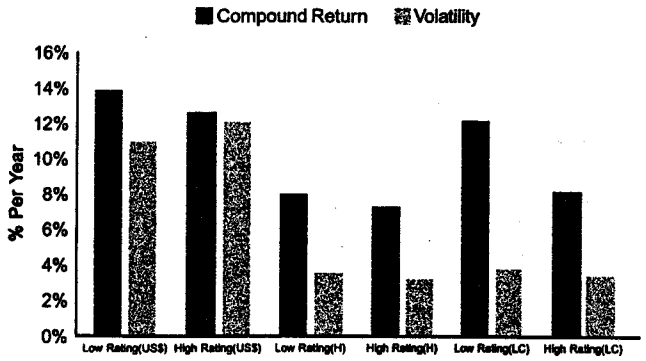
So far, we have documented strong relations between both local and U.S. dollar-based bond returns and country credit rating. The cross-sectional patterns in the forward premiums mitigate the relation for the currency-hedged returns when we look at averages over our sample.

VI. INVESTMENT STRATEGIES BASED ON COUNTRY CREDIT RATINGS

We construct two country credit rating portfolios: a low credit-rating country portfolio and a high credit-rating country portfolio. The portfolios are constructed with equal initial investments and rebalanced quarterly. These portfolios are designed to measure the out-of-sample information in credit ratings. That is, given the credit ratings, we form the portfolios and hold them for one quarter. At the end of the quarter, we rebalance the portfolios according to the new credit rating information. To be conservative, we allow for a one-quarter lag in the information on country ratings to ensure that all information is available.

The composition of a portfolio will change if a change in a country's credit rating moves it into a different half, or if the addition of a new country to the study universe moves a country into a new half. Returns are analyzed in local currency terms, in U.S. dollars (unhedged), and in currency-hedged terms, with coupons reinvested. Since we built these portfolios based on lagged country credit ratings, the returns on these portfolios can be viewed as the out-of-sample performance of a portfolio selection strategy based on credit risk.

EXHIBIT 6 ■ Country Selection Strategies Based on Country Credit Risk ■ December 1985-March 1994



Notes: The low (high) rating portfolio consists of the bottom (top) half of countries ranked by country credit rating. U.S.$ means bond total returns are calculated in U.S.$. LC represents bond returns calculated in local currencies, and H is a hedged portfolio return.

EXHIBIT 7 ■ Country Selection Strategies Based on Country Credit Rating Portfolio Statistics ■ December 1985-March 1994

	Annual Return (%)	Annual Volatility (%)	Average Credit Rating
Three- to Five-Year Indexes			
Low Rating (U.S.$ return)	13.8	10.9	77.9
High Rating (U.S.$ return)	12.6	12.0	90.7
Low Rating (hedged return)	7.9	3.4	77.9
High Rating (hedged return)	7.2	3.1	90.7
Low Rating (local currency return)	12.1	3.7	77.9
High Rating (local currency return)	8.1	3.3	90.7
Currency Portfolios			
Low Rating (currency change)	−1.4	10.9	76.8
High Rating (currency change)	−3.9	12.1	90.2
Low Rating (forward premium)	4.2	0.9	76.8
High Rating (forward premium)	0.9	1.0	90.2
Country Indexes			
Low Rating (U.S.$ return)	14.1	11.2	77.9
High Rating (U.S.$ return)	13.0	12.6	90.7
Low Rating (local currency return)	12.4	4.4	77.9
High Rating (local currency return)	8.4	4.7	90.7

Notes: Three- to Five-Year Indexes refers to the J.P. Morgan Government Bond Indexes with maturities of three to five years. Country Indexes refers to the J.P. Morgan Government Bond Indexes (which include a broad range of maturities).

While Exhibit 3 shows a relation between average returns and average credit rating over the full sample, Exhibits 6 and 7 demonstrate that the credit rating variable is able to distinguish between expected returns in the context of an out-of-sample portfolio strategy. Consistent with the in-sample results, the low credit-rating portfolio substantially outperforms the high credit-rating portfolio in local currency terms. The low credit-rating portfolio delivers 400 bp extra annual return. Interestingly, the volatility of the low credit-rating portfolio is 40 bp lower than the high credit-rating portfolios.

Also consistent with Exhibit 3, there is less of a spread when the portfolio returns are calculated in U.S. dollar terms. Nevertheless, the low credit-rating portfolio produces a 13.8% average annual return compared to the 12.6% average return for the high rating portfolio. Note also that, when measured in U.S. dollars, the low credit-rating portfolio is 110 bp less volatile.

Exhibit 7 also shows the returns for a currency-hedged investment strategy. The low credit-rating portfolio provides 70 basis points more return than the high credit-rating portfolio, although it does so at the price of 30 basis points of additional volatility. This is also consistent with the intuition that the forward premiums are working against the success of this strategy.

Exhibit 7, and the analysis in Exhibit 8, can provide us with a better understanding of why the three portfolio returns (local currency, unhedged, and hedged) are different from one another.

In local currency terms, the low credit-rating portfolio has a return of 12.1%, 400 basis points greater than the high credit-rating portfolio. The local currency return can be obtained only if currency rates do not change over time. However, currency rates do change.

Exhibit 7 shows that, on average, the currencies of the high credit-rating portfolio appreciate by 3.9% per year against the U.S., while the currencies of the low credit-rating portfolio appreciate by 1.4% per year.

EXHIBIT 8 ■ Portfolio Returns Analysis

Annualized Average 85:12-94:03	Low Rating Portfolio	High Rating Portfolio	Difference
Forward Premium	4.2%	0.9%	3.3%
Actual Currency Devaluation	−1.4%	−3.9%	2.5%
Difference	5.6%	4.8%	0.8%

The spread in currency returns is therefore 250 basis points. If we subtract 250 from 400 basis points, the local currency bond return spread, we get 150 basis points, or 1.5%. This is very close to the actual unhedged U.S. dollar return spread of 1.2% (in Exhibit 3). The fact that the low and high credit-rating currencies did not appreciate by the same amount reduces the unhedged return spread.

These calculations also help us understand why the hedged returns produced an even lower return spread. The average forward premium for the low credit risk portfolio (currencies in local units per U.S. dollar) is 4.2%. One way of looking at this is to say that the market expects the average low credit-rating portfolio currency to decline by 4.2% per year. High credit-rating portfolio currencies are expected to decline by 90 basis points per year. The spread in market expectations is therefore 3.3%.

However, as we have already seen, the actual spot currency return spread is 2.5%. This 80-basis point difference (3.3% – 2.5%) is the reason that the return spread for the hedged portfolios is smaller than the return spread for the unhedged portfolios.

Do these results help us answer the question, should we hedge? If you are pursuing a portfolio strategy based on credit rating, then it is not clear that you want to hedge. The overlay of the 100% currency hedging strategy diminishes the cross-sectional dispersion between the low rating and high rating bonds. Given that there is a relation between the unhedged bond returns and credit ratings and a relation between the forward premiums and the credit ratings, it makes much more sense to treat the bonds and the currency portfolios as separate asset classes. That is, the investor should not be constrained by the binary choice of a 0% hedge (no currency position) or a 100% hedge (short forward currency position).

It is much more logical to treat the currency positions as separate assets. Indeed, our results suggest that a strategy based on country credit risk may involve reverse hedges on some of the currencies.

While our analysis concentrates on the bond indexes with three- to five-year maturities, we also examine the broader J.P. Morgan national indexes, which include a full range of maturities. This provides a robustness check of our results.

Consistent with the local currency-denominated returns for the three- to five-year indexes, Exhibit 7 shows that the low credit-rating broader bond index return presents about 400 bp extra returns combined with 30 bp less volatility. The broader-maturity country bond low rating portfolio, when measured in U.S. dollar returns, presents 110 bp extra expected return and 140 bp less volatility.

VII. RATINGS AND RISK

The evidence suggests that country ratings do a reasonable job in distinguishing high expected return opportunities from lower expected return opportunities across national markets. It is possible, though, that the country rating is proxying for some other type of risk such as interest rate sensitivity.

When examining bonds on a global basis, one has to be careful about the definition of interest rate sensitivity. The usual metric, duration, is usually applied in a domestic context. It represents the bond price sensitivity to changes in some benchmark interest rate. The issue, however, is the definition of the benchmark interest rate. In a global analysis, the appropriate benchmark is a world-weighted interest rate. For this purpose, we use the J.P. Morgan world bond index.

Exhibit 9 shows the average credit rating against the national sensitivity to changes in the world bond index. Although Australia has both the lowest bond beta (0.1) and the lowest credit rating, there is no significant relation between the bond betas and credit rating. The other low-beta countries are the U.S. and Canada. Most of the bonds have betas in the 1.3 to 1.5 range. It is obvious that the country credit rating is not simply a proxy for price sensitivity to rate changes.

A more traditional duration measure is present-

EXHIBIT 9 ■ Country Credit Rating and World Bond Market Betas ■ Inclusion to March 1994

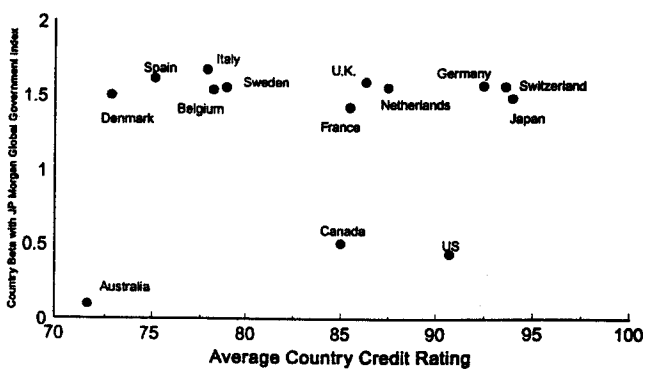


EXHIBIT 10 ■ Portfolio Composition in March 1994

High Credit Risk Portfolio	Market Capitalization ($MM)	Yield (%)	Duration	Country Credit Rating
Australia	$46,910	6.60	4.44	68.9
Belgium	$141,720	6.90	4.48	78.8
Canada	$155,930	6.44	5.28	81.9
Denmark	$67,670	6.12	4.08	77.8
Italy	$299,200	9.33	3.46	72.6
Spain	$113,080	8.22	3.85	74.7
Sweden	$68,490	6.87	3.92	74.5
Average	$127,571	7.21	4.22	75.6
Low Credit Risk Portfolio				
France	$298,430	5.85	5.23	88.2
Germany	$516,190	5.85	4.37	89.4
Japan	$918,900	3.69	5.51	91.0
Netherlands	$154,120	5.82	5.37	88.4
Switzerland	$19,770	4.41	6.28	92.2
United Kingdom	$268,160	6.83	6.37	86.0
United States	$1,756,200	5.61	5.22	89.7
Average	$561,681	5.44	5.48	89.3

Note: Market statistics are for the Salomon Brothers Government Bond Indexes, which include a broad range of maturities.

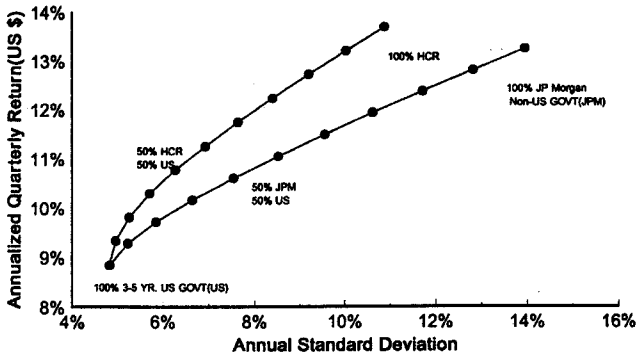
ed in Exhibit 10. These durations approximate the interest rate sensitivity of the Salomon Brothers bond index returns for the countries in our sample (not the J.P. Morgan indexes).

As mentioned earlier, the Salomon country index measures returns on a broader range of issues. The durations for the J.P. Morgan indexes are not available, but it is obvious that the national durations will not explain the differences in the bond returns. Notice that the average duration of the low credit-rating portfolio is *less* than the high credit-rating portfolio. The four countries with the lowest credit ratings (highest credit risk), Australia, Italy, Spain, and Sweden, have some of the lowest durations.

VIII. PORTFOLIO CONTROL WITH HIGH CREDIT RISK

Our analysis suggests that credit rating is able to separate high expected return opportunities from low ones. Exhibit 11 presents mean-variance efficient portfolios composed of U.S. Treasuries and the J. P. Morgan non-U.S. bond index and portfolios composed of

EXHIBIT 11 ■ Efficient Portfolio Selection ■ High Credit Risk versus Passive International Investment ■ December 1985-March 1994



HCR: High credit risk portfolio.

Treasuries and the high credit risk portfolio (unhedged U.S. dollar returns). This contrasts a passive strategy (Treasuries and the non-U.S. bond) to an active strategy, which is based on an out-of-sample selection of low rating bonds.

For Exhibit 11, the low rating portfolio is calculated in U.S. dollar terms. Notice that the active strategy dominates the passive global strategy at every point of opportunity. For example, for an investor with a taste for 10% volatility, 200 bp extra expected return could be achieved by combining the U.S. bond position with the low rating portfolio instead of combining with the broader non-U.S. bond portfolio.

IX. CONCLUSIONS

We show that country credit ratings are useful information in the context of tactical global fixed-income asset allocation. We find that out-of-sample portfolio returns based on country credit risk deliver higher returns with lower volatility.

How significant are these results? The regression of the local currency returns on the credit rating produces an R^2 of 72%. Investors, though, can get only their own country's local return. These local bond returns are not attainable by a global investor.

The more meaningful regression is U.S. dollar returns on country credit ratings. This regression is

highly significant and explains 43% of the cross-sectional variance.

Finally, it is important to put our findings in a meaningful context for fixed-income management. Bennett, Esser, and Roth [1994] show that over the twenty years ending December 1992 and maintaining equal durations, BBB bonds produced a return of 10.37% and Treasuries produced a return of 9.13% (spread of 124 bp). The unhedged low credit-rating portfolio had a return differential of 120 basis points, equivalent to the BBB-Treasury return spread. The U.S. dollar return volatilities of the low credit-rating portfolio and the BBB portfolio were approximately the same.

The bottom line is that our low credit-rating portfolio provides BBB-like return enhancement. Furthermore, none of the countries in our selection universe has an S&P credit rating less than AA. So in a sense, our low credit-rating portfolio is able to provide BBB returns with AA credit risk.

ENDNOTES

Harvey's research is supported by the Batterymarch Fellowship.

*Using the eleven countries with data from 1985, the same regression explains 32% of the cross-sectional variation.

REFERENCES

Bennett, Thomas L., Stephen F. Esser, and Christian G. Roth. "Corporate Credit Risk and Reward." *Journal of Portfolio Management*, Spring 1994, pp. 39-47.

Burik, Paul, and Richard M. Ennis. "Foreign Bonds in Diversified Portfolios: A Limited Advantage." *Financial Analysts Journal*, March/April 1990, pp. 31-39.

Eaker, Mark R., and Dwight M. Grant. "Currency Risk Management in International Fixed-Income Portfolios." *Journal of Fixed Income*, December 1991, pp. 31-47.

Erb, Claude, Campbell R. Harvey, and Tadas Viskanta. "Country Risk and Global Equity Selection." *Journal of Portfolio Management*, forthcoming, 1994.

Frankel, Jeffery, and Kenneth Froot. "Forward Discount Bias: Is It an Exchange Risk Premium?" *Quarterly Journal of Economics*, February 1989, pp. 139-161.

Hodrick, Robert J. "Intertemporal Asset Pricing with Time-Varying Risk Premia." *Journal of International Economics*, 1981, pp. 573-587.

Levy, Haim, and Zvi Lerman. "The Benefits of International Diversification in Bonds." *Financial Analysts Journal*, September/October 1988, pp. 56-63.

Litterman, Robert, and José Scheinkman. "Common Factors Affecting Bond Returns." *Journal of Fixed Income*, June 1991, pp. 54-61.

Mark, Nelson C. "Time-Varying Betas and Risk Premia in the Pricing of Forward Foreign Exchange Contracts." *Journal of Financial Economics*, December 1988, pp. 335-354.

Scheinkman, José, and Laurence Weiss. "Volatility and the Yield Curve." *Journal of Fixed Income*, June 1991, pp. 49-53.

Shapiro, Harvey D. "Wages of Virtue." *Institutional Investor*, March 1994, pp. 69-77.

Sims, Ian. "The Prospective Real Yield and Its Applications to Active Global Bond Management." Delaware International Advisors, London, 1993.

Wolff, Christian. "Forward Foreign Exchange Rates, Expected Spot Rates, and Premia: A Signal Extraction Approach." *Journal of Finance*, June 1987, pp. 395-406.