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Emerging Market Local Currency Bond Market, Too Risky to Invest?*

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Abstract

Over the last decade emerging market (EM) sovereign debt has become a firmly established strategic asset class. Besides Dollar-denominated debt, local currency emerging market debt has also been developing to become an attractive and complementary investment asset class. EM countries have been successful to reduce currency mismatches and maturity problems by implementing sound fiscal and monetary policies. Analyzing the period from 2002 to July 2009, we show that the local currency debt provides significant additional alpha and diversification to traditional bond portfolios. In particular, first, EM local currency bond returns are less correlated to the US stock market, treasury and high-yield bond markets, and global risk premia compared to the a case of EM equity and Dollar-denominated bond markets. Second, we document that yields and excess returns on local currency debt depend largely on expected depreciation of the exchange rate against Dollar, while excess returns on Dollar-denominated EM debt are for the most part compensation for bearing the global risk. Third, we report that EM sovereign local currency bond returns beat other emerging market and mature market asset classes by providing higher risk adjusted excess returns and diversification. We believe that our results will have important policy implications not only for international investors but also for the EM governments. We suggest that the development of local currency bond markets in EM countries could contribute to global financial stability by reducing currency mismatches and reliance on foreign currency debt, which in turn is linked to growth and poverty reduction.

JEL Classifications: G10, G11,G15

Keywords Sovereign Bond Market, Local Currency Bonds, Emerging Markets, Bond Portfolio, Excess Returns

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Contents

- 1 Introduction** **3**

- 2 Data** **7**
 - 2.1 EM Local Currency Denominated Bond Returns 7
 - 2.2 EM US Dollar-denominated Bond Returns 7
 - 2.3 EM Money Market Returns (Local Currency) 8
 - 2.4 EM Equity Market Returns 8
 - 2.5 EM Credit Default Swap Premia 8
 - 2.6 Global Risk and US Market Variables 9

- 3 Recent Improvements in the Emerging Market Sovereign Debt** **9**

- 4 Results** **11**
 - 4.1 Descriptive Statistics and Correlation Matrices of Local Currency and Dollar-denominated Bond Returns 11
 - 4.2 Principal Component Analysis 12
 - 4.3 Determinants of EM Bond Yield Changes 13
 - 4.4 EM Sovereign Excess Returns 15
 - 4.5 Regressions of Excess Returns 18

- 5 Conclusion** **19**

1 Introduction

The importance of diversification and favorable return-risk profile of equity and fixed income portfolios are well defined in financial literature. Literature on diversification states that it is the spreading out investments with low correlations to reduce risks. Emerging markets (EM) are geographically dispersed and each having different economic and political situations attracts much attention from international investors seeking diversification and high yields. Over the last decade, EM debt has been widely accepted as a soundly established strategic asset class by global institutional investors. Asset flows to EMs have increased as EM countries have implemented sound fiscal and monetary policies, resulting in a structural improvement in overall creditworthiness. Many EM countries have taken advantage of this favorable environment to improve their debt structure by increasing the maturity of their debt and develop local currency debt markets.

The literature on the benefits of international diversification of equity portfolios is very large. Some important examples, among many others, are Grubel (1968), Solnik (1974), Lessard (1974), Heston and Rouwenhorst (1994), Levy and Sarnat (1970), French and Poterba (1991), De Santis and Gerard (1997), Das and Uppal (2004), and Campa and Fernandes (2006). The low correlations among international equity markets are the main ingredient for internationally diversified portfolios. These correlations are low as long as the local equity markets reflect the effects of country-specific factors such as the local monetary and fiscal policies, differences in institutional and legal regimes, and local economic shocks benefits of diversifying equity portfolios across countries (Longstaff, Pan, Pedersen, H., and Singleton (2008)).

While EM governments improve their debt structure by developing local-currency bond markets and look increasingly toward their domestic market for sources of finance, investors are looking more closely at local markets in search for higher yield and greater diversification. EM sovereigns are famous of providing high yields on their debt securities. Therefore, the question whether EM local-currency bond markets provide diversification benefits becomes extremely crucial. This issue has become exceptionally relevant as the correlations between asset returns have drastically increased due to the recent financial turmoil.

Improved debt management practices, better macroeconomic conditions as well as widening and diversification of the investor base facilitated the emergence and the fast growth of EM local

currency-denominated sovereign bond markets.¹ The growing interest of global investors in EM sovereign debt reflects the improved risk-return profile of these assets. Market capitalization of JPMorgan Global Bond Index-Emerging Markets (Gbi-Em)² has shown an average annual growth rate of circa 30% to \$990 Billion as of July 2009 from \$116Billion in 2002. Meanwhile, market value of US-dollar denominated EM debt securities proxied by JPMorgan Embi Global Index³ has increased from \$184 Billion from 2002 to only \$290 Billion as of July 2009.

By the help of various techniques, we examine sources and the degree of co-movement of yields and excess returns, vulnerability of EM debt investment to contagion and the determinants of yields of the local currency-denominated EM sovereign bonds. We provide several contributions to the literature. First, we show that EM sovereign local currency bond returns are notably less correlated across countries compared to returns in other EM asset classes, i.e. Dollar-denominated bonds and stock market indices. Average partial correlation coefficient for local currency bond Dollar return across countries is 33%, while it is 44% for Dollar-denominated debt returns and 51% for local stock market returns between January 2002 and July 2009.⁴ Literature on the benefits of international diversification found a low correlation among *developed equity markets*, and it attributes the low correlation to the predominance of country specific factors. However, our results suggest something contrary; unlike equity markets in developed countries, EM equity markets are highly correlated and possibly largely affected by global factors such as variation in credit risk premia, market liquidity and trading movements of international investors. On the other hand, local currency bond returns reflect much lower correlations, which signals that the effects of various country specific factors such as political risk, inflation and exchange rate expectations predominates when determining the returns.

Second, to further investigate the correlation and co-movement in the returns of EM asset classes, we use principal component analysis. We find that first factor explains 37% of the variance in the local-currency bond returns while it explains 49% and 54% of the variance in the Dollar-

¹BIS (2007), BIS (2008), IMF (2006) and IMF (2009)

²GBI-EM indices are comprehensive emerging market debt benchmarks that track local currency bonds issued by Emerging Market governments.

³The JPMorgan Emerging Markets Bond Index Global (EMBI Global or EMBIG) tracks total returns for traded external debt instruments in the emerging markets, and is an expanded version of the JPMorgan EMBI+. As with the EMBI+, the EMBI Global includes U.S. dollar-denominated Brady bonds, loans, and Eurobonds with an outstanding face value of at least \$500 million.

⁴Important thing to note here is that, when we mention returns we always mean United States Dollar returns.

denominated debt and local stock market returns, respectively. Further, we show that the first principal components are highly correlated to the US stock and bond market returns and the return spread between US corporate investment grade and high yield bonds.

Third, we regress the changes in yields of local currency and Dollar-denominated bond yields on three categories of explanatory variables: local economic variables, global financial market variables and global risk premia. In general, local variables, specifically expected increase in exchange rate depreciation variable has significant explanatory power on local currency bond yield changes. Local stock market index return and 5-year Credit Default Swap (CDS) premium changes have significant t-statistics in 9 out of 16 countries. For Dollar-denominated yield changes however, the coefficients of the US Treasury and corporate investment grade bond yields together with CDS premium changes are significant. This is a striking result as it suggests: while local-currency bond yields largely move along with exchange rate expectations, US-dollar-denominated bond yield changes reflect the changes in the global financial market conditions and risk premia.

Next task is to examine the implications of this result in the excess returns of EM bond portfolios. Even though the financial world has been facing one of the biggest crises in its history, both bond markets (local currency and Dollar-denominated) provided positive excess returns above the traditional asset classes such as US Treasury, US corporate and high yield bond markets, and US equity markets (See Table 10-11). Sharpe Ratios of EM local currency bond index are the highest from 2002 to 2008 and it is only negative in 2008. Note even in 2008 this ratio is always higher than all other asset classes except for the US Treasury (See Figures 6-7).

We regress changes in EM excess returns of EM local currency and Dollar-denominated bond portfolios on changes in the excess returns of US equity and bond portfolios. The results confirm that US market variables explain a large variation in US-dollar-denominated bond excess returns. Strikingly enough, R-squared of the regression of EMBI Global Composite index on the US market excess returns is 0.818. On the other hand, global market factors explain a much lower variation in local currency-denominated bond portfolio returns, which have an average R-squared half of that of Dollar-denominated bond portfolio returns. Longstaff, Pan, Pedersen, H., and Singleton (2008) examine the sovereign credit excess returns implied by their CDS premia. Their results are related to our study for Dollar denominated bond returns, as CDS premia are comparable to spreads on similar maturity dollar-denominated-bond yields. Our result that Dollar-denominated bond returns

are explained to the most part by global financial market is consistent with the results of Longstaff, Pan, Pedersen, H., and Singleton (2008) where the authors conclude that whatever risk premium there may be in sovereign credit returns appears to be primarily compensation for bearing the risk of the global factors that drive sovereign credit.

To summarize, our results reveal that the EM local-currency debt provides significant additional alpha and diversification to traditional bond portfolios. In particular, first, EM local currency bond returns are less correlated to the US stock market, treasury and high-yield bond markets and global risk premia comparing to EM equity markets and dollar-denominated bonds. This is because Dollar-denominated bond yield spreads reflect the credit risk to the most part, and credit spreads are driven more by external factors such as global economic forces, risk premia, and liquidity and trading patterns Longstaff, Pan, Pedersen, H., and Singleton (2008). Second, we find that yields and excess returns on local currency debt depend largely on local economy, specifically on changes of expected depreciation of the exchange rate. The reason for this is that local-currency bonds bear two other risk components, i.e. exchange rate risk and local market liquidity risk. The exchange rate and liquidity risks reflect the changes in the local macroeconomic, political, institutional, and legal environment. Outperforming risk adjusted excess results, less dependence on global financial market and increasing asset flows to EMs are the signs of EM countries' recent success in implementing sound fiscal and monetary policies, resulting in a structural improvement in overall creditworthiness.

2 Data

2.1 EM Local Currency Denominated Bond Returns

We use JPMorgan Government Bond Index-Emerging Markets (GBI-EM) for the returns and yields in the EM local currency denominated bonds. Even though GBI-EM tracks the local currency bonds, in our analysis the returns are all expressed in terms of US Dollars, for which we use GBI-EM(\$). This way the local currency returns can be compared to other investments. GBI-EM indices are comprehensive emerging market debt benchmarks that track local currency bonds issued by Emerging Market governments. The index was launched in June 2005 and is the first comprehensive global local Emerging Markets index. Luckily enough, the historical prices of GBI-EM indices are provided from the year 2002. Therefore, our sample period for EM local currency denominated bond returns and yields is between January 2002 and July 2009. The GBI-EM indices are composed of only those countries from the GBI universe that meet criteria for an Emerging Market, resulting in 17 countries from four regions. The regional sub-division of the indices consists of Asia, Europe, Latin America, and Middle East/Africa. Table 2 provides the list of countries in our analysis. The data is available at the stations of Thomson Financial Datastream.

2.2 EM US Dollar-denominated Bond Returns

For the returns, yields and spreads of the EM US Dollar-denominated bonds we use JPMorgan Emerging Markets Bond Index Global. The JPMorgan Emerging Markets Bond Index Global (EMBI Global or EMBIG) tracks total returns for traded external debt instruments in the emerging markets, and is an expanded version of the JPMorgan EMBI+. As with the EMBI+, the EMBI Global includes U.S. dollar-denominated Brady bonds, loans, and Eurobonds with an outstanding face value of at least \$500 million. Our sample period for EMBI Global index is also between January 2002 and July 2009 for the sake of being able to do a matching comparison with EM local-currency bond indices. For the same reason of matching, we include only the countries on which there is GBI-EM Broad index. The data is available at the stations of Thomson Financial Datastream.

2.3 EM Money Market Returns (Local Currency)

For local money market returns in emerging markets we use the JPMorgan Emerging markets Plus Index (ELMI+). ELMI + tracks total returns for local-currency-denominated money market instruments in the emerging markets. The ELMI + was back built to December 31, 1993, using the same base date as that of the EMBI+. To date, 24 countries are included in the ELMI representing Asia, Emerging Europe, Latin America and the Middle East / Africa. As in the case of GBI-EM index, we use the US Dollar returns of ELMI+ indices. The data is available at the stations of Thomson Financial Datastream

2.4 EM Equity Market Returns

In order to assess the performance of EM local equity markets we use Morgan Stanley Capital International Emerging Markets Index (MSCI-EM) that is designed to measure equity market performance in global emerging markets. The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure equity market performance of emerging markets. As of June 2009 the MSCI Emerging Markets Index consisted of the following 22 emerging market country indices: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey. The returns of MSCI-EM are expressed in US dollars.

2.5 EM Credit Default Swap Premia

In the section to analyze the determinants of yields of local-currency-denominated we use Credit Default Swap (CDS) premia to control for the credit risk of the underlying sovereign. For the countries in our analysis, we use 5-year mid CDS premia from January 2002 to July 2009. Although, CDS's are traded for maturities from 1 to 10 years, 5-year-maturity CDS is accepted to be the most liquid one. For this reason, we use 5-year Mid CDS premia to control for the default risk. The CDS data are downloaded from Thomson Financial Datastream stations. As discussed in Duffie (1999) and Hull and White (2001), a CDS contract is an insurance like contract against the event that an entity such as a firm or a sovereign default on its debt. Since CDS prices the default risk explicitly it is a good benchmark for the pure credit risk of the sovereign.

2.6 Global Risk and US Market Variables

In the section where we search for the determinants of returns and yields and sources of communality we use some widely accepted global risk and liquidity factors and US bond and equity market variables. Specifically, we have three Fama - French factors, US Treasury 5-year bond yields and returns, S&P500 index returns, CBOE-VIX -volatility of the options written on S&P500-, US corporate high-yield and investment grade indices by Merrill Lynch and Barclays Capital. For global liquidity we use the spread between 3-month Overnight Indexed Swap and US T-bill (OIS-Treasury). For global risk premia, among others mentioned above, we use the spread between 3 month Libor and OIS. The justification and significance of these variables are discussed extensively in the results section.⁵

The Fama/French factors are constructed using the 6 value-weight portfolios formed on size and book-to-market. SMB (Small Minus Big) is the average return on the three small portfolios minus the average return on the three big portfolios. HML (High Minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios. $R_m - R_f$, the excess return on the market, is the value-weight return on all NYSE, AMEX, and NASDAQ stocks (from CRSP) minus the one-month Treasury bill rate (from Ibbotson Associates). $R_m - R_f$ includes all NYSE, AMEX, and NASDAQ firms. SMB and HML for July of year t to June of $t+1$ include all NYSE, AMEX, and NASDAQ stocks for which we have market equity data for December of $t-1$ and June of t , and (positive) book equity data for $t-1$.⁶

3 Recent Improvements in the Emerging Market Sovereign Debt

In the last decade, many emerging market countries have made impressive improvements in macroeconomic fundamentals and carried out structural reforms. In addition, many EM countries have improved their debt management capability. These factors have led to a sustained and significant upgrading of the EM sovereign debt class, about half of which is now investment grade. The low yields in developed countries' assets coupled with improved quality and performance of EM as-

⁵See Caballero, Farhi, and Pierre-Olivier (2008) for details on TED, and Libor minus OIS spreads.

⁶See Fama and French (1993) for a complete description of the factor returns

sets have led to a significant increase of developed world's investor interest in EM assets. Since EM financial markets are comparatively shallow, relatively small changes in the asset allocation of large global investors can significantly affect EM funding costs. Several EMs have proactively taken advantage of this benign environment to lock in longer-term funding, improve debt structures, and develop local currency markets. Overall, emerging debt markets have been resilient to recent fluctuations in mature financial markets.

The exchange rate risk, interest rate risk, and rollover risk are the key risk types that the EM countries are exposed. Indeed, several EM countries have focused on reducing these risks. Exchange rate risk, the risk of the possibility of a sharp increase in the local currency value of foreign currency debt obligations, can be managed by reducing the share of foreign currency-denominated debt. Interest rate risk, the risk of rising in the interest payments because of an increase in the expected interest rates, can be reduced by increasing the share of fixed-rate debt and the average maturity of the debt. Rollover risk, the risk of facing a very high cost of new funding, can be managed by increasing the maturities of the debt stock.⁷

Many EM countries have been successful in coping with these three key risks in the last decade. Several EM countries managed to increase the share of local currency-denominated debt in their debt structure. Figure 1 to Figure 6 show the market value of emerging market sovereign local currency (GBI-EM Broad) and Dollar-denominated (EMBI Global) EM sovereign bond markets. Figures clearly show that the market capitalization of local currency-denominated bonds has been growing at a much faster pace, which increases the share of domestic currency-denominated debt in the EM balance sheets. Besides the success of increasing the share of local currency-denominated debt, many EM governments have also achieved to increase the average maturity of their debt (see Table 1).⁸ In other words, a shift away from short-term variable rate towards medium/long term fixed rate borrowing was facilitated by improved macroeconomic fundamentals and debt management. Recent research shows that "domestic original sin" - the inability of a sovereign to borrow in its own currency at long tenors and fixed rate - is closely related to, high inflation, high-service-to-GDP ratio, and narrow investor base. Mehl and Reynaud (2005) The positive developments in the last decade have helped to overcome the problem of original sin to the most part (see Table 1).

⁷IMF (2006)

⁸BIS (2008)

Another positive improvement for EM countries is the widening and diversification of their investor base.⁹ Studies by IMF (2006) and BIS (2008) report a growing participation of foreign strategic investors in external debt, a significant increase in foreign investors' willingness to take exposures in local currency debt, and an exposition of the domestic institutional investor base coupled with less reliance on bank financing. On the other hand, as a result of the reforms on social security systems and financial deregulation, new long-term local institutional investors, such as insurance companies, pension funds and mutual funds, have emerged. These institutional investors have a natural demand for long-duration assets, which enables governments to begin issuing medium and long-term local-currency denominated debt. Another gain is to reduce exchange rate induced shocks by insulating debt financing from volatile international capital flows.

While EM governments improve their debt structure by developing local-currency bond markets and look increasingly toward their domestic market for sources of finance, investors are looking more closely at local markets in search for higher yield and greater diversification. EM sovereigns are famous of providing high yields on their debt securities. The question, whether EM local-currency bond markets provide diversification benefits, becomes extremely crucial. We analyze this question in our paper as it has become exceptionally relevant as the correlations between asset-returns have drastically increased due the recent financial turmoil.

4 Results

4.1 Descriptive Statistics and Correlation Matrices of Local Currency and Dollar-denominated Bond Returns

Tables 2 and 3 present the descriptive statistics of weekly returns of local currency and Dollar-denominated bond indices. In general, local-currency bonds provide higher absolute USD returns. In fact, GBI-EM indices provide higher returns than S&P 500, US Treasury Bonds, US corporate high-yield and investment-grade bonds.

Tables 4 and 5 present the matrices of pairwise correlations of weekly returns in sovereign GBI-EM and EMBI-Global indices. Since the time series of observations for the countries are not equal

⁹IMF global outlook 2006

in length, the correlation between each pair of countries is based on the weeks in which the data overlap. When we compare the two correlation matrices we see that local-currency bond returns are notably less correlated across countries than the case in the returns in USD-denominated bonds. Average pairwise correlation coefficient for local-currency bond US-dollar return across countries is 33%, while it is 44% for US-dollar denominated debt returns between January 2002 and July 2009.

We present the correlation coefficients between the weekly returns in EM composite bond and equity market indices, US equity and bond markets in Table 6. Comparing to other indices, GBI-EM composite index returns are remarkably less correlated to other global bond market returns including US Treasury, corporate high-yield and investment grade bond index returns. Note that the GBI-EM Broad Composite index is composed of only 17 EM countries while EMBI Global Composite index contains 32 EM countries. This coverage difference is not against our findings of GBI-EM providing more diversification; to the contrary, it follows the same direction. As EMBI Global Composite is composed of nearly twice as many countries, if anything, one would expect to observe a lower correlation.

The literature on the international portfolio diversification suggests a low correlation among developed equity markets, and it attributes the low correlation to the predominance of country specific factors. However, our results suggest something contrary. Unlike equity markets in developed countries, EM equity markets are highly correlated and possibly largely affected by global factors such as variation in credit risk premia, market liquidity and trading movements of international investors. On the other hand, we observe much lower correlations for local currency bonds, which signals that the effects of several country specific factors such as political risk, inflation and exchange rate expectations outweighs when forming the local currency bond returns.

4.2 Principal Component Analysis

The aim of this section is to analyze whether the correlations of EM asset classes can be explained by some common factors. Table 7 presents the results for principal component analysis (PCA) of the correlation matrix of weekly percentage returns of portfolios formed by Gbi-Em, Embi Global, Elmi+ and Msci indices for emerging market countries in our sample. This table is divided into two parts, i.e. all observations and overlapping observations. All observations section presents the results of the PCA analysis using the pairwise correlation matrix calculated by using all the

observations available. Overlapping observations section, however, inputs the correlation matrix calculated by making use of the sample period for which the data is available for all the sovereigns in our sample.

The results indicate that there is a significant amount of commonality in the returns of EM asset classes regardless of whether we analyze all or overlapped observations. However, this commonality is the least in the portfolios of local currency bond and local money market returns. We see that the first principal component captures 37% of the variation in the correlation matrix of local currency bond returns. This percentage rises to 49% and 54% for EM Dollar-denominated bond and equity market returns.

Moreover, the first three principal components cumulatively explain 56%, 53%, 75% and 66% of variation in the correlation matrices of local currency bond, money market, Dollar-denominated bond and equity market portfolio returns, respectively. Again, the commonality measured by the PCA analysis is the smallest among local currency bond and money market portfolio Dollar-returns.

We calculate the time series of the first principal components of the country indices. Table 8 reports the regression results of the first principal components of Gbi-Em Broad, Embi Global, Elmi+, Msci return indices on various US bond and equity market variables. The regression results indicate that S&P 500, US high yield and investment grade bond returns, and the return difference between BB and BBB rated corporate bonds have significant explanatory powers for all of the first components of EM asset classes. As expected, US equity and corporate bond market performances are positively associated with the returns in the EM assets. Besides, the return differences among BB-BBB and BBB-AAA have positive and significant explanatory powers on the first principal components.

We compare the R-Squareds of the regressions in order to evaluate which first factor is explained the most by the US equity and bond markets. Higher R-Squareds in the regressions of equity market and USD denominated bond market returns suggest that they are better fitted by US equity and bond market performances.

4.3 Determinants of EM Bond Yield Changes

In this section, we analyze the determinants of EM local currency and Dollar-denominated bond yield changes. We regress the changes in yields of local currency and Dollar-denominated bond

yields on three categories of explanatory variables: local economic variables, global financial market variables and global risk premia. Local market variables include the expected depreciation rate of exchange rates versus US Dollar, Credit Default Swap premium and local equity market index. As a novelty in this literature, we use the weekly percentage change in forward rates of exchange rates against USD as a proxy for the change in the depreciation expectations. By definition, EM local currency bond holders bear an additional risk comparing to Dollar-denominated bond holders, i.e. currency risk. As forward exchange rates reflect the market expectations for the depreciation rate, percentage change forward rate would provide the change in the expected depreciation rate of the underlying's exchange rate. We have the data for the one year forward rates against USD for all 16 countries in our analysis provided by Reuters.

Table 9 reports the regression results of weekly percentage change in the yields of sovereign local currency bond indices on the weekly changes of local and US market variables. In general, local variables, specifically expected increase in exchange rate depreciation variable has significant explanatory power on local-currency bond yield changes. Interestingly, this variable is significant for the countries that implement a floating exchange regime. During our sample period, the countries, Argentina, Brazil, Colombia, Hungary, Indonesia, Mexico, Poland, South Africa and Turkey were following a floating exchange rate regime, while other countries were implementing a heavily managed floating or fixed exchange rate regime.¹⁰ For all the countries listed above, the change in expected depreciation variable has significant explanatory power in bond yields at 1% level. This is a striking result as it suggests while local currency bond yields largely move along with the exchange rate expectations when the exchange rate freely floats according to the market.

Moreover, Table 9 reports that local stock market index return and 5-year Credit Default Swap premium changes have significant robust t-statistics for most of the countries. A CDS contract written on sovereign debt is essential because it is considered as a measure of the underlying country's credit risk. As a higher CDS premium reflects a higher credit risk, we expect to observe that the CDS premium has a positive and significant sign in the regression, which is the case for most countries. On the other hand, local stock markets are believed to be affected by various country specific factors such as political risk, inflation and exchange rate expectations. As expected, local stock

¹⁰See IMF (April-2008) for the classification of exchange rate arrangements and monetary frameworks of emerging market and developed countries by the International Monetary Fund.

market performances have negative coefficients. Global financial market and global risk variables do not have significant explanatory power over local market variables on local currency bond yields for most of the countries in Table 9.

Table 10 reports a similar regression analysis for the determinants of Dollar-denominated bond yields. This time CDS premiums measuring the underlying's credit risk have significant explanatory powers for most of the countries. Besides CDS, equity market performances carry the expected signs and they are significant for 6 out of 16 EM countries. Change in expected depreciation rate variable however seem not to be as important as in the case of Table 9. It is apparent that Dollar-denominated bond yields are affected mostly by the country credit risk as a local component.

Unlike local currency bonds, Dollar-denominated bond yields are affected heavily by global financial market performance. US corporate investment grade yield changes have significant explanatory powers on Dollar-denominated EM bond yields for 12 out of 16 countries. US corporate high-yield and Treasury bond yield changes are also important factors affecting the yields for majority of the countries. This is remarkable as it suggests while local currency bond yields largely move along with exchange rate expectations, foreign currency-denominated bond yield changes reflect the changes in the global financial market conditions and risk premia. In brief, these results reinforce the findings in the previous sections on the correlation matrices and the principal component analysis. That is, the dependence on global financial market performance and risk factors is larger for hard currency-denominated bonds.

4.4 EM Sovereign Excess Returns

Previously we have shown that EM bonds whether foreign or local currency denominated have provided superior returns comparing to traditional fixed income asset classes. These returns are correlated and a major source of this correlation is their common dependence on global financial market and risk premia. Moreover in a comparative analysis, we have showed that this dependence is the smallest among the local currency-denominated bonds. Since, what really matters to investors is the combination of excess returns and risk, the next step is to analyze the implications of these results for the excess returns.

Table 11 and 12 provide the descriptive statistics for monthly excess returns of local and foreign currency-denominated bond portfolios. Not surprisingly, all of the EM countries except Argentina in

our analysis have provided significantly positive excess returns on their Dollar-denominated bonds between the January 2002 and July 2009. This holds true also for local currency-denominated bonds except for Argentina. When we form regional portfolios, Middle East and African local currency-denominated bond portfolios provide the highest average excess returns. Asian EM bond portfolios provide the lowest excess returns. As one would expect, average monthly standard deviation of excess returns is the highest for Middle East and African and lowest for Asian sovereigns. On the other hand, regional excess returns and standard deviations are closer to each other in the case of Dollar-denominated bond portfolios.

Since what is really important for investors is the risk adjusted excess returns, in Figures 7 and 8 we provide ex post Sharpe Ratios for EM sovereign bonds and various traditional investment classes for the time period between 2002 and 2009. Sharpe Ratios illustrated in Figure 7 are calculated for the whole period. Annual Sharpe Ratios are provided in Figure 8.

The calculation Sharpe Ratio follows¹¹: Let R_{Bt} be the Dollar return on the EM sovereign bond in month t , R_{Ft} the return on the risk-free bond in period t and E_t the excess return in period t :

$$E_t = R_{Bt} - R_{Ft} \quad (1)$$

If \bar{E} is the average value of excess return over the historic period from time $t = 1$ to T then,

$$\bar{E} = \frac{1}{T} \sum_{t=1}^T E_t \quad (2)$$

And σ_E is the standard deviation of the excess return over the period,

$$\sigma_E = \sqrt{\frac{\sum_{t=1}^T (E_t - \bar{E})^2}{T - 1}} \quad (3)$$

Then, the ex post Sharpe Ratio S_h is given by:

$$S_h = \frac{\bar{E}}{\sigma_E} \quad (4)$$

Sharpe Ratio in the form of S_h , indicates the ex post average monthly excess return per unit of

¹¹See Sharpe (1994)

monthly ex post variability of the excess return. Assuming that the excess return over T months is measured by simply summing the one-month excess returns and that the latter have zero serial correlation, the Sharpe Ratio for T periods is found by:

$$\overline{e_T} = T e_1 \tag{5}$$

$$\sigma_{e_T}^2 = T \sigma_{e_1}^2 \tag{6}$$

then,

$$\sigma_{e_T} = \sqrt{T} \sigma_{e_1} \tag{7}$$

hence,

$$S_T = \sqrt{T} S_1, \tag{8}$$

where e_1 and e_T are one-month and T-months excess returns, S_1 and S_T are one-month and T-months Sharpe Ratios.

Analyzing Figures 7 and 8 calculated using above formulation; it is evident that EM debt provides superior risk adjusted returns in the period of January 2002-July 2009. In particular, the local-currency bond portfolio of Asia (GBI-Asia) provided the highest Sharpe Ratio during our sample period, while S&P500 has showed a negative risk-adjusted excess return. It is apparent that the US equity and corporate bond markets have been affected the most by the current financial turmoil contrary to the general view that they are less volatile than EM financial instruments. Analyzing Sharpe Ratio's annually, we document that the EM local currency bond portfolio provided risk-adjusted excess returns for all years except for the year 2008. Even in 2008 it performs better than other asset classes, providing a higher Sharpe Ratio.

Of course Sharpe Ratios should be taken into account with caveats. The ex post version takes into account both the average differential return and the associated variability. However it does not incorporate information about the correlation of a fund or strategy with other assets, liabilities, or previous realizations of its own return.

4.5 Regressions of Excess Returns

In the previous section we have showed that EM debt has provided high excess returns in the last decade. EM debt carries various risk premia, which in turn, causes these high excess returns. Excess returns include a risk premium as compensation for credit risk inherent in sovereign debt. Furthermore, investors might require a premium for currency risk and various types of liquidity risk such as flight to quality or liquidity and sovereign credit crunches.¹² Therefore in this section, we try to analyze the nature of these risk premia by regressing the excess returns of EM sovereign local and foreign currency-denominated bond portfolios on excess returns of various the US equity and bond market portfolios.

Table 13 reports the regression results of excess returns of sovereign local currency bond portfolios (converted to US Dollars) on the three Fama-French Factors, and the excess returns on: five-year US Treasury bonds, US corporate investment grade and high-yield bond indices by Barclays Capital, detailed explanation of which is provided in the Data section of this paper. In line with the findings on yield determinants, regression results of local currency bond excess returns show that the US market factors do not have significant explanatory powers for majority of the countries. In particular, 9 sovereigns have significant coefficients for weighted US equity market index by Fama-French, 6 have significant coefficients for investment grade bond index, and 2 have significant coefficients for US Treasury index and so on. While all of the alphas are positive, 7 of them are significant. The mean alpha of 16 countries adds up to 0.58 per month. Average alpha is high when we think of the average monthly excess returns is only 0.75 (Table 11). For the portfolio of all the local currency bonds of all of the 16 EM sovereigns (GBI-EM Composite), only US equity market and investment grade bond index have significant coefficients, while its alpha is significantly positive and R-squared is 52%.

Table 14 reports the regression results of excess returns of sovereign Dollar-denominated bond portfolios on the excess returns of the US market factors. In line with the findings in the previous sections, the results suggest that US market factors have more explanatory power compared to EM local currency bonds. Mainly, the US corporate investment grade bond, Treasury bond and the US equity market index excess returns explain the largest part of deviation in the Dollar-denominated bond excess returns. R-Squareds are high with an average of 64%, ranging from 29% for Brazil

¹²LPPS 2008

to 84% for Malaysia. Although all of 16 sovereigns have positive alphas, only one of these is significant. US equity market, Treasury, investment and high-yield bond indices have all significant explanatory powers on the portfolio of 32 emerging market Dollar-denominated bond indices (EMBI Global). Furthermore, the R-squared of the regression of EMBI global is as high as 82%. Thus, after controlling for global risk factors as proxied by U.S. equity and bond market excess returns, there is little or no evidence of an individual risk premium, which makes it more difficult to diversify away the risk. In other words, the positive mean excess return from taking sovereign Dollar-denominated bond positions appears to be, to a large part, compensation for bearing the risk of global factors that drive sovereign spreads; a diversified portfolio of the US stock and bond positions reproduces a substantial portion of the historic excess returns in the sovereign Dollar-denominated debt market.

Emerging market local currency-denominated bond excess returns show little dependence on US market factors comparing to the case for Dollar-denominated bond excess returns. At a first glance, an analysis comparing the large portfolios of all the bonds of all the countries suggests a significant difference in the reliance of two EM bond markets to the global market. While 4 of 6 US market variables have significant explanatory power on Dollar-denominated portfolio; for local-currency denominated portfolio, only the US equity market variable has a significant coefficient. Furthermore, the R-Squared of foreign currency-denominated large portfolio is 82%, which is 50% larger than that of local currency-bond portfolio.

5 Conclusion

Emerging market sovereign debt has become a firmly established strategic asset class. Besides dollar-denominated debt, local currency emerging market debt has also been developing to become an attractive and complementary investment to traditional fixed income instruments. EM countries have been successful to reduce currency mismatches and maturity problems by implementing sound fiscal and monetary policies, which in return allowed them to extend the maturity of their borrowings denominated in local currency. While EM governments improve their debt structure by developing local-currency bond markets and look increasingly toward their domestic market for sources of finance, investors are looking more closely at local markets in search for higher yield and greater diversification. EM sovereigns are famous of providing high yields on their debt securities.

Therefore, the question whether EM local-currency bond markets provide diversification benefits becomes extremely crucial. This issue has become even exceptionally relevant as the correlations between asset-returns have drastically increased due the recent financial turmoil.

Analyzing the period from 2002 to July 2009, we show that the local currency debt provides significant additional alpha and diversification to traditional bond portfolios. In particular, first, EM local currency bond returns are less correlated to the US stock market, treasury and high-yield bond markets and global risk premia comparing to the a case of emerging market equity and Dollar-denominated bond markets. Contrary to the literature suggesting a low correlation between the equity markets in developed countries, EM equity markets are highly correlated and possibly largely affected by global factors such as variation in credit risk premia, market liquidity and trading movements of international investors. On the other hand, local-currency bonds reflect much low correlations, which signals that the effects of various country specific factors such as political risk, inflation and exchange rate expectations predominates when determining the returns.

In order to analyze the common factors that cause the correlation between the returns of EM assets, we perform a principal component analysis. The results indicate that there is a significant amount of commonality in the returns of EM asset classes. However, this commonality is the least in the local-currency bond and money market returns. We see that the first principal component captures 37% of the variation in the correlation matrix of local-currency bond returns. This percentage rises to 49% and 54% for EM Dollar-denominated bond and equity market returns.

Furthermore, we document that yields and excess returns on local currency debt depend largely on expected depreciation of the exchange rate, while excess returns on dollar-denominated EM debt are for the most part compensation for bearing the global risk. As a novelty in this literature, we use the weekly percentage change in forward rates of exchange rates against USD as a proxy for the change in the depreciation expectations. By definition, EM local currency bond holders bear an additional risk comparing to Dollar-denominated bond holders, i.e. currency risk. In particular, unlike local currency bonds, Dollar-denominated bond yields are affected heavily by global financial market performance. This is a striking result as it suggests while local-currency bond yields largely move along with exchange rate expectations, US-dollar-denominated bond yield changes reflect the changes in the global financial market conditions and risk premia.

Last but not the least, we report that EM sovereign local currency bond returns beat other

emerging market and traditional investment classes by providing higher annual and long term risk adjusted excess returns, providing added alpha and diversification to bond portfolios. Consistent with the previous sections, emerging market local-currency denominated bond excess returns show little dependence on excess returns of US market factors comparing to the case for emerging market Dollar-denominated bond excess returns.

In summary, we argue that local currency bond returns are determined primarily by idiosyncratic or country-specific factors, which allows standard portfolio diversification methods to manage sovereign local currency bond portfolios. Indeed, our results suggest that there exists a large country specific premium in the local-currency bond returns even after controlling for global risk factors. These country specific premia might stem from various country specific factors such as political risk, inflation and exchange rate expectations. On the other hand, after controlling for global risk factors as proxied by the US equity and bond market excess returns, there is little or no evidence of an individual risk premium in the Dollar-denominated bond returns, which makes it more difficult to diversify away the risk. In other words, the positive mean excess return from taking sovereign Dollar-denominated bond positions appears to be, to a large part, compensation for bearing the risk of global factors that drive sovereign spreads; a diversified portfolio of U.S. stock and bond positions reproduces a substantial portion of the historic excess returns in the sovereign debt market.

We believe that our results will have important policy implications not only for market participants but also for the governments and the international institutions. We suggest that the development of local currency bond markets in EM countries could contribute to global financial stability by reducing reliance on foreign currency debt and currency mismatches, which in turn is linked to growth and poverty reduction.

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Table 1: Maturity of domestic central government debt outstanding. Average original and remaining maturity in years Government debt outstanding includes bonds, notes and money market instruments. Regional totals based on the countries listed in the table and weighted by the corresponding amounts outstanding. Asia larger economies and total emerging markets exclude China for all periods. These estimates should be regarded as indicative and may not be strictly comparable across countries. Industrial countries consist of Australia, Belgium, Canada, Germany, Spain, the United Kingdom and the United States.

	2002		2003		2004		2005		2006		2007		2008	
	Original	Remaining	Orig.	Remain.	Orig.	Remain.	Orig.	Remain.	Orig.	Remain.	Orig.	Remain.	Orig.	Remain.
Argentina	...	...	1	0.7	1.3	1	1.1	12	17	11	10.3	16.7	10.6	10.6
Brazil	...	2.9	...	2.7	...	2.4	...	2.3	...	2.6	...	...	3	3.3
Chile	5.6	13	7.6	5.4	7.2	6.9	8.4	6.7	5.6	7.8	6.8	10.2	9.2	9.2
Colombia	6.4	4.5	6.5	4.2	6.8	4.1	6.8	3.8	7.5	3.9	4.1	8.2	4.4	4.4
Czech Rep.	7.3	5.2	7.9	5.7	8.5	6	8.6	5.7	9.3	6.3	5.6	9.3	5.8	5.8
Hungary	...	3.7	...	4	...	4.1	...	4.1	...	4	6.8	7.1	3.8	3.8
India	14	8	14	9	15	10	14	10	16.9	10	14.7	14.9	10.6	10.6
Indonesia	13.1	7.6	7.8	7.8	7.9	8.4	7.6	7.6	11.5	7.1	13.3	4.8	4.1	4.1
Korea	5.4	3.7	5.5	3.7	5.8	4	6.1	4.1	6.6	4.2	7	7.5	4.5	4.5
Malaysia	...	4	...	5	...	5	8.6	5	8.4	5.2	10	9.7	5.3	5.3
Mexico	...	2.3	...	2.5	...	3	...	3.4	...	4.3	...	...	6.5	6.5
Peru	2.5	1.2	3.3	2.1	6.5	5.5	11	9.9	13.9	12.2	18.5	19.4	16.6	16.6
Philippines	7.1	4.2	7	4.2	7	3.9	7.2	4.1	7.9	4.7	7.8	8.1	4.9	4.9
South Africa	17.4	8.9	16.6	8.2	15.4	8.2	16	8.1	16.8	8.3	17.3	18.3	9.9	9.9
Poland	4.3	2.7	4.4	2.7	5.4	3.2	6.2	3.6	6.9	3.9	8	8.6	4.2	4.2
Russia	3.8	1.7	5.6	4.1	10.8	8.9	11.1	8.6	11.9	9	12.9	13.4	9.7	9.7
Thailand	9.4	...	8.5	6	8.7	6	8.6	5.6	8.8	5.4	9.7	10.2	5.8	5.8
Turkey	3.2	2.4	2.9	1.9	2.8	1.6	3.3	1.8	3.5	1.9	3.8	3.9	1.9	1.9
Industrial Count.	9.9	5.2	10	5	10.2	4.9	10.4	5.9	10.6	5	10.9	11	5	5
Central Europe	4.8	3.3	5.1	3.5	6	3.8	6.6	4	7.4	4.3	7.8	8.4	4.4	4.4
Asia, L. Econs.	10.9	7	10.6	7.1	10.7	7.3	10.1	7	11.2	6.9	10.9	11.5	7.6	7.6
Latin America	5.5	2.8	2.6	2.5	3.4	2.7	3.5	3.9	13.7	4	13.6	14	4.9	4.9
Total EM's	9.4	5.1	8.1	4.8	8.4	4.9	8.2	5	9.9	5.1	9.9	10.2	5.5	5.5

Source: BIS Working Group Survey

Table 2: **Descriptive Statistics and first order serial correlations for JP Morgan GBI-EM Broad Index.** This table reports summary statistics for week-end percentage total US-dollar returns for JP Morgan GBI-EM Broad Bond Indexes for emerging market sovereigns.

	Mean	Std Dev.	Minimum	Maximum	Obs.	Serial Corr.
Argentina	-0.11	6.49	-29.97	20.62	107	0.196
Brazil	0.33	2.64	-13.33	10.26	393	0.111
Chile	0.24	1.75	-10.01	6.16	350	-0.023
China	0.15	0.62	-4.73	3.18	289	-0.045
Colombia	0.36	2.36	-10.26	10.11	341	-0.038
Egypt	0.14	1.55	-6.84	5.46	93	0.242
Hungary	0.26	2.86	-17.79	12.06	393	-0.015
Indonesia	0.29	3.22	-25.58	24.63	341	0.037
Malaysia	0.09	0.79	-3.36	3.74	393	0.045
Mexico	0.11	1.94	-9.30	12.07	393	0.012
Peru	0.24	2.02	-6.86	14.48	145	0.074
Poland	0.23	2.38	-14.35	10.73	393	-0.124
Russia	0.05	1.57	-10.37	8.08	232	0.010
South Africa	0.34	3.11	-16.67	13.01	393	-0.052
Thailand	0.18	1.09	-3.87	3.94	393	0.178
Turkey	0.34	2.89	-15.18	9.93	276	0.050
Gbi-Em Composite	0.23	1.10	-4.78	5.31	393	0.023
Gbi-Em Europe	0.26	2.19	-12.22	10.16	393	-0.068
Gbi-Em Latin America	0.33	2.80	-16.36	21.00	393	-0.017
Gbi-Em Mid E/Afr	0.22	1.76	-10.57	7.00	393	0.009
Gbi-Em Asia	0.16	0.62	-2.38	3.09	393	0.156

Table 3: **Descriptive Statistics for JP Morgan EMBI Global Index.** This table reports summary statistics for week-end percentage total returns for JP Morgan EMBI Global Bond Indexes for emerging market sovereigns.

	Mean	Std Dev.	Minimum	Maximum	Obs.	Serial Corr.
Argentina	0.12	3.81	-22.09	19.28	393	0.075
Brazil	0.30	2.29	-15.58	10.24	393	0.080
Chile	0.14	0.89	-4.06	2.95	393	-0.006
China	0.12	0.80	-5.64	4.87	393	0.102
Colombia	0.21	1.49	-5.90	10.70	393	0.079
Egypt	0.16	0.57	-2.01	2.88	393	0.020
Hungary	0.08	1.47	-16.66	10.52	393	0.078
Indonesia	0.23	2.92	-15.36	31.56	267	0.015
Malaysia	0.15	0.98	-8.84	5.74	393	-0.038
Mexico	0.16	1.13	-7.40	6.80	393	0.188
Peru	0.21	1.60	-7.70	13.13	393	0.055
Poland	0.13	0.92	-5.51	5.39	393	0.162
Russia	0.23	1.69	-10.50	17.36	393	-0.015
South Africa	0.16	1.15	-8.25	10.15	393	0.106
Thailand	0.11	0.47	-1.23	1.84	222	0.031
Turkey	0.25	2.07	-10.83	20.73	393	-0.010
EmbiG Composite	0.20	1.34	-7.08	12.83	393	0.094
EmbiG Europe	0.22	1.60	-10.34	18.10	393	0.006
EmbiG Latin America	0.21	1.03	-9.35	6.30	393	0.076
EmbiG Middle East	0.20	1.49	-7.61	9.78	393	0.124
EmbiG Asia	0.17	1.29	-7.97	15.60	393	0.007

Source: JP Morgan, Datastream

Table 4: **Correlation Matrix of Weekly Returns in GBI-EM Index of Sovereigns.** This table reports the pairwise correlation coefficients for weekly percentage returns in the local currency GBI-EM Broad Bond Indices converted to US Dollars.

	Argentina	Brazil	Chile	China	Colombia	Egypt	Hungary	Indonesia	Malaysia	Mexico	Peru	Poland	Russia	S.Africa	Thailand	Turkey
Argentina	1															
Brazil	0.47	1														
Chile	0.26	0.24	1													
China	-0.02	-0.05	-0.01	1												
Colombia	0.37	0.48	0.29	-0.01	1											
Egypt	0.31	0.3	0.26	-0.14	0.23	1										
Hungary	0.37	0.27	0.06	0.02	0.35	0.18	1									
Indonesia	0.43	0.36	0.21	0.04	0.38	0.34	0.4	1								
Malaysia	0.23	0.25	0.1	0.17	0.33	0.07	0.39	0.41	1							
Mexico	0.36	0.45	0.27	0.05	0.38	0.22	0.43	0.38	0.22	1						
Peru	0.34	0.49	0.26	0.02	0.5	0.23	0.43	0.54	0.29	0.56	1					
Poland	0.41	0.32	0.11	0.07	0.35	0.06	0.8	0.4	0.45	0.42	0.46	1				
Russia	0.24	0.34	-0.03	0.1	0.26	0.09	0.64	0.24	0.35	0.4	0.25	0.64	1			
S.Africa	0.3	0.24	0.07	0.04	0.29	0.17	0.53	0.31	0.33	0.32	0.46	0.53	0.41	1		
Thailand	0.1	0.18	0.18	0.11	0.17	-0.05	0.29	0.33	0.42	0.19	0.23	0.31	0.2	0.23	1	
Turkey	0.41	0.58	0.12	0.05	0.48	0.23	0.67	0.45	0.45	0.6	0.51	0.62	0.37	0.66	0.29	1

Source: JP Morgan, Datastream

Table 5: **Correlation Matrix of Weekly Returns in EMBI Global Index for sovereigns.** This table reports the pairwise correlation coefficients for weekly percentage returns in the EMBI Global Indices.

	Argentina	Brazil	Chile	China	Colombia	Egypt	Hungary	Indonesia	Malaysia	Mexico	Peru	Poland	Russia	S.Africa	Thailand	Turkey
Argentina	1															
Brazil	0.42	1														
Chile	0.22	0.36	1													
China	0.13	0.15	0.74	1												
Colombia	0.52	0.66	0.3	0.21	1											
Egypt	0.24	0.34	0.33	0.35	0.34	1										
Hungary	0.34	0.15	0.41	0.38	0.27	0.14	1									
Indonesia	0.59	0.67	0.4	0.28	0.76	0.2	0.47	1								
Malaysia	0.26	0.23	0.81	0.86	0.29	0.36	0.38	0.43	1							
Mexico	0.49	0.61	0.5	0.4	0.68	0.33	0.45	0.68	0.44	1						
Peru	0.46	0.68	0.34	0.29	0.76	0.41	0.27	0.71	0.36	0.65	1					
Poland	0.15	0.15	0.66	0.8	0.16	0.33	0.4	0.03	0.73	0.38	0.21	1				
Russia	0.52	0.53	0.42	0.39	0.63	0.34	0.44	0.83	0.49	0.68	0.66	0.26	1			
S.Africa	0.45	0.37	0.58	0.53	0.57	0.34	0.55	0.79	0.65	0.7	0.59	0.44	0.76	1		
Thailand	0.04	-0.06	0.66	0.78	0.04	0.27	0.55	0.24	0.72	0.39	0	0.58	0.26	0.57	1	
Turkey	0.49	0.55	0.35	0.28	0.62	0.27	0.36	0.85	0.37	0.61	0.62	0.18	0.74	0.67	0.07	1

Source: JP Morgan, Datastream

Table 6: Correlation Matrix of Weekly Returns in Gbi-Em Composite, Embi Global Composite, Elmi+ Composite, Msci-Em Composite, S&P 500 Composite, Merrill Lynch US Corporate High Yield and Barclays Capital US Corporate Investment Grade Indexes and the current 5 year US Treasury Bond.

	Gbi-Em	EmbiG	Elmi+	Msci	S&P500	US Trsy	High Yield	Inv Grade
Gbi-Em	1							
EmbiG	0.6	1						
Elmi+	0.89	0.62	1					
Msci	0.67	0.61	0.72	1				
S&P500	0.38	0.31	0.42	0.63	1			
US Trsy 5-Year	0.03	0.13	-0.03	-0.25	-0.38	1		
High Yield	0.37	0.58	0.37	0.52	0.4	-0.14	1	
Inv Grade	0.23	0.44	0.17	0.07	-0.12	0.67	0.42	1

Source: JP Morgan, Merrill Lynch, Datastream

Table 7: **Principal Component Analysis.** This table presents the results for the principal component analysis (pca) of the correlation matrix of weekly percentage returns of Gbi-Em, Embi Global, Elmi+ and Msci indices for emerging market countries in our sample. All observations section presents the results of the pca analysis using the pairwise correlation matrix calculated by using all the observations available. Overlapping observations section reports the pca analysis using the correlation matrix calculated by using the sample period for which the data is available for all sovereigns.

Principal Component	All Observations		Overlapping Observations	
	Percentage Explained	Cumulative Percentage Explained	Percentage Explained	Cumulative Percentage Explained
Gbi-Em				
First	0.37	0.37	0.45	0.45
Second	0.11	0.48	0.11	0.57
Third	0.08	0.56	0.10	0.66
EmbiG				
First	0.49	0.49	0.59	0.59
Second	0.19	0.68	0.19	0.79
Third	0.07	0.75	0.06	0.85
Elmi+				
First	0.36	0.36	0.50	0.50
Second	0.09	0.45	0.10	0.61
Third	0.08	0.53	0.09	0.70
Msci				
First	0.54	0.54	0.66	0.66
Second	0.06	0.61	0.07	0.73
Third	0.06	0.66	0.06	0.79

Source: Datastream and JPMorgan

Table 8: **Regression of First Principal Components on Global Financial Market Variables.** This table reports the regression results of the first principal components of Gbi-Em Broad, Embi Global, Elmi+, Msci sovereign indices on weekly changes in: S&P500 total return index, volatility index of options written on S&P500 by CBOE, US Corporate high yield and investment grade bond indices, 5 year US Treasury bond index, return difference BB and BBB and return difference between BBB and AAA rated US corporate bonds.

	Gbi Broad		Embi Global		Elmi+ Money Mkt		Msci Equity Mkt	
S&P 500	0.52*** (9.20)	0.58*** (7.79)	0.27*** (4.57)	0.25** (3.31)	0.51*** (9.25)	0.60*** (8.21)	0.70*** (11.77)	0.71*** (8.90)
Treasury	0.11 (0.39)	0.68* (2.20)	1.35*** (4.59)	2.10*** (6.73)	-0.19 (-0.68)	0.44 (1.46)	-0.22 (-0.73)	0.46 (1.41)
High Yield	0.12 (1.06)	-0.62** (-3.04)	0.54*** (4.48)	-0.30 (-1.44)	0.07 (0.65)	-0.74*** (-3.69)	0.25* (2.02)	-0.53* (-2.48)
Inv. Grade	0.39 (1.67)	1.04*** (3.90)	0.84*** (3.51)	1.49*** (5.49)	0.41 (1.81)	1.09*** (4.19)	0.25 (1.03)	0.88** (3.14)
BB-BBB		1.58*** (4.47)		1.75*** (4.87)		1.67*** (4.82)		1.65*** (4.42)
BBB-AAA		0.26 (1.39)		0.57** (2.99)		0.42* (2.25)		0.46* (2.31)
VIX		0.01 (0.73)		-0.02 (-1.39)		0.01 (1.02)		-0.01 (-0.79)
Constant	-0.02 (-0.19)	-0.10 (-0.83)	-0.20 (-1.59)	-0.26* (-2.17)	0.00 (0.04)	-0.08 (-0.66)	0.01 (0.07)	-0.05 (-0.43)
Observations	227	227	231	231	231	231	231	231
R^2	0.407	0.457	0.510	0.568	0.402	0.459	0.545	0.586

Robust t statistics in parentheses

Source: JP Morgan, Merrill Lynch, Barclays Capital, Datastream

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: **Regressions of the Determinants of Local-Currency-Denominated Bond Yields.** This table reports the regression results of weekly percentage change in the yields of sovereign local currency bond indices on the weekly changes of: the expected depreciation rate of exchange rates versus US Dollar, Credit Default Swap premium, Local Equity Market Index (MSCI), S&P500 total return, yields of 5 year Us Treasury Bonds, yields of US corporate High Yield and Investment Grade bond indices by Barclays Capital, CBOE Volatility index of options written on S&P500, changes in yield spread between BB and BBB rated US corporate bonds, the spread between three month Labor and T-bill rate (TED).

	Local Variables				Global Financial Market				Global Risk Premia				
	Exp.	Exch.	Equity	CDS	US Equity	US Treasury	HY	us IG	VIX	BB-BBB	TED	α	Obs	R-sqrd
Argentina	0.23** (2.67)	-0.44*** (-3.91)	0.29*** (3.69)	0.26 (0.78)	-0.02 (-0.15)	-0.62 (-1.67)	0.30 (0.71)	0.03 (0.41)	0.06 (0.57)	0.72 (1.36)	-1.77 (-1.05)	106	0.482
Brazil	0.24** (2.90)	-0.09* (-2.31)	0.00 (0.23)	0.31*** (3.42)	0.09* (2.59)	0.06 (0.71)	-0.01 (-0.13)	0.04** (3.19)	0.04 (1.87)	0.18* (2.31)	-0.45* (-2.31)	271	0.265
Chile	-0.03 (-0.12)	-0.17 (-1.34)	0.00 (0.09)	0.38* (2.08)	0.02 (0.19)	-0.02 (-0.12)	0.02 (0.09)	0.01 (0.46)	0.03 (0.62)	-0.02 (-0.09)	0.10 (0.23)	271	0.024
China	0.16 (0.90)	-0.03 (-0.55)	-0.02 (-1.15)	-0.04 (-0.32)	-0.03 (-0.53)	-0.16 (-1.25)	0.12 (0.82)	-0.00 (-0.24)	0.04 (1.28)	-0.29* (-2.43)	0.47 (1.57)	271	0.042
Colombia	0.13* (2.02)	-0.13*** (-4.47)	0.05** (3.24)	0.13 (1.74)	0.04 (1.16)	-0.02 (-0.26)	0.13 (1.32)	0.02 (1.72)	0.01 (0.75)	-0.08 (-0.99)	0.07 (0.40)	271	0.357
Egypt	0.28 (1.22)	-0.08 (-1.25)	0.02 (0.77)	0.47** (2.89)	-0.01 (-0.14)	0.37* (2.02)	-0.03 (-0.12)	0.08 (1.99)	-0.03 (-0.47)	0.74* (2.43)	-2.21* (-2.23)	93	0.342
Hungary	0.58*** (6.44)	-0.09* (-2.10)	0.06*** (3.70)	-0.04 (-0.42)	0.03 (0.67)	-0.05 (-0.48)	0.16 (1.30)	-0.02 (-1.42)	0.02 (0.96)	-0.04 (-0.37)	0.05 (0.20)	271	0.515
Indonesia	0.45*** (3.39)	-0.31*** (-6.70)	0.07** (2.73)	-0.01 (-0.13)	-0.04 (-0.90)	-0.21 (-1.73)	0.19 (1.38)	-0.02 (-0.89)	0.04 (1.34)	0.00 (0.04)	0.18 (0.67)	249	0.525
Malaysia	0.42 (1.32)	0.00 (0.02)	0.01 (0.36)	-0.06 (-0.57)	0.03 (0.52)	-0.39** (-2.93)	0.36* (2.40)	0.02 (1.16)	0.05 (1.61)	-0.01 (-0.09)	0.05 (0.17)	207	0.110
Mexico	0.54*** (5.26)	-0.06 (-1.13)	0.00 (0.05)	-0.02 (-0.22)	0.11*** (3.44)	-0.11 (-1.44)	0.16 (1.75)	0.01 (1.10)	0.02 (1.17)	0.03 (0.37)	-0.11 (-0.62)	271	0.370
Peru	0.04 (0.32)	-0.12** (-3.28)	0.06* (2.36)	-0.05 (-0.50)	0.09* (2.30)	0.02 (0.16)	0.05 (0.46)	-0.00 (-0.23)	0.02 (0.65)	0.01 (0.09)	-0.07 (-0.23)	145	0.411
Poland	0.21** (2.60)	-0.09* (-2.30)	0.02 (1.93)	0.01 (0.15)	-0.05 (-1.39)	-0.18 (-1.93)	0.39*** (3.55)	-0.01 (-0.07*)	0.03 (1.34)	-0.17 (-1.91)	0.26 (1.23)	271	0.255
Russia	0.04 (0.27)	0.08 (1.42)	0.12*** (3.91)	-0.29 (-1.64)	-0.00 (-0.06)	-0.08 (-0.42)	0.07 (0.32)	-0.07* (-2.49)	-0.01 (-0.24)	0.09 (0.50)	0.03 (0.08)	232	0.108
S. Africa	0.43*** (6.75)	0.06 (1.35)	0.03* (2.13)	0.03 (0.45)	0.08* (2.43)	-0.12 (-1.59)	0.07 (0.77)	0.02 (1.44)	0.01 (0.58)	-0.09 (-1.31)	0.08 (0.49)	271	0.335
Thailand	-0.04 (-0.17)	-0.04 (-0.65)	-0.01 (-0.33)	-0.51*** (-3.89)	0.12* (2.09)	-0.43** (-3.14)	0.34* (2.11)	-0.03 (-1.29)	0.06* (1.99)	-0.11 (-0.83)	0.26 (0.81)	271	0.142
Turkey	0.54*** (5.84)	-0.08 (-1.87)	0.09*** (3.35)	0.34*** (3.56)	0.05 (1.24)	0.16 (1.58)	-0.02 (-0.17)	0.03* (2.21)	-0.03 (-1.19)	-0.10 (-1.05)	-0.05 (-0.21)	269	0.565

Robust t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: JP Morgan, Merrill Lynch, Barclays Capital, Datastream

Table 10: **Regressions of the Determinants of Dollar-Denominated Bond Yields.** This table reports the regression results of weekly percentage change in the yields of EMBI Global bond indices on the weekly changes of: the expected depreciation rate of exchange rates versus US Dollar, Credit Default Swap premium, Local Equity Market Index (MSCI), S&P500 total return, yields of 5 year US Treasury Bonds, US corporate High Yield and Investment Grade bond Indices by Barclays Capital, CBOE Volatility index of options written on S&P500, changes in yield spread between BB and BBB rated US corporate bonds, the spread between three month Libor and T-bill rate (TED).

	Local Variables				Global Financial Market				Global Risk Premia						
	Exp.	Exch.	Equity	Equity	CDS	US Equity	US Treasury	HY	us IG	VIX	BB-BBB	TED	α	Obs	R-sqrd
Argentina	0.17*	(2.22)	-0.13	(-1.59)	0.00	(0.66)	0.02	(0.15)	0.59*	(2.30)	0.04	(0.67)	0.17	271	0.168
Brazil	0.07	(0.93)	-0.10**	(-2.85)	0.05***	(6.85)	0.08**	(2.76)	0.26***	(3.74)	-0.02	(-1.46)	-0.10	271	0.574
Chile	0.16*	(2.19)	0.05	(1.26)	0.00	(0.06)	0.19***	(6.84)	0.07	(1.12)	-0.02	(-0.66)	-0.04	271	0.642
China	-0.09	(-0.81)	-0.05	(-1.76)	-0.02	(-1.48)	0.26***	(8.03)	0.08	(0.99)	-0.01	(-1.09)	0.10	271	0.630
Colombia	-0.02	(-0.31)	-0.08**	(-2.79)	0.14***	(9.46)	0.10**	(3.24)	0.11	(0.99)	0.02	(-1.29)	-0.06	271	0.633
Egypt	-0.28	(-0.86)	0.18	(1.97)	-0.03	(-0.65)	-0.01	(-0.13)	0.48	(1.38)	0.03	(0.35)	0.35	117	0.206
Hungary	0.11	(0.58)	-0.22*	(-2.42)	0.05	(1.39)	-0.12	(-1.26)	-0.60*	(1.88)	-0.04	(0.13)	0.21	271	0.269
Indonesia	0.12	(1.09)	-0.09*	(-2.35)	0.20***	(9.43)	0.09*	(2.30)	0.02	(0.20)	0.04	(0.61)	0.14	249	0.650
Malaysia	-0.48	(-1.69)	-0.25**	(-3.22)	0.03*	(2.05)	0.32***	(7.22)	0.29*	(2.41)	-0.05	(-0.74)	0.09	207	0.552
Mexico	0.28**	(3.12)	-0.05	(-1.22)	0.08***	(6.38)	-0.01	(-0.31)	0.63***	(1.66)	-0.01	(-1.65)	0.14	271	0.602
Peru	-0.10***	(-3.80)	-0.04	(-1.37)	0.13***	(9.37)	0.14***	(2.93)	-0.08	(-0.80)	-0.00	(-0.80)	0.01	271	0.590
Poland	0.16	(1.93)	-0.03	(-0.69)	-0.01	(-1.01)	0.08	(0.78)	0.04	(0.45)	0.02	(0.10)	-0.04	271	0.564
Russia	0.29***	(3.62)	-0.07**	(-2.66)	0.15***	(10.36)	-0.05	(-1.22)	0.57***	(1.39)	-0.02	(-1.07)	0.03	265	0.647
S. Africa	0.15*	(2.03)	-0.02	(-0.34)	0.10***	(6.05)	0.08*	(2.20)	0.45***	(1.18)	-0.02	(-0.05)	-0.09	271	0.529
Thailand	1.22	(0.64)	-0.17	(-0.37)	0.39	(1.82)	1.42	(1.28)	-0.16	(-0.20)	-0.02	(1.33)	-0.43	101	0.141
Turkey	0.06	(0.77)	-0.06	(-1.64)	0.20***	(8.28)	0.09*	(2.31)	0.14	(1.56)	0.02	(-0.07)	0.00	269	0.631

Robust t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: JP Morgan, Merrill Lynch, Barclays Capital, Datastream

Table 11: **Descriptive Statistics for Excess Returns of Local Currency Bond Indices.** This table reports the summary statistics for monthly excess returns of local currency JP Morgan Gbi-Em Broad Bond Indices (converted to US Dollars) for individual and clustered emerging market sovereigns.

	Mean	Std Dev	Ex Ret /Std Dev	Minimum	Maximum	Obs.
Argentina	0.07	19.33	0.004	-56.84	52.04	24
Brazil	1.35	7.07	0.191	-26.44	28.11	90
Chile	0.88	3.79	0.232	-16.61	8.85	80
China	0.46	1.34	0.343	-5.19	3.78	66
Colombia	1.33	5.24	0.254	-12.37	16.24	78
Egypt	0.45	4.57	0.098	-10.25	8.82	20
Hungary	0.92	5.96	0.154	-22.07	16.31	90
Indonesia	1.03	7.21	0.143	-29.03	33.25	78
Malaysia	0.21	1.77	0.119	-5.22	6.65	90
Mexico	0.31	3.58	0.087	-14.40	12.85	90
Peru	0.85	5.21	0.163	-10.19	16.22	33
Poland	0.77	4.60	0.167	-15.46	9.54	90
Russia	0.12	4.00	0.030	-17.09	13.36	53
S. Africa	1.36	6.58	0.207	-16.37	15.99	90
Thailand	0.57	2.74	0.208	-6.80	9.42	90
Turkey	1.27	6.36	0.200	-22.42	13.13	63
Gbi Composite	0.82	2.52	0.325	-7.60	8.42	90
Gbi Europe	0.93	4.47	0.208	-16.96	10.06	90
Gbi L.America	0.79	3.88	0.204	-15.07	11.21	90
Gbi Mid E/Africa	1.33	6.44	0.207	-15.99	28.04	90
Gbi Asia	0.53	1.56	0.340	-3.48	8.16	90

Source: JP Morgan, Thomson Financial Datastream

Table 12: **Descriptive Statistics for Excess Returns of US Dollar Denominated Bond Indices.** This table reports the summary statistics and Sharpe Ratios for monthly excess returns of JP Morgan Embi Global Bond Indices (converted to US Dollars) for individual and clustered emerging market sovereigns.

	Mean	Std Dev	Ex Ret/Std Dev	Minimum	Maximum	Obs.
Argentina	0.49	9.24	0.053	-43.99	33.80	90
Brazil	1.18	6.15	0.192	-19.29	26.62	90
Chile	0.42	2.12	0.198	-8.05	6.37	90
China	0.35	2.20	0.159	-9.53	13.03	90
Colombia	0.76	3.58	0.212	-12.62	12.10	90
Egypt	0.49	1.25	0.392	-2.81	3.79	90
Hungary	0.16	2.90	0.055	-19.69	9.91	90
Indonesia	0.67	4.89	0.137	-21.81	20.43	61
Malaysia	0.46	2.41	0.191	-13.15	8.39	90
Mexico	0.49	2.44	0.201	-8.75	10.80	90
Peru	0.73	3.57	0.204	-14.73	9.72	90
Poland	0.35	2.15	0.163	-10.70	7.06	90
Russia	0.81	3.22	0.252	-13.29	7.24	90
S. Africa	0.51	2.61	0.195	-14.28	9.31	90
Thailand	0.07	0.87	0.080	-2.38	3.05	90
Turkey	0.88	4.39	0.200	-16.22	12.19	90
Embi Composite	0.67	2.93	0.229	-14.23	7.78	90
Embi Europe	0.75	3.17	0.237	-15.88	8.60	90
Embi L. America	0.69	3.44	0.201	-14.05	8.72	90
Embi Mid E/Africa	0.73	2.44	0.299	-12.81	6.48	90
Embi Asia	0.54	2.34	0.231	-12.27	8.06	90

Source: JP Morgan, Thomson Financial Datastream

Table 13: **Regressions of Excess Returns of Gbi-Em Local Currency Bond Indices on Global Risk Factors.** This table reports the regression results of Sharpe style excess returns for sovereign local currency bond indices (converted to US Dollars) on the three Fama-French Factors, and the excess returns on: five-year US Treasury bonds, US corporate investment grade and high-yield bond indices by Barclays Capital.

	Mkt-Rf	SMB	HML	Treasury	HY	IG	α	N	Adj R.sqrd
Argentina	-1.72* (-2.53)	-2.28 (-1.02)	1.65 (1.30)	-4.81 (-1.19)	0.43 (0.37)	6.99*** (3.47)	0.14 (0.03)	23	0.509
Brazil	0.73** (2.92)	-0.40 (-1.11)	-0.04 (-0.15)	-0.40 (-0.55)	0.10 (0.28)	0.65 (1.08)	1.45* (2.50)	89	0.314
Chile	0.18 (1.16)	-0.06 (-0.30)	-0.28 (-1.55)	0.34 (0.57)	0.29 (1.33)	0.27 (0.52)	0.57 (1.46)	79	0.220
China	-0.00 (-0.02)	0.19* (2.22)	0.07 (1.22)	0.24 (1.04)	-0.13* (-2.06)	0.06 (0.42)	0.41* (2.37)	65	0.147
Colombia	0.55** (2.91)	-0.19 (-0.74)	0.22 (0.87)	-0.95 (-1.44)	-0.40 (-1.23)	1.54* (2.43)	1.30** (2.73)	77	0.425
Egypt	0.16 (1.42)	-0.24 (-0.87)	-0.34 (-1.89)	-0.22 (-0.52)	-0.16 (-0.76)	1.15*** (4.08)	0.37 (0.68)	19	0.774
Hungary	0.45* (2.35)	0.07 (0.38)	0.67** (2.68)	-0.60 (-1.06)	-0.54 (-1.40)	1.97*** (4.23)	0.54 (1.10)	89	0.416
Indonesia	0.14 (0.51)	0.42 (1.12)	0.39 (1.54)	-0.12 (-0.14)	0.56 (1.25)	1.22 (1.56)	0.36 (0.58)	77	0.425
Malaysia	0.12* (2.01)	-0.02 (-0.20)	0.10 (1.36)	0.18 (0.73)	-0.04 (-0.28)	0.19 (0.97)	0.13 (0.76)	89	0.139
Mexico	0.51*** (5.57)	-0.21 (-1.78)	0.13 (1.14)	0.97* (2.32)	0.35* (2.17)	-0.36 (-1.07)	0.07 (0.29)	89	0.513
Peru	0.46* (2.03)	0.22 (0.40)	-0.13 (-0.35)	1.27 (1.56)	0.10 (0.18)	0.22 (0.23)	0.67 (0.76)	32	0.306
Poland	0.55*** (4.14)	0.03 (0.20)	0.48** (2.99)	0.49 (1.11)	-0.19 (-0.75)	0.43 (1.11)	0.47 (1.18)	89	0.367
S. Africa	0.33 (1.28)	0.35 (1.04)	0.16 (0.51)	-0.02 (-0.04)	0.10 (0.22)	1.01* (2.07)	0.91 (1.52)	89	0.234
Thailand	0.18* (2.39)	0.12 (1.04)	0.20* (2.36)	1.22*** (3.97)	0.11 (0.82)	-0.28 (-1.22)	0.18 (0.78)	89	0.278
Turkey	0.60** (2.66)	0.31 (0.81)	0.10 (0.32)	-0.27 (-0.45)	-0.45 (-1.53)	1.70*** (3.47)	1.32* (2.15)	62	0.422
Gbi Comp.	0.26*** (3.31)	0.10 (0.92)	0.13 (1.40)	0.50* (2.38)	0.11 (0.83)	0.23 (1.56)	0.54** (3.16)	89	0.524

Robust t statistics in parentheses

Source: K.R. French, JP Morgan, Barclays Capital, Merrill Lynch, Datastream

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 14: **Regression Excess Returns of Embi Global Sovereign Bond Indices on Global Risk Factors.** This table reports the regression results of Sharpe style excess returns for sovereign US Dollar denominated bond indices on the three Fama-French Factors, and the excess returns on: five-year US Treasury bonds, US corporate investment grade and high-yield bond indices by Barclays Capital.

	Mkt-Rf	SMB	HML	Treasury	HY	IG	α	N	Adj. R.sqrd
Argentina	0.27* (0.21)	-2.28 (-1.02)	1.65 (1.30)	-4.81 (-1.19)	0.43 (0.37)	6.99*** (3.47)	0.14 (0.03)	89	0.533
Brazil	0.66* (2.49)	-0.44 (-1.35)	-0.22 (-0.69)	0.96 (1.29)	0.41 (1.00)	-0.08 (-0.12)	1.04 (1.81)	89	0.294
Chile	0.13 (1.68)	-0.01 (-0.23)	0.06 (0.59)	0.45 (1.67)	-0.18 (-1.28)	0.73** (3.23)	0.17 (1.26)	89	0.686
China	0.02 (0.40)	0.06 (1.63)	-0.00 (-0.05)	0.04 (0.18)	-0.34 (-1.75)	1.19*** (3.30)	0.17 (1.30)	89	0.789
Colombia	0.37* (2.50)	0.07 (0.49)	-0.08 (-0.44)	0.11 (0.29)	-0.02 (-0.11)	0.79** (2.73)	0.56 (1.80)	89	0.505
Egypt	0.00 (0.06)	-0.02 (-0.33)	-0.10 (-1.83)	0.36*** (3.35)	0.17* (2.36)	0.12 (1.06)	0.35** (3.23)	89	0.449
Hungary	0.00 (0.02)	-0.07 (-0.75)	0.05 (0.34)	-0.59 (-1.17)	-0.23 (-0.93)	1.44* (2.45)	0.11 (0.45)	89	0.479
Indonesia	0.14 (0.99)	0.30 (1.54)	0.22 (1.73)	0.59 (1.41)	0.61** (2.90)	0.80*** (3.34)	0.30 (1.10)	60	0.796
Malaysia	0.04 (1.34)	0.03 (1.11)	0.08 (1.50)	0.30 (1.30)	-0.13 (-1.34)	1.06*** (3.73)	0.13 (1.17)	89	0.844
Mexico	0.14* (2.11)	-0.06 (-0.83)	0.08 (0.97)	0.58** (3.01)	0.16 (1.36)	0.54** (3.11)	0.17 (1.40)	89	0.769
Peru	0.19 (1.75)	0.01 (0.08)	-0.11 (-0.84)	-0.24 (-0.63)	0.09 (0.48)	1.06** (3.05)	0.55 (1.87)	89	0.538
Poland	0.06 (1.65)	-0.04 (-0.89)	-0.01 (-0.12)	0.39 (1.83)	-0.09 (-1.06)	0.82** (3.22)	0.12 (1.04)	89	0.769
S. Africa	-0.04 (-0.94)	0.11* (2.04)	-0.09 (-1.38)	0.03 (0.15)	0.08 (0.93)	1.11*** (5.00)	0.19 (1.41)	89	0.793
Thailand	-0.003 (-0.16)	0.04 (1.27)	0.04 (1.48)	0.78*** (6.04)	-0.002 (-0.01)	-0.15 (-1.01)	0.19 (3.11)	51	0.863
Turkey	0.43*** (4.02)	0.01 (0.06)	-0.05 (-0.31)	0.55 (1.29)	0.18 (0.50)	0.62 (1.20)	0.55 (1.48)	89	0.482
Embi Glob.	0.26*** (4.28)	-0.10 (-1.50)	-0.01 (-0.16)	0.43* (2.53)	0.26*** (3.57)	0.58*** (4.62)	0.38* (2.44)	89	0.818

Robust t statistics in parentheses

Source: K.R. French, JP Morgan, Barclays Capital, Merrill Lynch, Datastream

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1: Maturity of Domestic Central Government Debt Outstanding in Years.

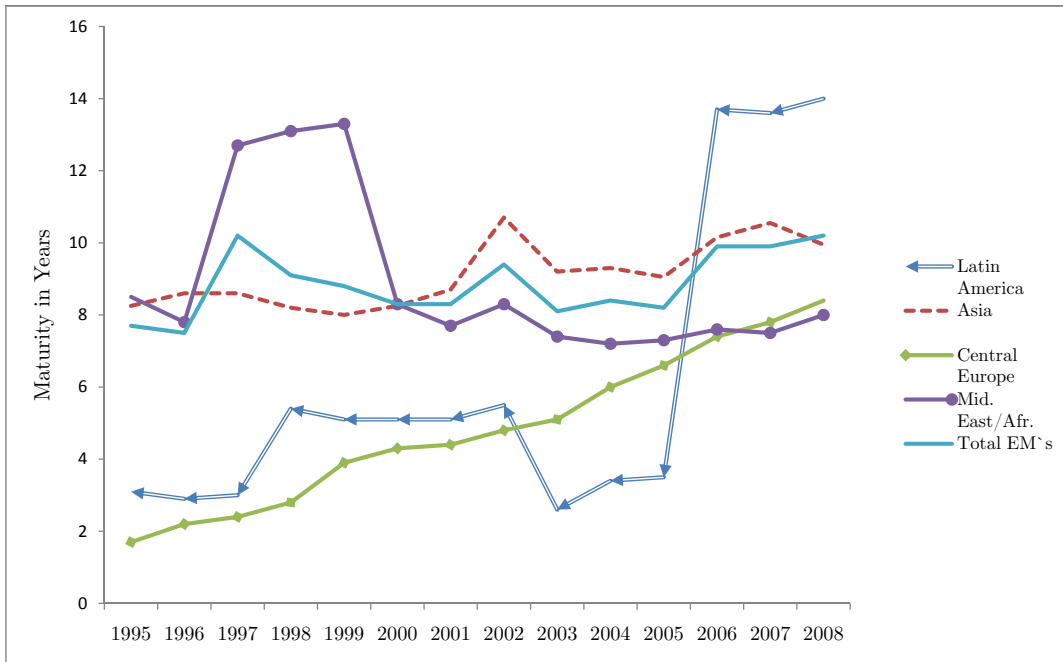


Figure 2: Market Value of Emerging Market Sovereign Local Currency and US Dollar Denominated Bond Markets.

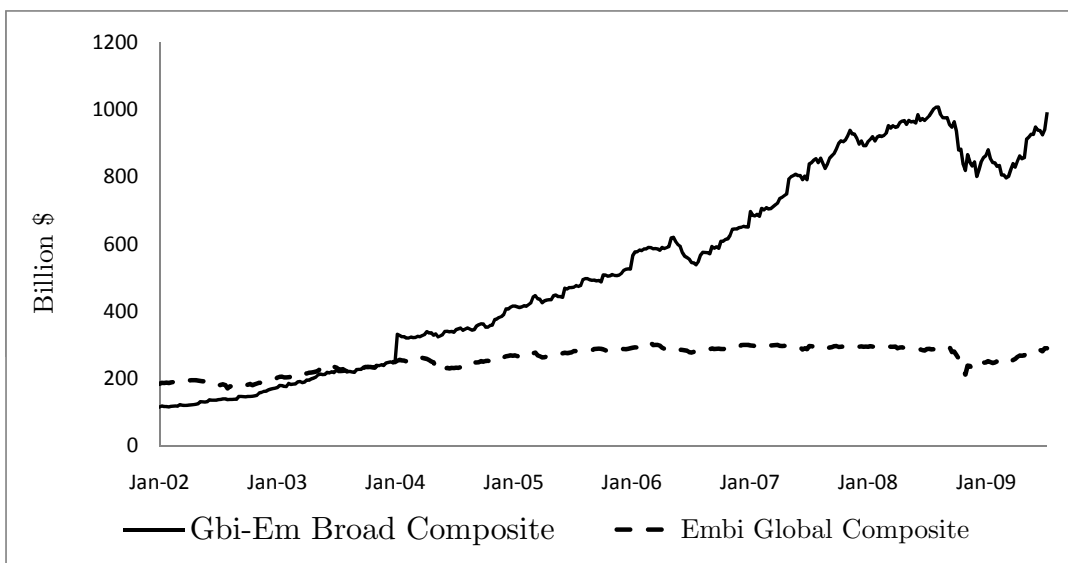


Figure 3: European EM Sovereign Bond Market

Figure 4: L. American EM Sovereign Bond Market

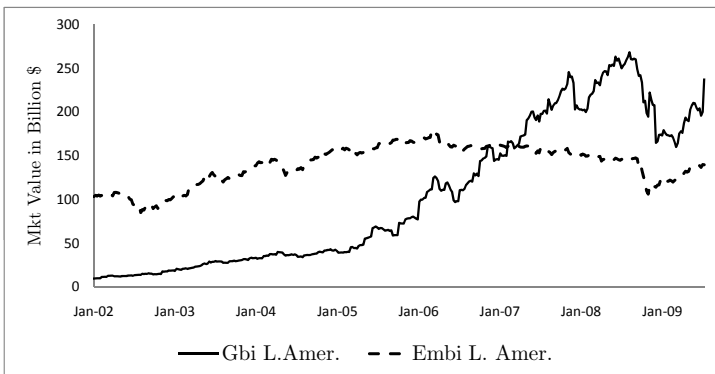
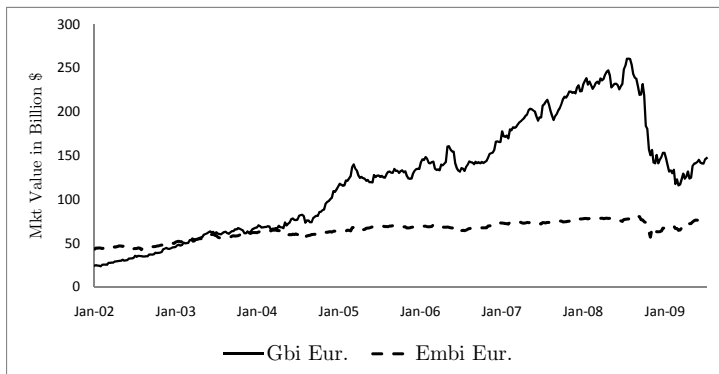


Figure 5: Asian EM Sovereign Bond Market

Figure 6: M. East and African EM Bond Market

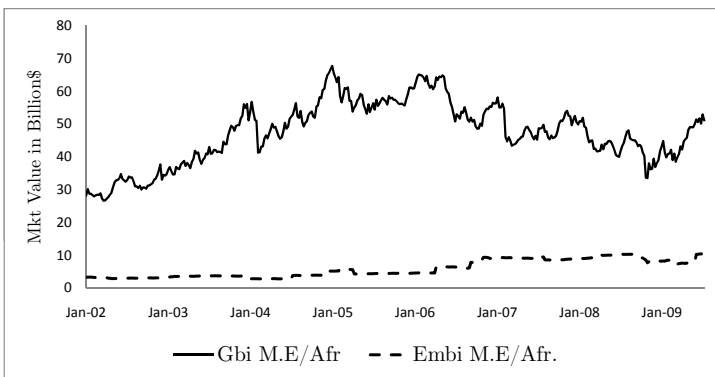
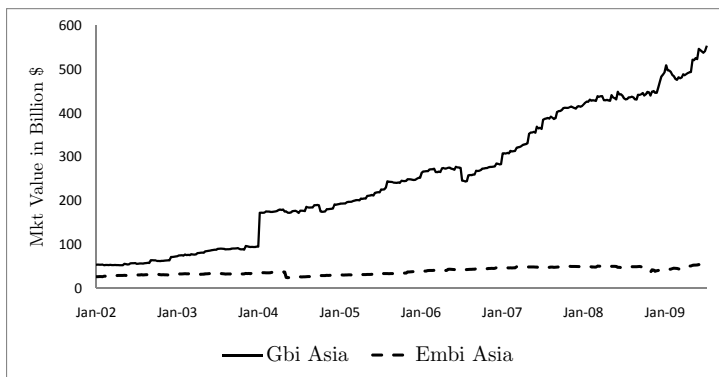


Figure 7: **Sharpe Ratios of Various Investment Classes for the Period 2002-2009** This figure illustrates the Sharpe Ratios calculated as the ratio of excess returns over the whole period of 2002-2009 to standard deviation of the excess returns.

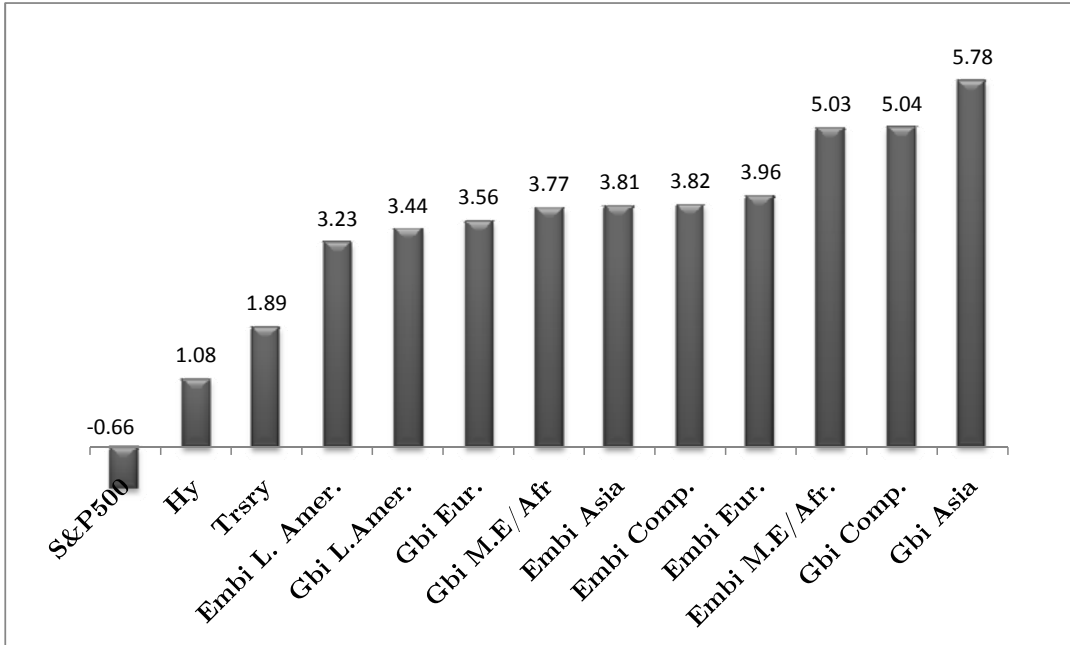


Figure 8: **Annual Sharpe Ratios from 2002 to 2009** This figure illustrates the annual Sharpe Ratios calculated as the ratio of annual excess returns between 2002-2009 to annualized standard deviation of the excess returns.

