

Understanding Emerging Market Bonds

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Draft as of: October 21, 1999

Abstract

Although emerging market bonds have been a investment option for centuries, only in the last decade have we had the data to begin to study their behavior. According to this data emerging market bonds have had high volatility, negative skewness and low, but increasing, correlation with existing asset classes. Not surprisingly we find that as with other asset classes, country risk plays an important role in the pricing of emerging market bonds. We also introduce a measure of market sentiment for emerging market bonds. For many investors the extreme characteristics of emerging market bonds will make it difficult for them to invest, for others we provide some insight on means for emerging market bond investments.

Introduction

The 1990s emerging market bonds have seen nearly a full cycle of sentiment. Starting with their emergence after a decade of default and turmoil. Next the strong performance of emerging market bonds attracted considerable attention and some measure of acceptance. Indeed, from 1991 to the summer of 1997, the average returns on emerging market bonds in the 1990s exceeded that of the Standard and Poor's 500 index. At the time we argued [Erb, Harvey and Viskanta (1997a)], that any judgment on the viability of emerging market bonds as an asset class was difficult given 1) the short history of data and 2) that characteristics were being measured over a long bull market. Then in 1997 & 1998 the world capital markets saw two bouts of severe economic and financial crisis. These setbacks not only produced poor returns and some subsequent defaults. It also impeded further interest into the asset class.

Much of the research into emerging market bonds was done prior to these economic and financial declines. A number of authors then pointed out some of the benefits to emerging market debt. While highlighting the risks involved, Nemerever (1996), Dahiya (1997), and Froland (1998) all made the case for investment in emerging market bonds. None however could have foreseen the coming turmoil and shakeout.

Emerging market equities, on the other hand, have garnered a great deal more research attention. Harvey (1995) finds that standard asset pricing models fail when applied to these markets. Harvey attributes the failure of these models to the lack of integration of the emerging capital markets with global capital markets. Bekaert and Harvey (1995, 1997) propose and test models of expected returns in emerging markets that explicitly take the degree of market integration into account. Erb, Harvey and Viskanta (1996) propose a model of expected returns based on risk ratings in emerging market countries.

With nearly a decade of data we are now more aware of both the opportunities and pitfalls involved with emerging market debt. In this paper we have the following

objectives. First, a brief exploration of the history of emerging market lending. Second, we examine the recent performance of emerging market bonds and note the unique statistical properties of emerging market bond returns, including their correlation with other asset classes. Third, we note the importance of country risk in the pricing and returns of emerging market bonds. Fourth, we document some new statistical insights on emerging market bonds. Finally, we note how investors and plan sponsors might approach potential investments in emerging market bonds.

Historical Perspective

Although many of the discussions about emerging market bonds apply only to the last decade global bond investing has a long and storied history. Through, at least, the First World War London was the center of global finance. Although today it is hard to believe the United States was for much of the nineteenth century viewed as an emerging market. Not only was it emerging, but went through periodic eras of default. According to Chernow (1990), “During the depression of the 1840s – a decade dubbed the Hungry Forties – state debt plunged to fifty cents on the dollar. The worst came when five American states – Pennsylvania, Mississippi, Indiana, Arkansas and Michigan – and the Florida Territory defaulted on their interest payments.”¹

Latin American lending had already become quite widespread in the nineteenth century. Again Chernow, “...as early as 1825 nearly every borrower in Latin America had defaulted on interest payments. In the nineteenth century, South America was already known for wild borrowing sprees, followed by waves of default.”² By the 1920s foreign lending in the United States had once again become widespread. In fact the sale of re-packaged foreign bonds to individual investors, and the subsequent losses, played a role in the enactment of the Glass-Steagall Act in 1933, see Chernow (1990).

Volatility has been a hallmark of emerging market bonds throughout time. Exhibit 1a shows the yield on Argentinean and Brazilian bonds from 1859 through 1959.³ One

can clearly see periodic bouts of distress and volatility. This long-term historical perspective allows us to put the volatile decade of the 1990s into context. Exhibit 1b shows the stripped yields over US Treasuries for Argentina and Brazil from 1991 to 1999. Again we see both high relative yields and ample volatility.

Data

Data on the emerging market bonds is limited in large part by the short history of many of these instruments. We have found that J.P. Morgan Securities provides an impressive source of data on emerging market bonds and we will utilize their data throughout this paper. They now track a number of indices including EMBI (Emerging Market Bond Index), EMBI+, and EMBI Global. EMBI consists of U.S. dollar denominated Brady bonds.⁴ EMBI+ expands on EMBI by including other non-local currency denominated bonds and has more restrictive liquidity requirements. As of September 30, 1999, the EMBI Global index included bonds from 27 countries.

A related problem, recognized in regard to emerging market equities, is that of market survivorship. Goetzman and Jorion (1999) demonstrate that emerging market equity markets that re-emerge after a period of dormancy have higher returns for some initial period greater than their long-term expected return. The upward bias should also be evident in emerging market bond markets as well. The aftermath of debt renegotiation and market liberalization drove returns for a period above their sustainable long-term average. Therefore, these data need to be interpreted with great care.

J.P. Morgan also produces the ELMI+ (Emerging Local Market Index) a local currency denominated money market index that covers 24 countries. It differs from the earlier indices in a number of respects. First it contains securities denominated in each country's local currency. Second, the index has a short duration (48 day average life as of September 30, 1999). Third the country composition differs materially from the hard currency indices. To date most foreign emerging market investment has been in the

longer duration hard currency bonds. However, given the problems many emerging markets suffered due to the currency mismatch between their revenues and debt service requirements we should not be surprised to see a preference towards local currency denominated debt.⁵ The issue will be finding investors willing to take on that not inconsiderable currency risk.

Risk and Expected Returns of Emerging Market Bonds

We need to exercise some caution in any historical analysis of emerging market bond performance. The J.P. Morgan EMBI index dates back only to January 1991. Whereas returns data for emerging market equities, from the International Finance Corporation (IFC), dates back to 1976. There are great dangers to drawing inferences on such short samples. For example, in the summer of 1997 the average performance of the EMBI index exceeded that of the S&P 500 and considerably exceeded that of the U.S. high yield index. Such return differentials were often used to promote investment in emerging market bonds.

Two years makes a huge difference. Both emerging market equities and bonds were subject to massive sell-offs beginning in August 1997. Average returns have decreased and volatility has increased.

Exhibit 2a shows that emerging market bonds (JPM EMBI) stand out in the northeast portion of the graph.⁶ Over the January 1991 to September 1999 period emerging market bonds have higher returns than emerging market equities (IFCG and IFCI) and U.S. high yield corporate debt (CSFB High Yield). The return advantage, however, came with the cost of higher volatility which we will see for emerging market bonds is largely idiosyncratic in a style analysis framework.

Exhibit 2b shows that emerging market bonds (JPM EMBI, EMBI+ & EMBIG) continue to stand alone in the northeast part of the graph. Over the January 1994 to September

1999 period emerging market bonds continue to have higher returns than emerging market equities (IFCG and IFCI) and U.S. high yield corporate debt (CSFB High Yield). However the advantage over domestic high yield has narrowed dramatically and comes at the expense of substantially higher volatility.

In both graphs it is also evident that emerging market bonds have considerably smaller market capitalization than other major global asset classes. This is demonstrated by the size of the bubble on either Exhibit 2a or 2b which represents the relative US\$ market capitalization as of September 1999. It is hard to even compare emerging market bonds with major equity indices (S&P 500, MSCI EAFE) or major bond indices (Lehman Aggregate or the JP Morgan Non-US GBI). More apt comparisons for emerging market bonds include domestic high yield bonds (CSFB High Yield) or emerging market equities (IFCI or IFCG). Again there remains a market capitalization gap, but it at least we are in the order of magnitude. JP Morgan's EMBI Global is however a larger opportunity set given its inclusion of a number of countries excluded from its prior standard benchmark, EMBI+.

Distributional Characteristics of Emerging Market Bonds

Research into the distributional characteristics of emerging market equities has shown significant deviations from normality. Bekaert and Harvey (1997) and Bekaert et al. (1997) demonstrate that emerging market equities exhibit skewness and excess kurtosis. They show that given a typical investor's preferences optimal investment weights should reflect the asset's contribution to portfolio skewness.

The intuition for this is straightforward. People like assets that deliver high positive skewness and are willing to accept low (or even negative) expected returns for these assets (lottery tickets, option payoffs). Investors do not like negative skewness. To take on negative skewness, investors demand a higher expected return.⁷

One difficulty with measuring skewness is that it likely changes through time. Therefore looking at past data may give no indication of future expected skewness. This is the so-called “peso problem” in economic theory. Looking at past currency movements, you may see little variation in rates during a managed float regime. However, there is a probability of a devaluation that you cannot detect from looking at past data. This is just the definition of negative skewness.

This issue of not being able to detect negative skewness using past data does not appear to be relevant for emerging market bonds. For example, in the January 1991 to May 1997 period, the EMBI has a negative skewness of -0.8. In the January 1994 to May 1997 period, the negative skewness is -0.6. During this same period, the EMBI+ has a negative skewness of -0.8. There was considerable evidence - before the emerging market meltdown - that emerging market bonds possessed negative skewness. This negative skewness is consistent with the high expected returns.

The events beginning in the summer of 1997 caused an even greater measured negative skewness. Exhibit 3a shows that the skewness for the EMBI portfolio in the January 1991 to September 1999 period is -1.9. From January 1994 to September 1999 we see skewness of -1.6, -2.0 and -2.0 for EMBI, EMBI+, and EMBI Global respectively.

We can see in Exhibit 3b that this skewness is driven in part by a large negative observation. This -25.6% return for EMBI in August 1998 is quite visible at the left hand part of the graph. However even when we exclude this observation from the entire January 1991 to September 1999 sample we still see skewness of -0.8.

Asset Class Correlations

In Exhibit 4 presents the correlation of J.P. Morgan's EMBI index with other asset classes. The sub-periods capture the results leading up to the initial emerging market

crisis, and the subsequent time period. We use EMBI because it has the longest history. The results would not be affected by the use of broader benchmarks, because the correlation between EMBI and EMBI+ or EMBI Global is very high at 0.98, and 0.99, respectively.

Examining the data through July 1997, one notices that the highest correlations are with the two IFC emerging market indices. Correlations against other U.S. dollar bond indices hover around 0.40 up to July 1997. A first glance at the data suggests that emerging market bonds are somewhat unique in their return patterns. However, there is an extraordinary shift in the patterns when the most recent data is examined.

Contrasting the period up to July 1997 to the 26 months afterwards, the correlation with the CSFB high yield index increases over 50 percent. The correlation with the S&P 500 is greater than 0.75 and is only slightly smaller than the IFC indices. The correlation with the government bond indices shifts from positive in the earlier period to negative in the most recent period.

Another way of approaching this question is to examine emerging market bond returns in a multivariate setting. We choose a Sharpe-style attribution methodology to examine both the overall and time-series properties of the asset class.⁸ If we can determine which asset classes that emerging market bonds correlate with, we gain a better understanding of what role they might play in a portfolio context.

Exhibit 5a & 5b shows the results for an analysis from January 1991 to September 1999. Over the full sample, the largest contributor to variation in emerging market debt returns is the IFC index. The CSFB High Yield index is the second most important followed by the S&P500 and long-term U.S. government bonds.

One can see in Exhibit 5b that emerging market bonds have gone through three distinct phases. The first phase which ends around June 1995 is characterized by a great deal of volatility in asset class contributions. The CSFB High Yield index begins as the most

prominent contributor. This should not be surprising because initially emerging market bonds were viewed, and sold, as a viable domestic high yield substitute. Emerging market bonds began showing up in what were previously purely domestic portfolios. High yield bonds eventually give way to the IFC Investable and Lehman Long Term Government Bond Index. This period has the lowest R-squares averaging some 54%.⁹

In this next period from July 1995 to September 1997 emerging market bonds are described solely by two asset classes: emerging market equities and long term US treasuries. This period finds volatility decreasing and the sovereign spreads on emerging market debt steadily decrease to what would be their historic low in September 1997. The explanatory power of these asset classes increases to some 63%.

That era of relative tranquility gives way to a crisis filled period. The returns on emerging market bonds effectively decouple from the US treasuries and are now associated with three major asset classes: emerging market equities, US equities and US high yield reappears as an influence. We see the highest R-squares of around 71%.

From this analysis we can see that over as short a period as a decade we cannot truly summarize the asset class influences on emerging market bonds. It clearly depends on the type of return regime expected. If emerging market bonds return to a more placid period we would expect to see a higher correlation with US treasuries and a continued influence of emerging market equities.

Bonds and Equities

Are emerging market equities and bonds substitutes? Intuition suggests that high yield bonds should behave similarly to equities - especially in times of distress. Our intuition is that emerging market stocks and bonds should have higher intra-market correlations

than those in the developed markets due to their country specific risk. This would allow an investor the chance to more readily substitute bonds and stocks within an emerging country. This could be very helpful in markets where liquidity and/or investability are issues.

Kelly, Martins and Carlson (1998) document this exact relationship between emerging market equities and bonds. They find that the lower a country's perceived creditworthiness the higher the correlation between its bond and equity markets. They also document the fact that credit shocks, both positive and negative, have had the anticipated effect on correlations.

Exhibit 6 details the equity-bond correlations for 18 countries and the major emerging market bond and equity indices. We report three sub-periods: January 1994-September 1999, January 1994-July 1997 and August 1997-September 1999. The third period isolates the emerging market sell-off and subsequent rebound.

The correlations are generally high which is consistent with our intuition. The most striking pattern in Exhibit 6 is the increase in the intra market correlations during the most recent period. Brazil, Peru, South Korea and Venezuela all show increased intra market correlations. For the index as a whole, the correlation increases from 0.73 in the period up to July 1997 to 0.84 over the last 26 months.

It is also the case that intra-market bond-equity correlations increase with perceived risk. This relationship is documented in Kelly, Martins and Carlson (1998) and Erb, Harvey and Viskanta (1999). In Exhibit 7 we can see that for the period January 1994 to September 1999 intra-market bond versus equity correlations increase as creditworthiness decreases, as measured by the Institutional Investor Credit Ratings. Were it not for two prominent outliers (Morocco and Nigeria) the R-square measure would increase from 11% to 50%. One can also see that the bond-equity correlations for the developed and emerging markets are substantially (nearly 0.60) different.

Country Risk Ratings and Emerging Market Bonds

As with all types of debt, investors in the emerging markets need to concern themselves with three primary sources of risk. The first is interest rate risk. This issue is non-trivial in regard to some emerging market bonds. Some of the bonds issued through loan restructurings have complex structures that need to be properly modeled to capture the interest rate sensitivities. This becomes all the more important because many emerging market bonds have relatively long durations. The second risk is currency risk. We have not focused on currency risk because most of our analysis focuses on U.S. dollar based debt. However, as mentioned earlier, local currency bond issuance will likely grow in the future. Hence, the management of currency risk will undoubtedly become more important over time.

The third type of risk is sovereign, or country risk. The countries in the emerging market bond arena cover not only a wide geographic area, but also cover a wide range of situations. For example most observers would recognize that the issues facing Brazil are quite different from those facing Russia or the Philippines. Accordingly researchers are focusing more effort on explaining the pricing of sovereign risk and how various services rate and rank sovereign risk.

Eichengreen and Mody (1997) study the fundamental determinants of yield spread on emerging market debt. They determine that sentiment has played a key role in determining emerging market bond spreads from 1991-1996. Cantor and Packer (1996) examine the factors that go into determining sovereign ratings. They find that macroeconomic factors are able to explain a large amount of the variation in commonly used sovereign ratings. They also examine the impact of changes in ratings on sovereign credit spreads. Dym (1997) also uses a model to derive credit sensitivities for a number of emerging markets and uses them to create a credit model investment strategy. Purcell (1996), also focuses on the emerging markets, examines the sources of sovereign risk and their role in emerging market bond investing. Erb, Harvey, and

Viskanta (1997b) model various commercial rating services' country risk ratings using macroeconomic variables, and examine their use in the portfolio management process.

A simple way of testing the value of publicly available country risk ratings is to use them to form portfolios. In Exhibit 8 we show the results of a portfolio simulation using the JP Morgan EMBI Global universe of countries. Every month we sort the countries into two portfolios based on the prior month's ICRG Composite Rating. One can see that the riskier portfolio outperformed the less risky portfolio and the benchmark. However this came with substantially higher volatility, and beta. In addition the most recent high risk sort includes: Algeria, Brazil, Colombia, Cote d'Ivoire, Croatia, Ecuador, Lebanon, Malaysia, Nigeria, Russia, South Africa, Turkey and Venezuela. While this exercise does not necessarily provide us an investable strategy it does give us some confidence for country risk to discriminate between high and low expected return countries.

Given this research, we should not be surprised to see that perceptions of country risk are reflected in sovereign yields and country bond returns. Erb, Harvey, and Viskanta (1996b) show that commonly used country risk ratings do an impressive job in explaining the cross-section of real yields in a sample of developed market bonds. In the emerging markets we study bonds denominated in U.S. dollars. This allows us to directly examine cross-country yield spreads over the appropriate (maturity-adjusted) Treasury yields.

Exhibit 9 shows the relation between Institutional Investors' Country Credit Ratings and the spread over U.S. Treasuries for the EMBI Global universe of countries. To simplify the analysis, and to keep it in two dimensions, we estimated for each country the spread over Treasuries for a four year spread duration.¹⁰

This has important ramifications for the type of analysis investors need to undertake. To add value above and beyond a given benchmark, an analyst needs to concern him or herself with the reasons behind the deviations from the calculated relationship between spreads and risk ratings. For outliers deciding whether the market is

improperly estimating country risk or mispricing certain bonds is the key to active emerging market bond selection.

Part of the issue may be the market is already anticipating credit risk adjustments. In Exhibit 10 we list the countries in the major emerging market indices, Political Risk Service's International Country Risk Guide Composite Rating, ICRG's one year forecast Composite Rating, and contemporaneous and forecasted yield spreads. Towards the bottom of the table one can see that Political Risk Services is forecasting reversals of fortune for Thailand (down) and Turkey (up). Forecasting future risk profiles adds another dimension to the analyst's job in active bond management.

Slope of the Sovereign Yield Curve

The issue of pricing emerging market bonds is an important one not only for its own sake, but also for our understanding of other emerging market assets. All financial valuation models require some estimate of the discount function. Understanding the dynamics of emerging market interest rates can help in accurately discounting cash flows in the emerging markets. Analysts have recognized in the emerging markets an upward sloping term structure of sovereign (interest rates over comparable U.S. Treasuries) spreads in many of the emerging markets. We can this is in Exhibit 11 we can see that this credit yield curve is upward sloping in a number of major emerging markets.

In this example, which only covers Eurobonds so as to keep credit comparable among a country's bonds, we see that there are exceptions to the rule. Distress tends to invert this curve. Prominent examples of this at the moment are Ecuador and Russia (not shown). In Exhibit 11 Venezuela also seems to be significantly inverted.

However this notion of an upward sloping sovereign yield curve is contrary to theory for risky issuers. Helwege and Turner (1999) survey the literature and find theoretical and

empirical support for inverted credit yield curves. However in their research they find that once credit quality is held constant for any given issuer, the credit yield curve slopes upward. Although this topic requires additional study, we can have some added confidence that this general notion of upward sloping yield curves in the emerging markets is confirmed in other risky bond markets as well.

Emerging Market Bond Sentiment

Just as we confirmed this notion of upward sloping sovereign yield curves in another setting, we also can find a measure of emerging market sentiment in another market as well. Many analysts view the premium (or discount) on closed-end funds as a sentiment measure of small investors. While we do not have the data to confirm the composition of ownership of domestically traded closed-end emerging market bond funds we can still examine the collective premium/discount on these funds and see if it has some ability to discriminate among return regimes.

In Exhibit 12 we can see the average premium on (up to) ten domestic closed-end emerging market bonds funds plotted against the JP Morgan EMBI+ total return index on a weekly basis. From this graph we can see that investors tend to bid up premiums during times of distress and reduce premiums during periods of relatively positive market returns. This relationship seems to point to investors' having a preference for yield stabilization, i.e. when NAVs are high, market prices are low, when NAVs are low, market prices are high.

It is interesting to note that it took the crisis in the Autumn of 1997 and the Summer of 1998 to really shift sentiment dramatically from its period of relative tranquility. This measure can provide emerging market bond investors with an indicator not dependent upon bond prices themselves. Another sentiment measure worth examining would be the relative in and outflows from dedicated open-end emerging market bonds funds. While neither of these would be a precise timing tool, they could be helpful in gauging

market sentiment.

Of course, the closed-end fund discount/premium need not simply reflect sentiment. Bekaert and Urias (1996) link the discount/premium to the degree of integration and diversification potential of closed-end country funds. While Arora and Ou-Yang (1999) present a dynamic model of premia and discounts on closed-end funds within a rational expectations framework.

Portfolio Context

For many investors the numerous practical issues involved with emerging market bonds will prevent them from making any sort of strategic commitment. Indeed there are a number of reasons to bypass emerging market bonds, starting with their small relative market capitalization and limited liquidity. Emerging market bond returns are also highly volatile and negatively skewed. From a practical perspective emerging market bond investments require additional analytic capabilities to cover some two dozen countries and markets. For these reasons, and more, many investors will find the costs outweigh the potential benefits of investing in what is a minor world investment opportunity.

For others the potential return opportunities are simply too large to ignore. In a world of low single digit equity risk premia, the nearly 1000 basis point sovereign spread on EMBI Global, as of September 30, 1999 begins to look attractive. For those investors, and others, there are some practical issues involved with emerging market bonds that need to be addressed.

The first issue is one of benchmark selection. As with many asset-class benchmarks the issue of benchmark efficiency is an obvious one. For example JP Morgan had, until recently, certain liquidity requirements for inclusion in their indices. This led to benchmarks that were highly weighted towards Argentina, Brazil. Even in their expanded benchmark, EMBI Global, these three countries make up 55% of the index.

For many investors this sort of concentration is simply not acceptable. JP Morgan has addressed this issue with EMBI Global Constrained that attempts to limit this overconcentration. With Argentina, Brazil and Mexico falling to some 36% of the index. However many investors will feel more comfortable with a self-structured portfolio. This is already a common practice with emerging market equity portfolios and can be applied to emerging market bonds as well.¹¹ For example, an investor could structure a benchmark so as to target a specific level of country risk, or limit any individual country's benchmark weight.

Given that a strategic commitment to emerging market bonds may not be feasible, many investors have tried to squeeze emerging market bonds into a related asset class in the hope of at least capturing some of the inherent return opportunities. Unfortunately this is a business risk given the high tracking errors between emerging market bonds and domestic high yield and non-US government bond indices. For example from January 1994 to September 1999 EMBI Global had annualized tracking errors of 17% and 22%, respectively, with the CS First Boston High Yield index and the JP Morgan Non-US Government Bond index. This makes the tactical decision between emerging market bonds and its asset class partners particularly treacherous.

However some have concluded that investing in emerging market bonds in conjunction with emerging market equities is a viable solution, for example see Kelly, Martins and Carlson (1998). From January 1994 to September 1999 JP Morgan EMBI Global and IFC Investable had an annualized tracking error of 15%. While still highly variable it seems that this is a more feasible solution. There are other benefits from a balanced emerging market portfolio including potentially greater liquidity and greater diversification opportunities.

Conclusions

Despite nearly a decade of data, there is much left to learn about emerging market

bonds. As we have seen the character of emerging market bond returns has been highly variable through time. In relatively good times, emerging market bonds seem to have rather unique return characteristics. However, in times of crisis, they are highly correlated with equity markets. The bonds have shown negative skewness that if expected to continue, needs to be compensated for in terms of higher expected returns. For many potential investors this combination of a relatively small market capitalization, high volatility, and negative skewness makes it impractical to invest in emerging market bonds.

Despite this, many emerging markets will require continuing capital inflows. The bond markets seem to be a preferred way of funneling capital to sovereign and quasi-sovereign entities. Undoubtedly the crises of 1997 and 1998 have made it difficult for many investors to view emerging markets as a viable investment opportunity. Hopefully this paper has provided some insights on the recent history in emerging markets and has highlighted the issues involved in emerging market bond investments going forward. Although the emerging bond markets are no longer priced at crisis levels, neither have they regained the level of complacency seen in the Autumn of 1997. Given the volatile history of these markets over the past decade, this middle ground may, in fact, be a reasonable starting point for the next decade.

¹ Chernow, Ron, The House of Morgan, 1990, Simon & Schuster: New York, p. 5.

² Ibid, p. 71.

³ Although one can argue that Argentina was at the time a relatively well developed country. Its equity market capitalization in the early 1920s exceeded that of England.

⁴ Brady bonds are those bonds issued under a Brady Plan restructuring. A Brady Plan debt restructuring, named after former U.S. Treasury Secretary Nicholas Brady, generally exchanges debt for freely traded bonds, reduces the overall level of debt and interest payments, and often offers new bonds with a pledge of U.S. Treasury zero-coupon bonds.

⁵ See Harvey and Roper (1998).

Abbreviation	Index
CSFB High Yield	Credit Suisse First Boston High Yield Bond Index
IFCI	International Finance Corporation Investable Composite
IFCG	International Finance Corporation Global Composite
JPM EMBI	J.P. Morgan Emerging Market Bond Index
JPM EMBI+	J.P. Morgan Emerging Market Bond Index Plus
JPM EMBIG	J.P. Morgan Emerging Market Bond Index Global
JPM Non-US GBI	J.P. Morgan Non-US Global Bond Index (unhedged)
Lehman Aggregate	Lehman Brothers Aggregate Bond Index

Lehman LT Government	Lehman Brothers Long Term Government Bond Index
Lehman IT Government	Lehman Brothers Intermediate Term Government Bond Index
MSCI EAFE	Morgan Stanley Capital International Europe, Australasia, and Far East Index
S&P 500	Standard and Poor's 500 Index
Wilshire 4500	Wilshire Associates 4500 Stock Index

⁷ In the context of a portfolio, we measure the contribution to the skewness of a portfolio, or coskewness. This measure is analogous to the beta for contribution to variance. See Harvey and Siddique (1999).

⁸ The asset class factor model seeks to explain the target returns using a pre-defined set of asset class returns. This can give us some insight into the strength of the relationship between asset classes. See Sharpe (1992) for an introduction to the style measurement process.

⁹ Strictly speaking, the R-square statistics from a Sharpe style analysis are not true r-square statistics. Because of the constraints on the analysis, at best we should characterize them as quasi-R-squares.

¹⁰ For each country we used the spread over Treasuries and spread duration for a number of sovereign bonds in each country. We then fit a linear regression for each country and calculated the spread over Treasuries for a four year duration. We chose four years because that approximates the overall spread duration on the J.P. Morgan EMBI Global index.

¹¹ See Masters (1998) for a discussion of the issues involved with emerging market equity indices. Many of these same issues are present with any emerging market bond index.

ACKNOWLEDGEMENTS

Much of this material was originally published as "New Perspectives on Emerging Market Bonds" in the Winter 1999 edition of the *Journal of Portfolio Management*, and was presented at the 1999 International Investment Forum meeting. The authors would like to thank Brian Mitchell at J.P. Morgan Securities, Inc. and Andrew Roper for their assistance.

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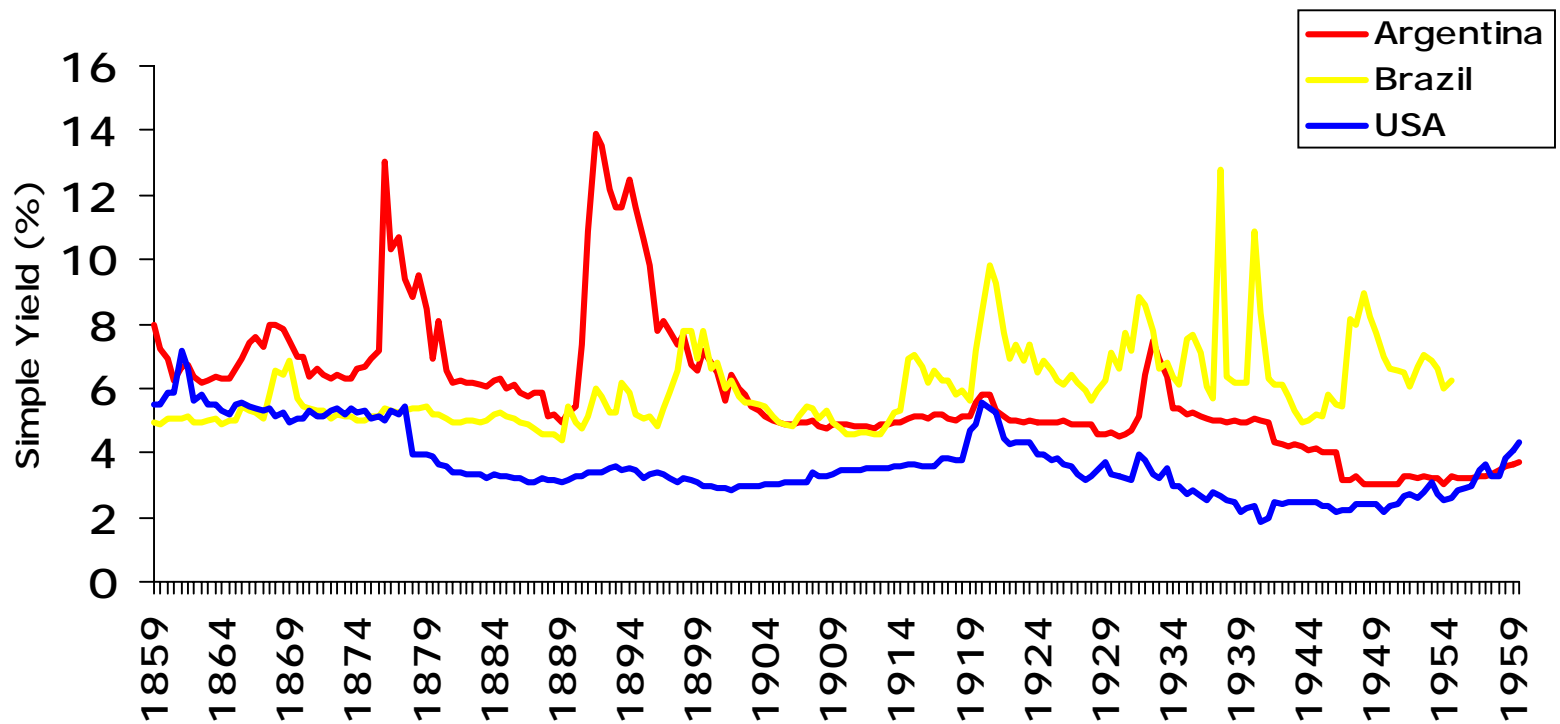
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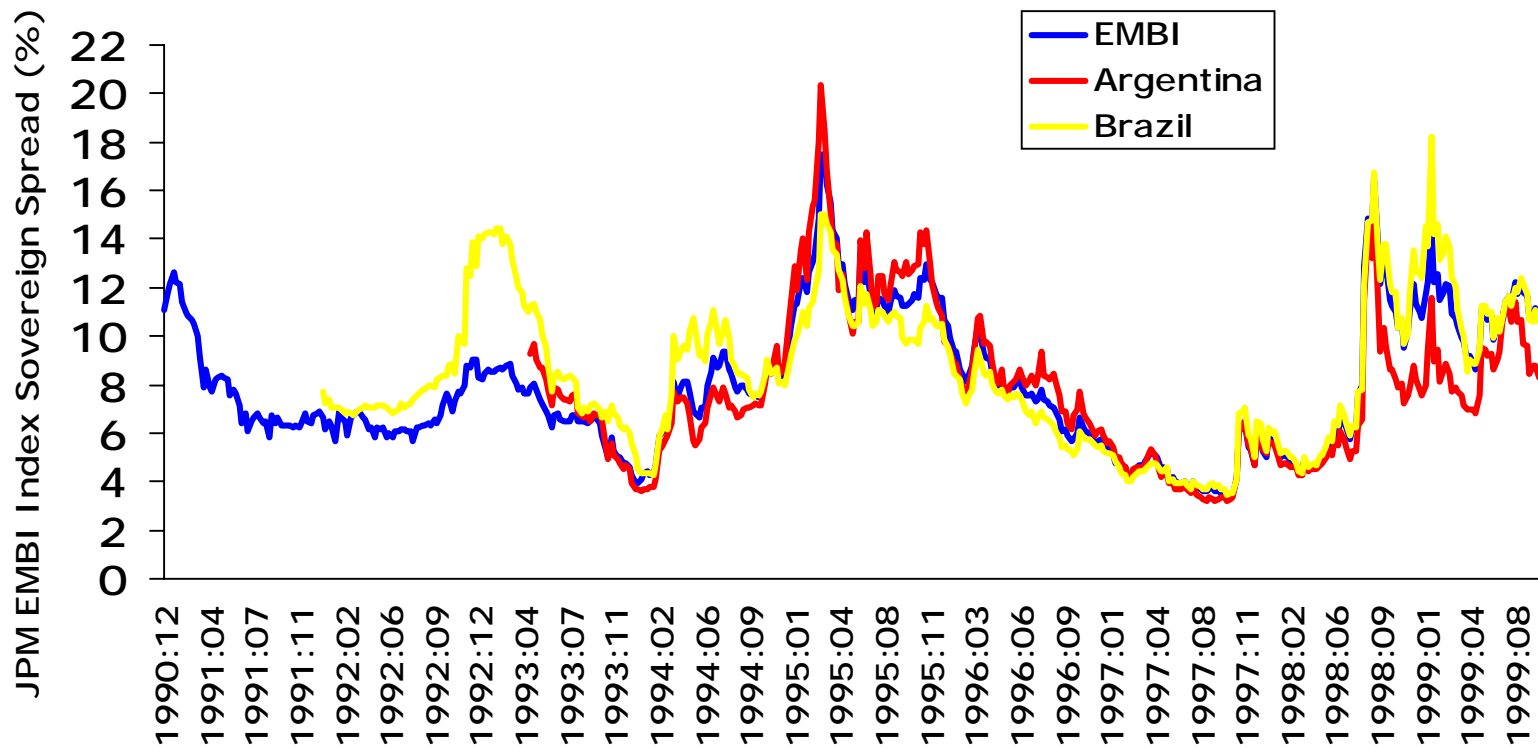
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Exhibit 1a
Historical Perspective
Long Term Historical Yields



Semi-Annual Observations
Source: Global Financial Database

Exhibit 1b
Historical Perspective
Recent Yields

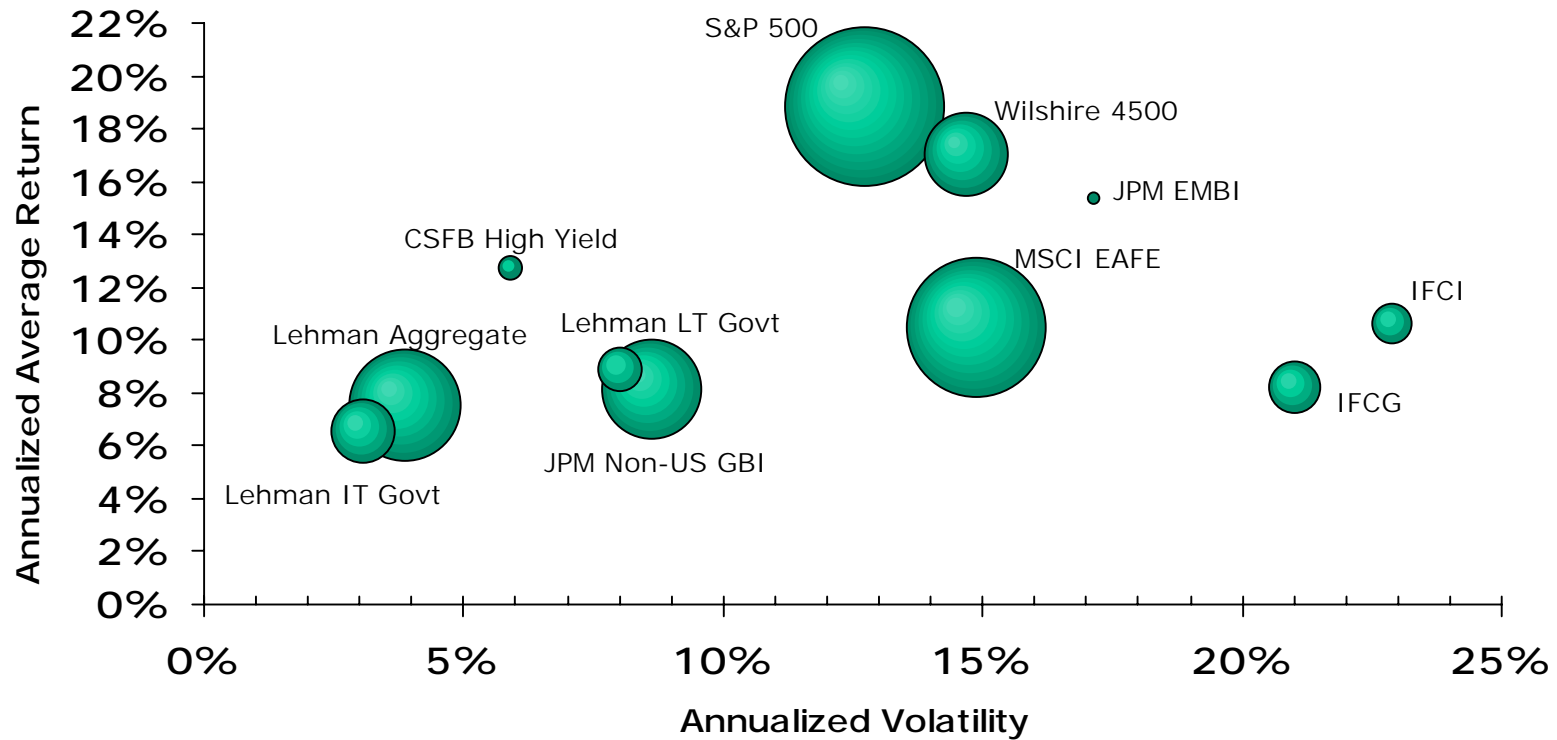


Weekly Observations
Source: JP Morgan Securities, Inc.

Exhibit 2a

World Capital Markets

Risk, Return and Relative Capitalization

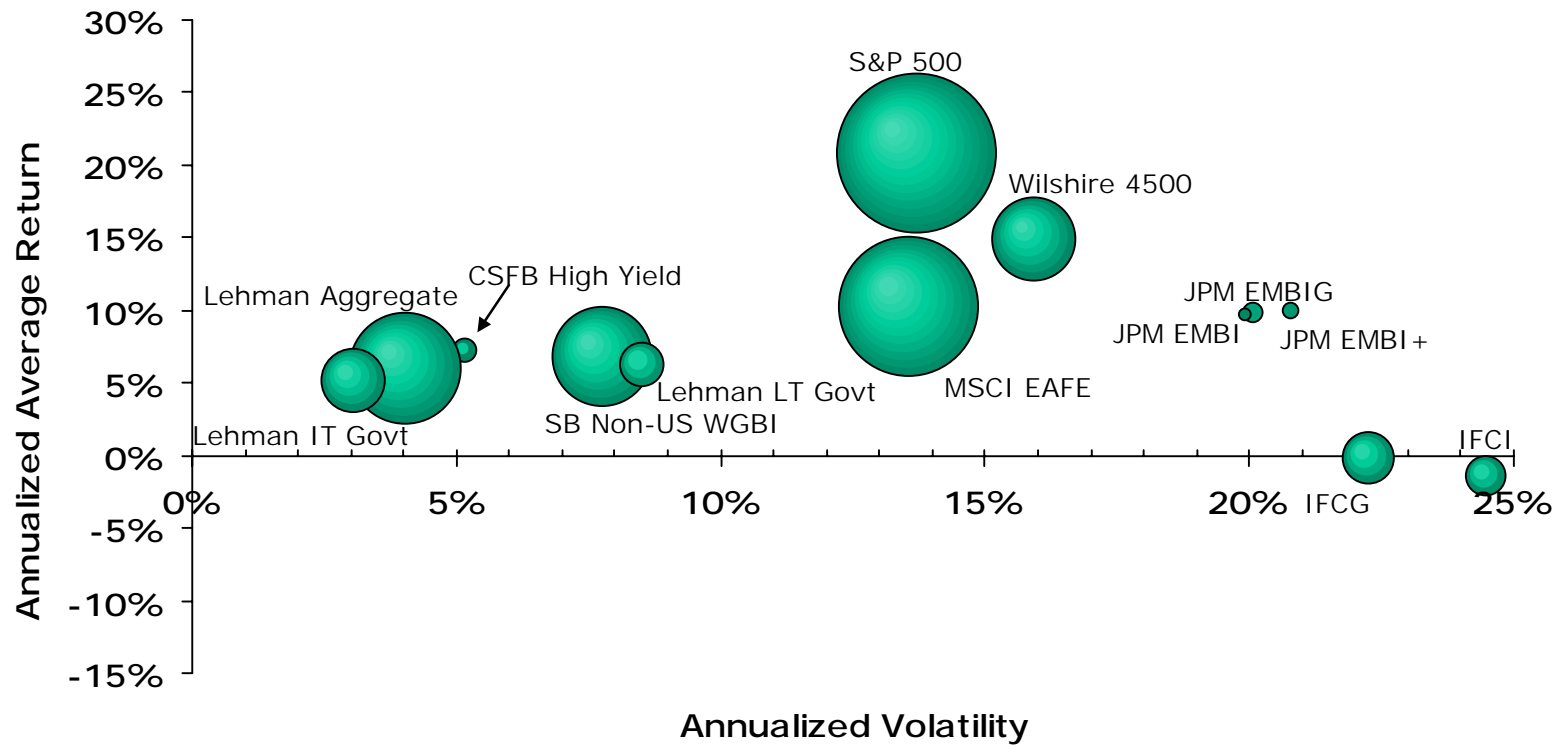


Data: Monthly US\$ Total Returns (1991:01-1999:09)

Exhibit 2b

World Capital Markets

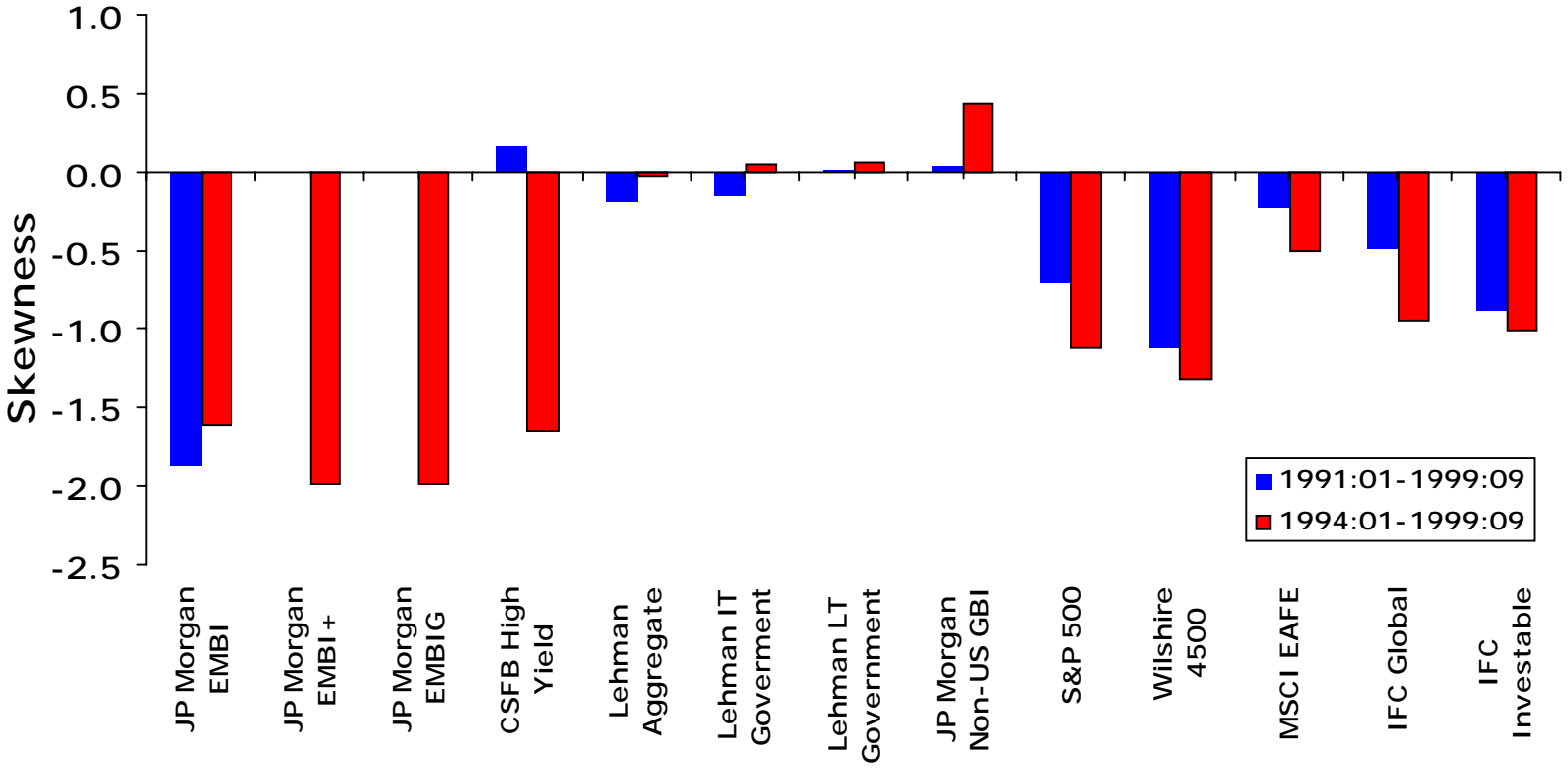
Risk, Return and Relative Capitalization



Data: Monthly US\$ Total Returns (1994:01-1999:09)

Exhibit 3a

World Capital Markets Skewness

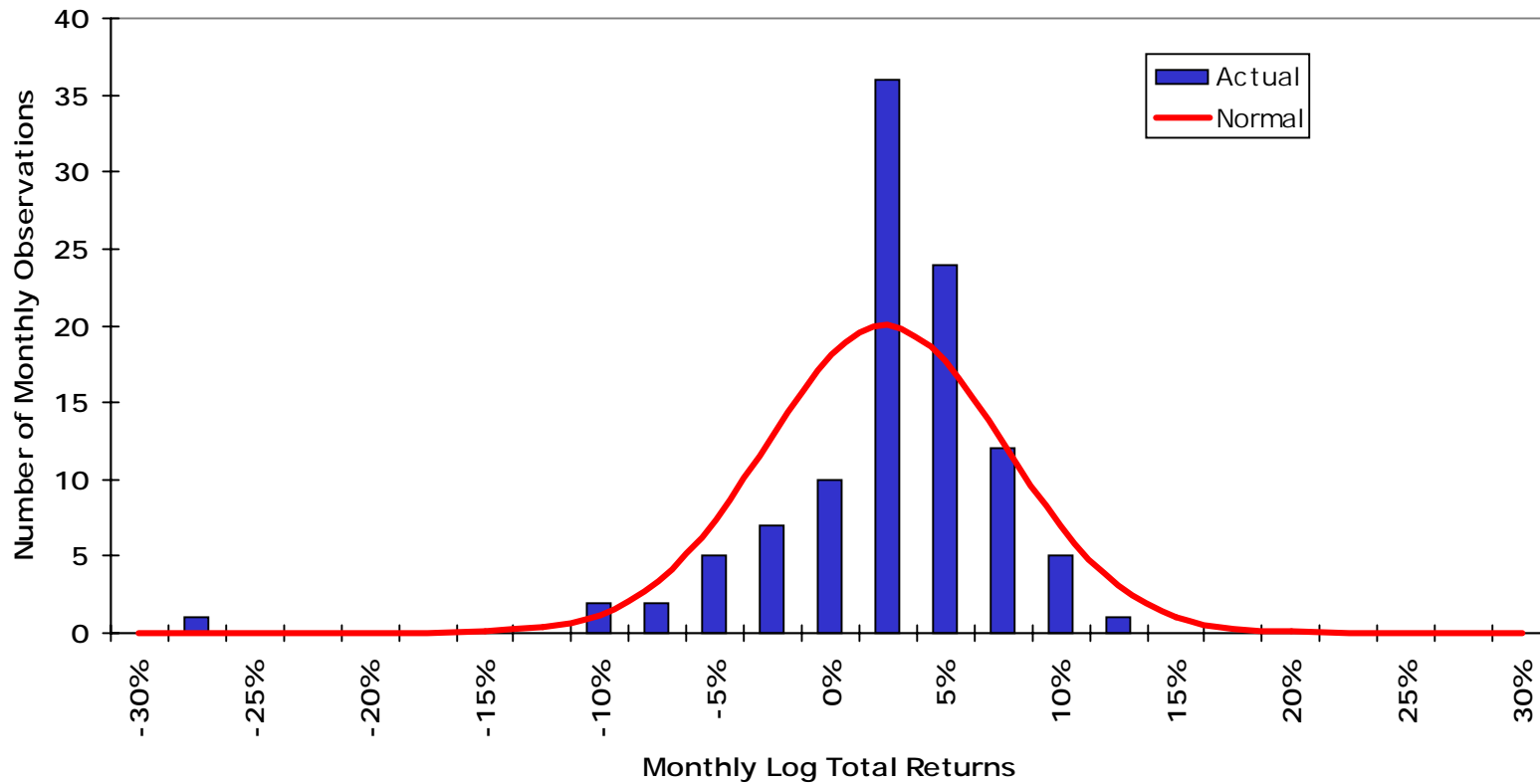


Data: Monthly US\$ Total Returns

Exhibit 3b

Emerging Market Bonds

Distribution of Actual vs. Normalized Returns

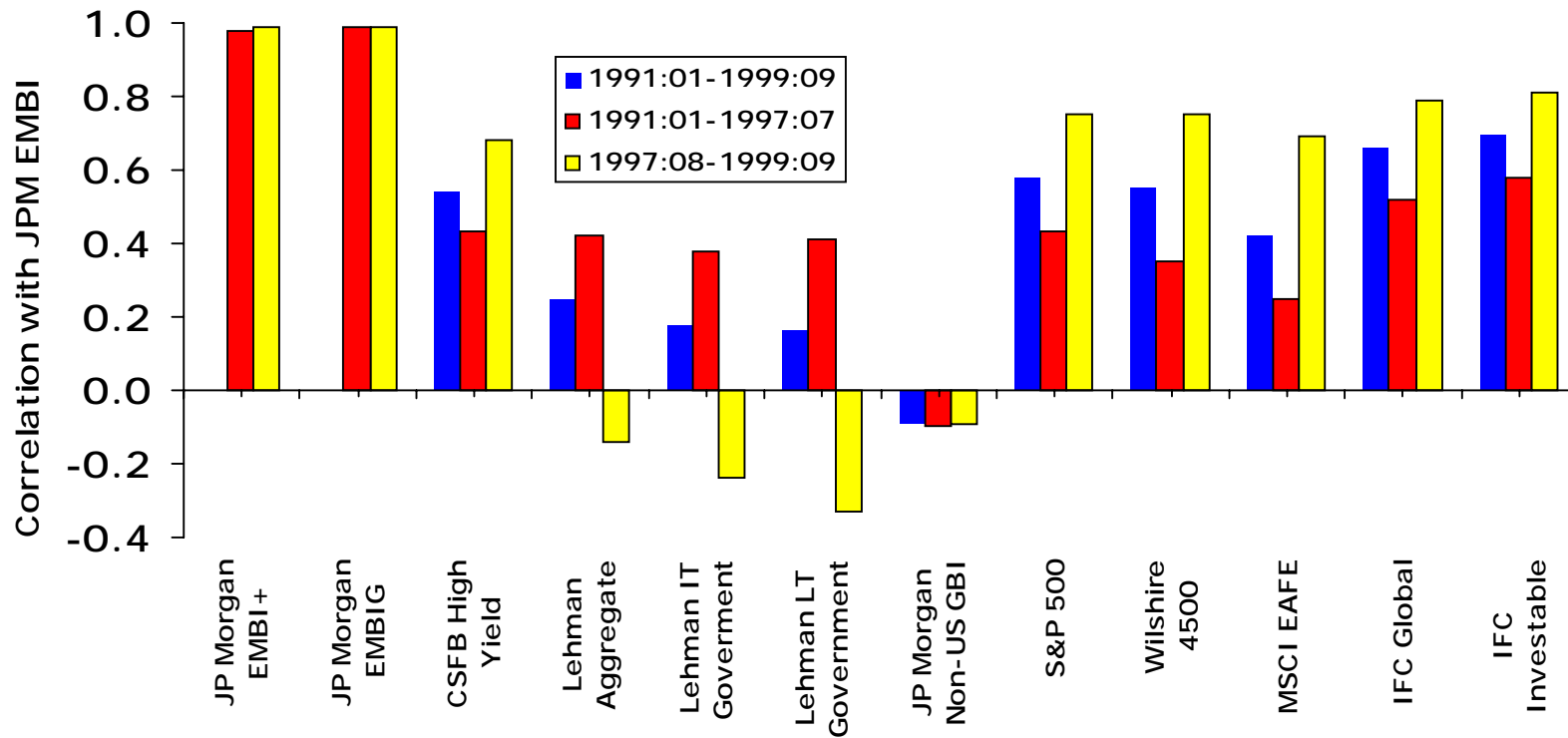


Data: 1991:01-1999:09
JP Morgan EMBI US\$ Total Returns

Exhibit 4

Emerging Market Bonds

Asset Class Correlations

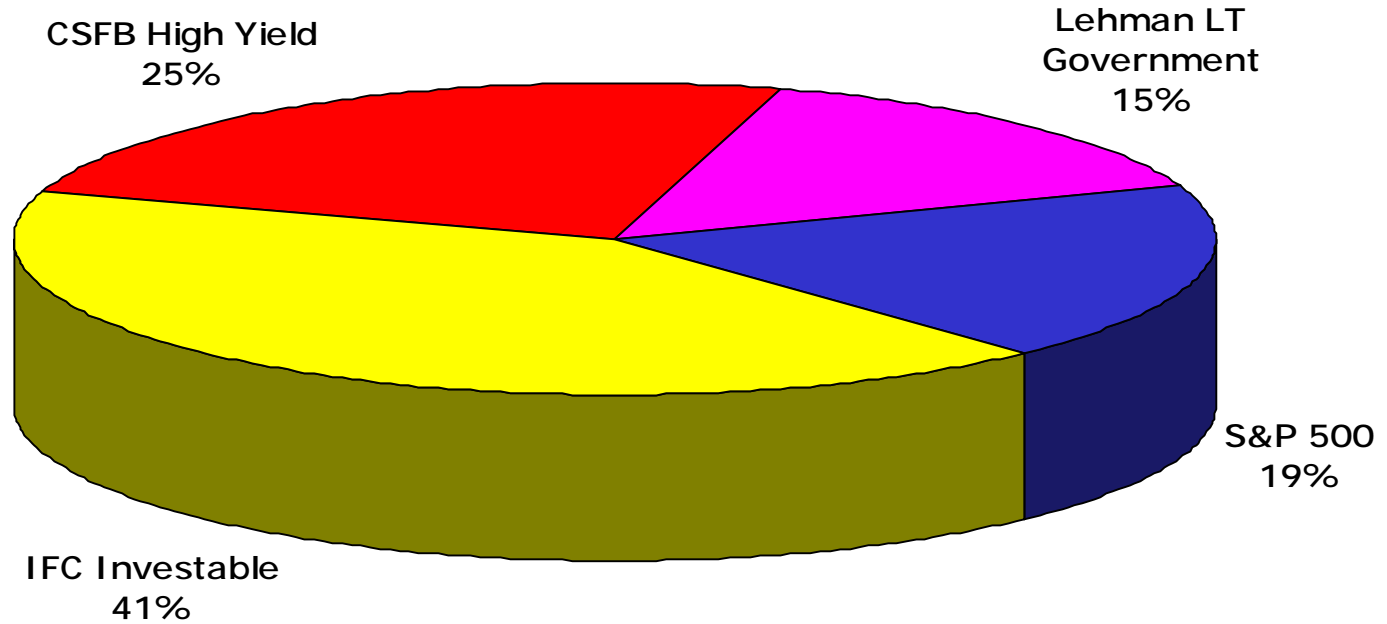


Data: Monthly US\$ Total Returns

Exhibit 5a

Emerging Market Bonds

JP Morgan EMBI - Overall Style Analysis

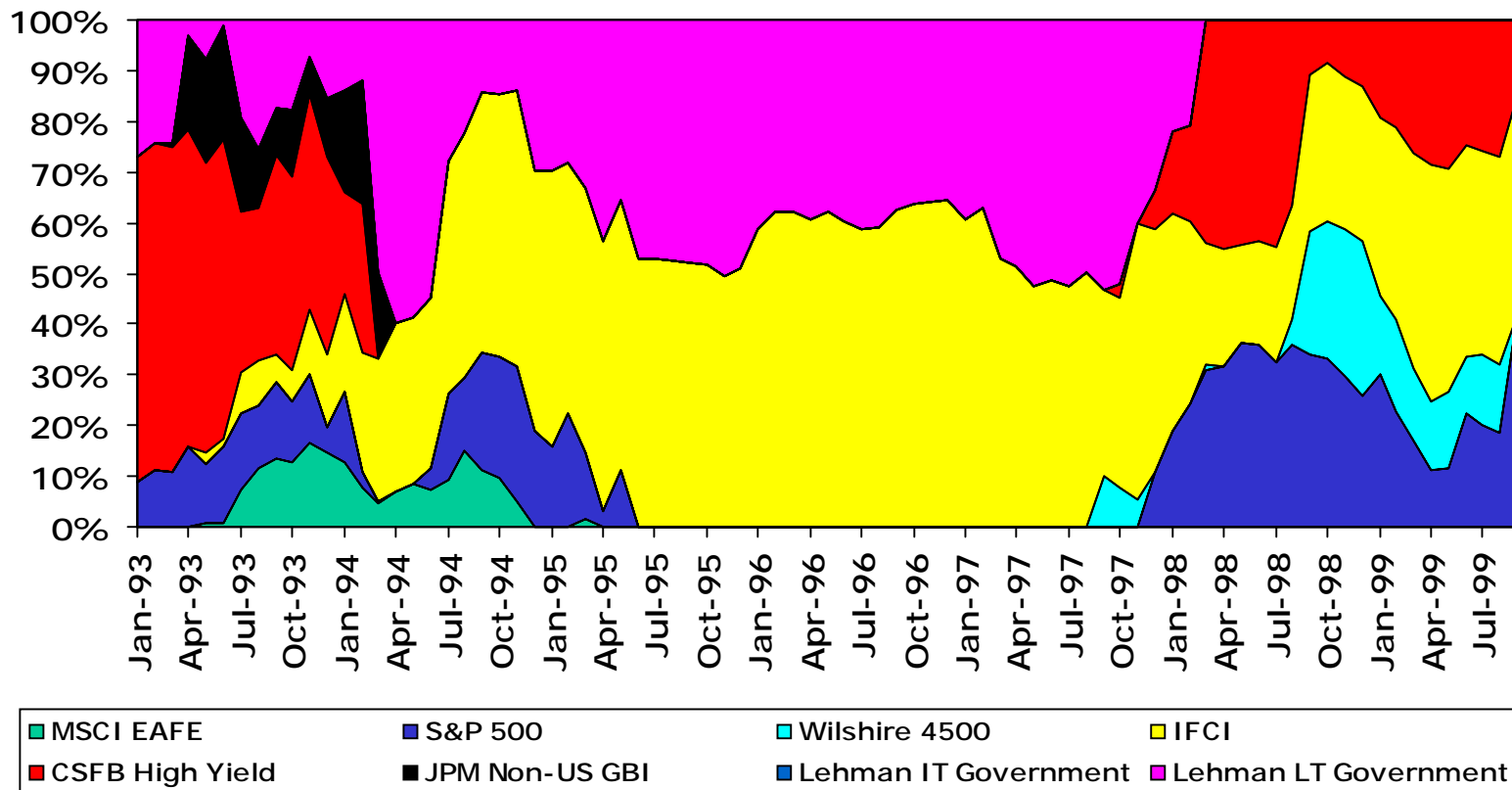


Emerging Market Bonds: JP Morgan EMBI
Data: 1991:01-1999:09
R-Squared: 59%

Exhibit 5b

Emerging Market Bonds

Rolling Style Analysis: JP Morgan EMBI

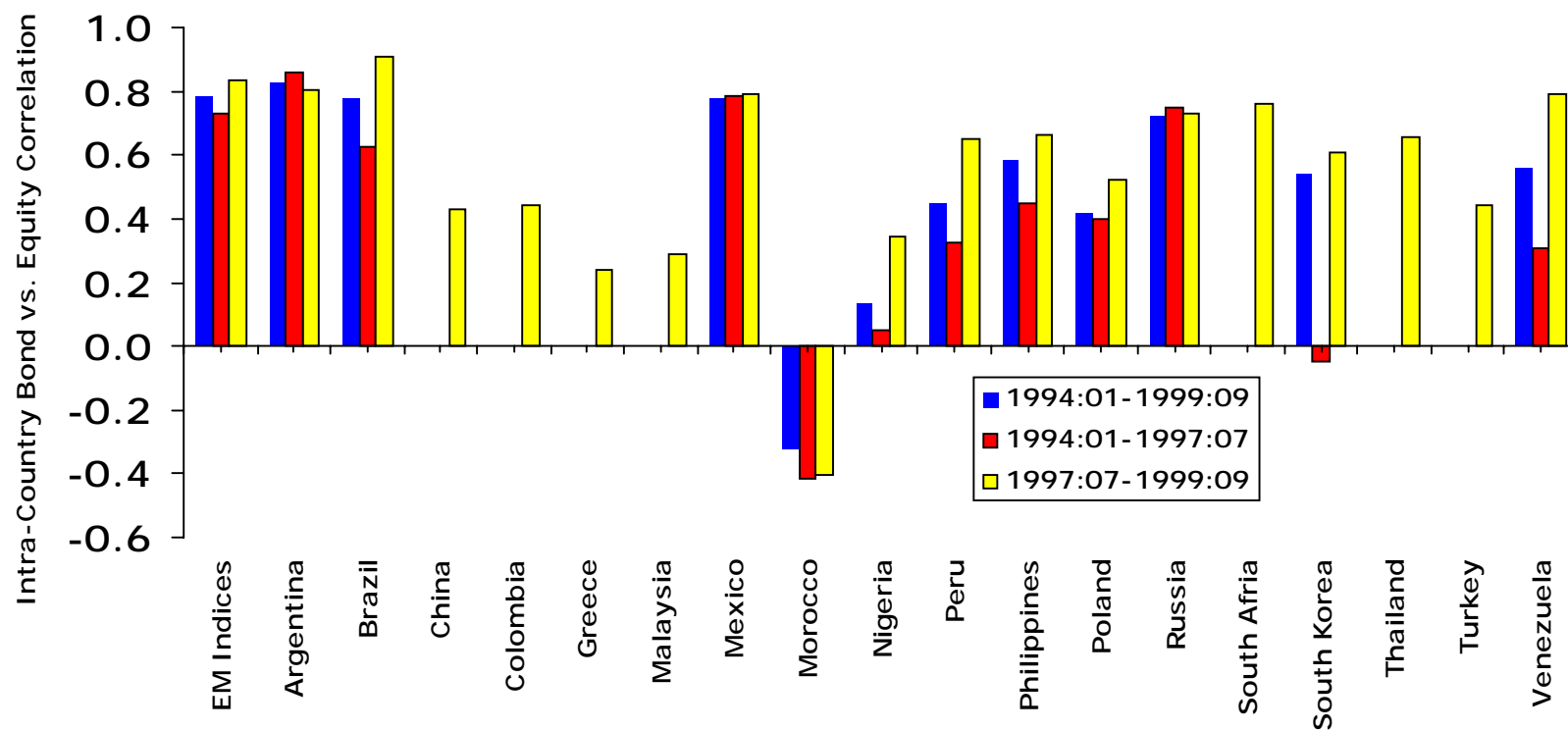


Source: Ibbotson Associates EnCorr Attribution
 24 Month Rolling Window
 Data: 1991:01-1999:09
 Overall R-Squared: 59%

Exhibit 6

Emerging Market Bonds

Intra-Market Equity vs. Bond Index Correlations

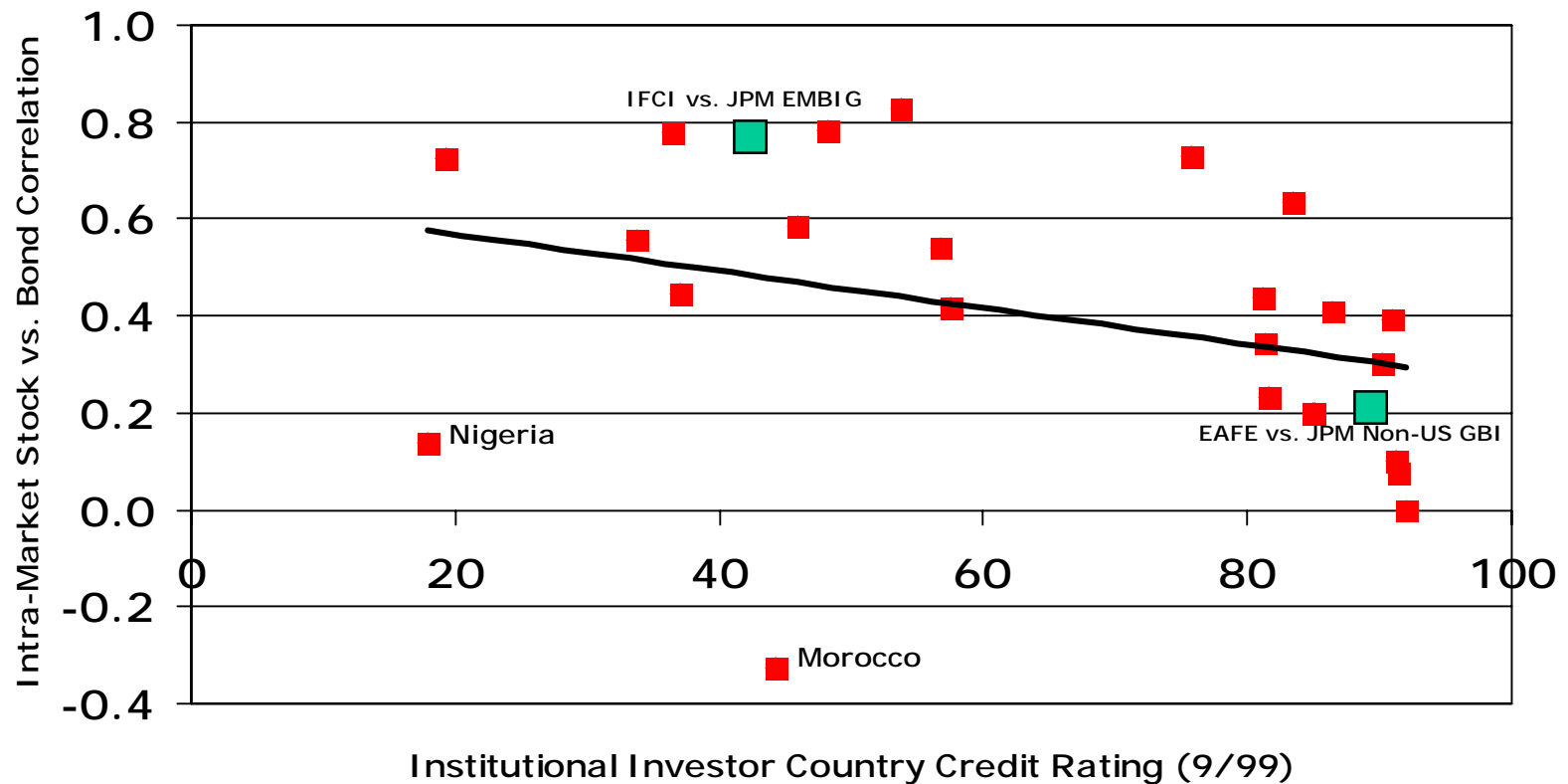


Data: Monthly US\$ Total Returns
 Equities: IFC Investable, Bonds: JP Morgan EMBI Global

Exhibit 7

Country Risk

Intra-Market Equity vs. Bond Index Correlations

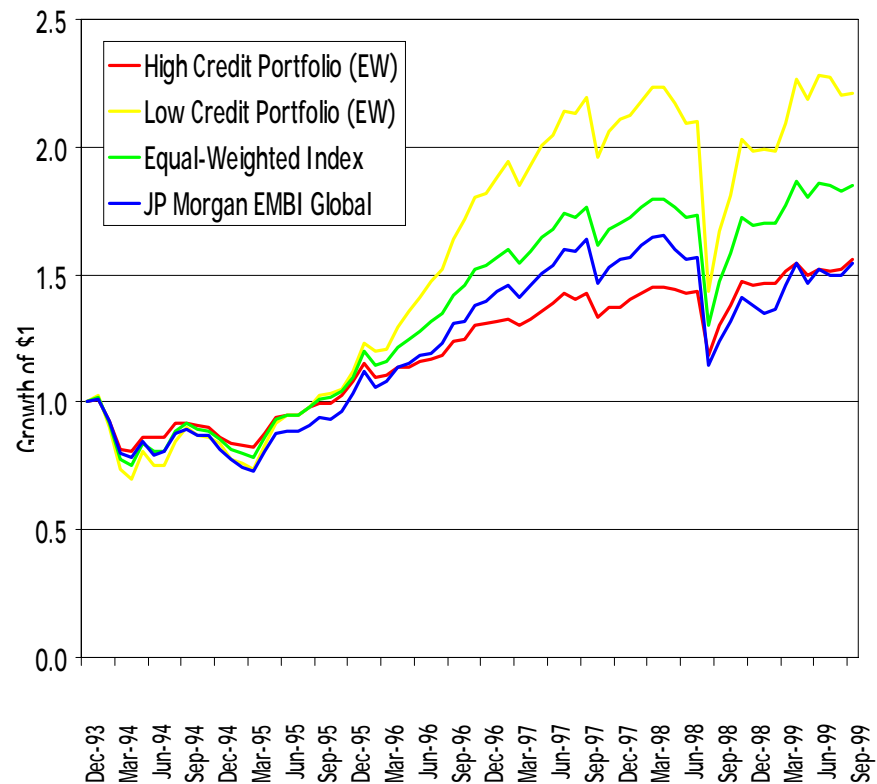


US\$ Total Returns: 1994:01-1999:09
 Bonds: JP Morgan Global Bonds & EMBI Global indices
 Stocks: MSCI EAFE & IFC Investables

Exhibit 8

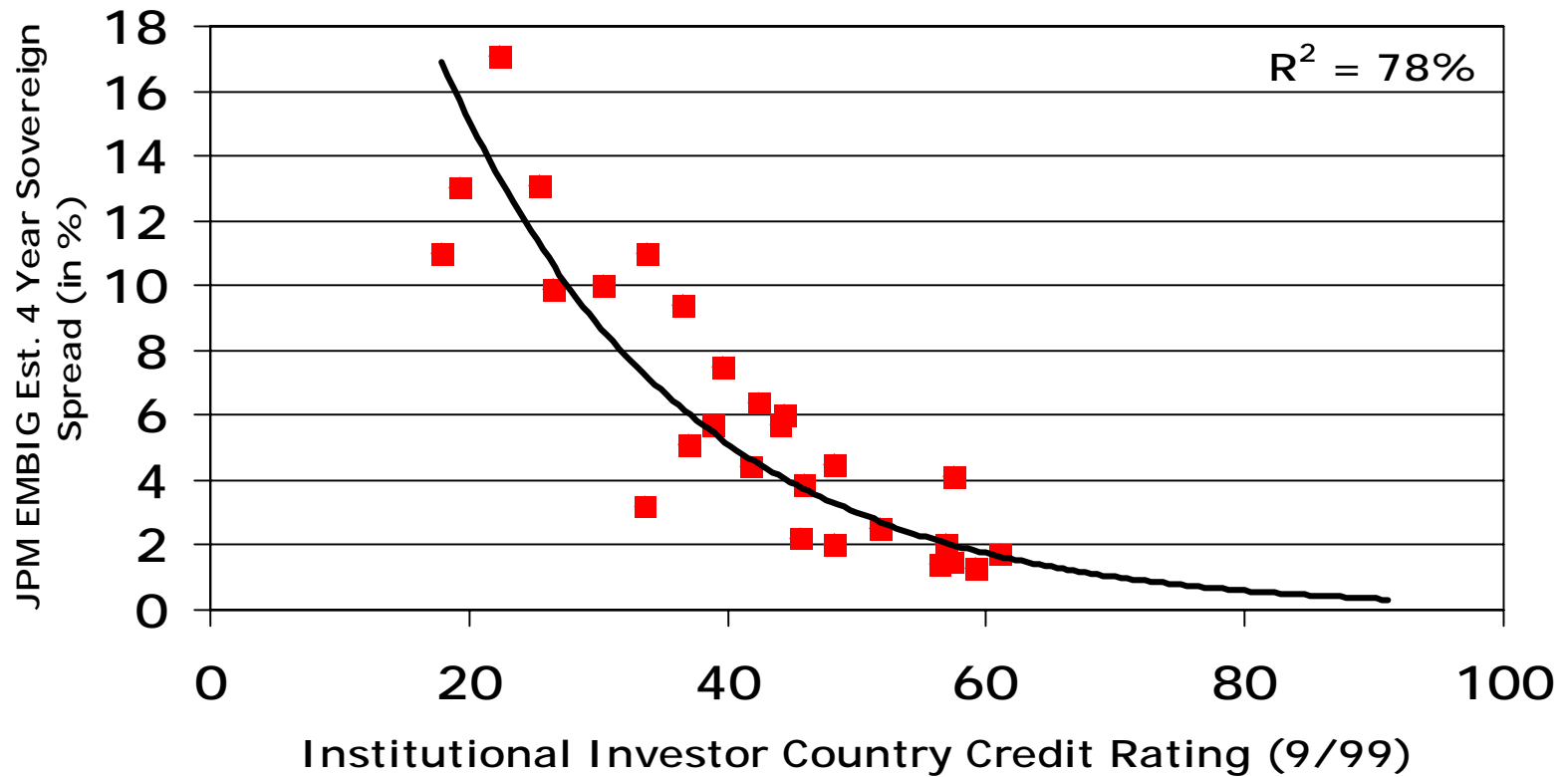
Country Risk Portfolio Exercise

	High Credit Portfolio (EW)	Low Credit Portfolio (EW)	All-Country Portfolio (EW)	JP Morgan EMBI Global
Arithmetic Returns	8.8%	17.2%	12.8%	9.7%
Geometric Returns	8.0%	14.8%	11.3%	7.8%
Standard Deviation	14.5%	25.1%	19.7%	19.9%
Beta with JP Morgan EMBI Global	0.69	1.21	0.95	1.00
Skewness	-1.5	-1.5	-1.6	-2.0



Monthly Data: 1994:01-1998:09
 JP Morgan EMBI Global Universe
 Total Returns in US\$
 Monthly Portfolio Rebalancing
 Credit Rating: ICRG Composite Rating

Exhibit 9
Country Risk
Current Statistics - Emerging Markets



Data: September 30, 1999
JP Morgan EMBI Global Universe
Author estimated 4 year duration sovereign credit spread

Exhibit 10

Country Risk

Estimated and Forecast Sovereign Spreads

Country	Country Weight in:		ICRG	ICRGC	Sovereign Spread	
	EMBIG	IFCI	Composite	Forecast	Fitted	Forecast
Algeria	0.5%		51.8	57.5	10.4%	8.7%
Argentina	21.3%	2.5%	73.0	69.5	4.2%	5.2%
Brazil	19.8%	7.6%	59.0	57.5	8.3%	8.7%
Bulgaria	1.9%		73.8	74.5	4.0%	3.8%
Chile	0.3%	4.4%	70.5	73.5	4.9%	4.1%
China	1.6%	2.3%	72.0	72.5	4.5%	4.4%
Colombia	1.1%	0.4%	53.3	58.0	9.9%	8.6%
Cote d'Ivoire	0.1%		67.8	63.3	5.7%	7.0%
Croatia	0.7%		70.3	69.0	5.0%	5.4%
Czech Republic		0.4%	75.5	75.0	3.5%	3.6%
Ecuador	0.9%		57.0	58.0	8.9%	8.6%
Egypt		0.5%	68.3	69.0	5.6%	5.4%
Greece	1.0%	9.4%	74.8	76.0	3.7%	3.3%
Hungary	0.7%	1.2%	75.3	76.0	3.6%	3.3%
India		2.6%	63.8	64.0	6.9%	6.8%
Indonesia		1.8%	48.3	52.5	11.4%	10.2%
Israel		2.4%	67.3	65.0	5.9%	6.5%
Jordan		0.2%	74.3	74.0	3.9%	3.9%
Lebanon	0.6%		53.8	55.5	9.8%	9.3%
Malaysia	3.0%	6.5%	72.0	69.0	4.5%	5.4%
Mexico	14.9%	10.1%	68.8	65.5	5.4%	6.4%
Morocco	1.1%	0.9%	71.8	72.0	4.6%	4.5%
Nigeria	1.7%		57.8	56.5	8.6%	9.0%
Pakistan		0.3%	54.0	58.0	9.7%	8.6%
Panama	1.9%		72.0	71.5	4.5%	4.6%
Peru	1.2%	0.8%	67.5	64.5	5.8%	6.7%
Philippines	2.9%	1.2%	70.5	69.0	4.9%	5.4%
Poland	2.7%	1.0%	77.0	78.5	3.1%	2.6%
Russia	5.2%	1.1%	53.0	48.0	10.0%	11.5%
Slovakia		0.1%	71.8	77.0	4.6%	3.1%
South Africa	0.6%	10.8%	69.5	65.5	5.2%	6.4%
South Korea	7.5%	13.2%	76.8	73.0	3.1%	4.2%
Sri Lanka		0.0%	64.3	62.5	6.8%	7.3%
Taiwan		12.9%	83.3	82.0	1.2%	1.6%
Thailand	0.4%	1.2%	73.0	67.5	4.2%	5.8%
Turkey	0.9%	3.7%	53.5	60.5	9.9%	7.8%
Venezuela	5.6%	0.6%	63.5	61.0	7.0%	7.7%
Zimbabwe		0.0%	55.3	49.0	9.4%	11.2%
Weighted Ave.	67.1	70.9				
	5.91%	4.81%				

Data: JP Morgan EMBIG (9/99), IFC Investables (9/99), ICRGC (9/99)

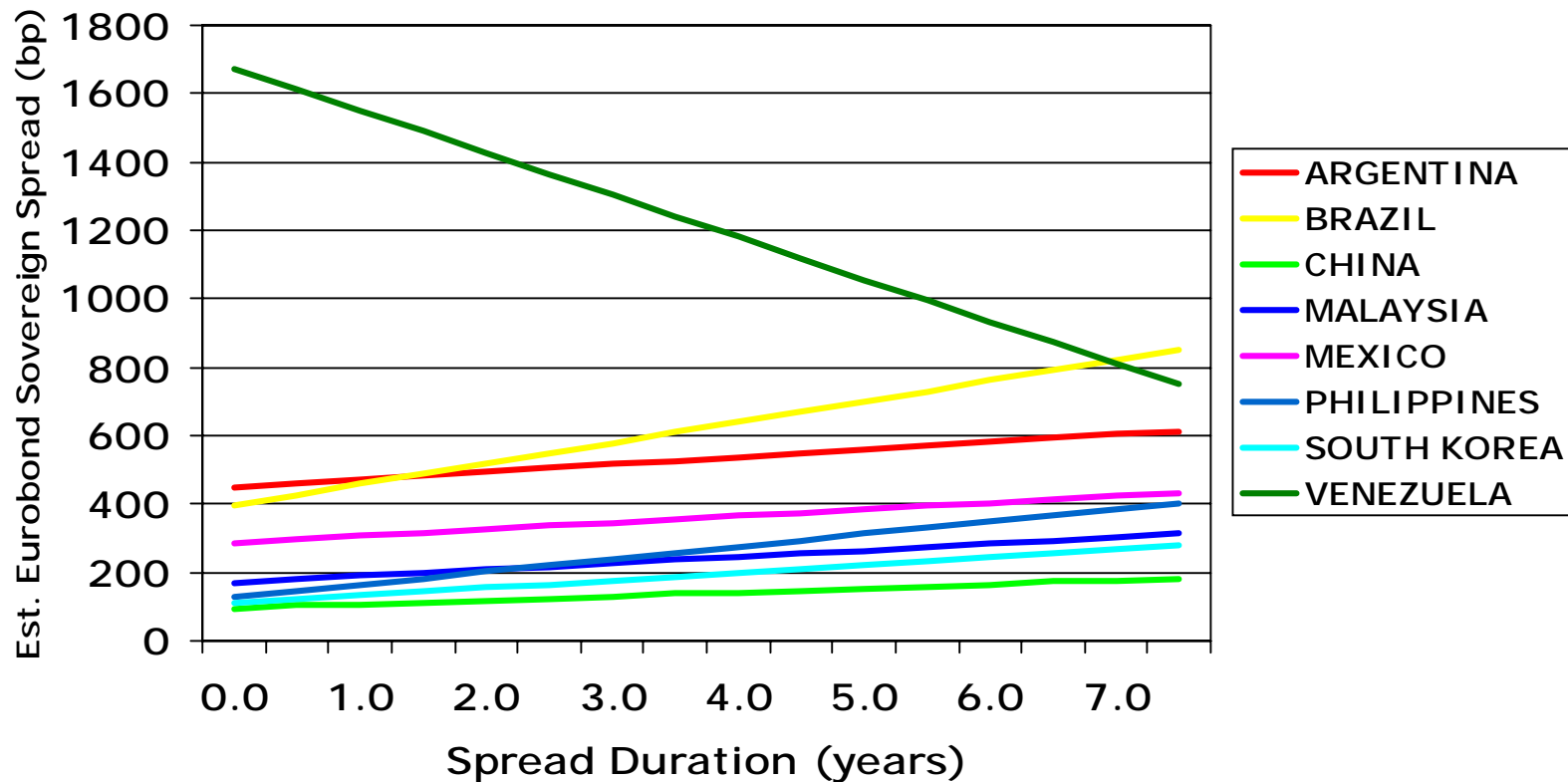
Estimated sovereign spreads fitted on EMBIG universe (4 year duration).

One Year ICRG Forecast.

Exhibit 11

Research Findings

Slope of Emerging Market Eurobond Yield Curve

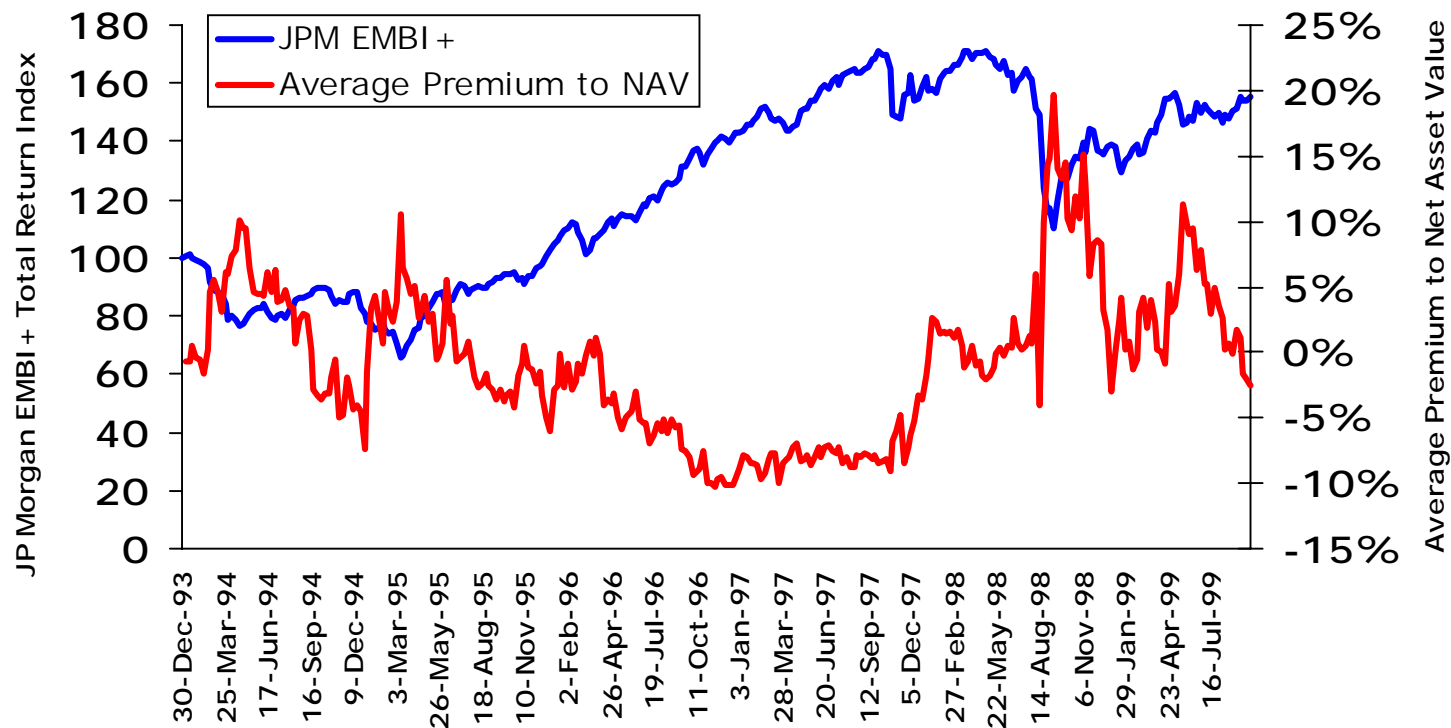


Source: JP Morgan Securities, Inc. & Author
Eurobond Yield Curves
Data: September 30, 1999

Exhibit 12

Sentiment

Closed-End Fund Premiums vs. Index Levels



Weekly Observations

Source: JP Morgan Securities, Inc. & Author

Average Premium: Premium to Net Asset Value on up to ten Emerging Market Closed-End Bond Funds

Emerging market debt (EMD) is a term used to encompass bonds issued by less developed countries. It does not include borrowing from government, supranational organizations such as the IMF or private sources, though loans that are securitized and issued to the markets would be included. A broader discussion of all types of borrowing by developing countries exists at [Developing countries' debt](#).¹ Emerging market bonds are geographically located in the following general regions: Latin America, Eastern Europe, Africa, Russia, the Middle East, and Asia ex Japan.² The term hard currency refers to currency of a highly developed country that is widely accepted around the world as payment for goods and services.³ Brady bonds were named after US Treasury Secretary Nicholas Brady, who, in an effort to promote a debt-reduction plan for the United States, introduced Brady bonds in 1989, allowing banks to exchange debt of emerging or developing countries for tradeable bonds.² For Professio... Fixed income markets are big, diverse and can be extremely difficult to understand. Even the largest and most closely watched fixed income markets in the world, US Treasuries and US Corporate bonds, for instance, are impacted by countless factors including investor needs, macro-economics, and regulatory oversight. But the complexity in those markets pales in comparison to that for emerging market bonds. First, it is important to understand what is included in the \$15 trillion emerging market umbrella. The J.P.Morgan Emerging Market Bond Index (EMBI) is the most widely tracked definition and provides good insight into what is considered an emerging market. Currently, the index tracks the bond markets of 67 emerging economies from Angola to Zambia. An emerging market (or an emerging country or an emerging economy) is a market that has some characteristics of a developed market, but does not fully meet its standards. This includes markets that may become developed markets in the future or were in the past. The term "frontier market" is used for developing countries with smaller, riskier, or more illiquid capital markets than "emerging". As of 2006, the economies of China and India are considered to be the largest emerging markets. According to... Emerging Markets Bonds ETFs invest in debt issued in emerging market countries. Bonds included in these funds may be government, quasi-government, or corporate debt. Emerging markets bonds tend to have lower credit quality than those of developed nations, and thus generally offer much higher yields. Quick Category Facts. Count: 23 ETFs are placed in the Emerging Markets Bonds ETFdb Category.Â Definitive List Of Emerging Markets Bonds ETFs. Definitive Historical Return Data For Emerging Markets Bonds ETFs. ETF Fund Flows. Definitive List Of Cheapest Emerging Markets Bonds ETFs. ESG Scores. Definitive List Of Highest Yielding Emerging Markets Bonds ETFs. Definitive List Of Emerging Markets Bonds ETF Holdings.