Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Jacob Borbidge
Senior Portfolio Manager,
Head of Investment Research

Alessio de Longis
Senior Portfolio Manager,
Head of GTAA Solutions

Chang Hwan Sung
Portfolio Manager

Dianne Ellis
Senior Analyst, Investment Research

Shuxing Deng
Senior Strategy Development Manager

Thomas Wu
Market Strategies Analyst

The authors would like to thank Gerald Evelyn, Wim Vandenhoeck and members of EM Local Debt team for their insights and support.

Invesco Investment Insights

Key Takeaways:

- Emerging market (EM) debt as an asset class continues to evolve and develop into a significant segment of the global bond market. Within EM debt we take a closer look at local currency sovereigns.
- Large cross-market differences between EM and more developed economies necessitates accounting for regional distinctions, in particular the behavior of FX.
- In this paper we explain how we formulate our Capital Market Assumption (CMA) for EM local currency sovereign debt. Our research should be helpful in determining the appropriate level of portfolio exposure for this asset class and where it sits in the broader picture of asset allocation.

Introduction

Present day EM local currency bond markets were established with the intention for EM countries to become more self-reliant in financing – against the backdrop of the continuous development of their domestic financial markets. The experience of the Mexican peso crisis (1994) and the Asian financial crisis (1997) revealed that the absence of domestic bond markets left EM countries exposed to the wrath of shifting foreign investor sentiment. Governments in EM realized the desirability of issuing debt in local currency and having a domestic institutional investor base, leading to the development of sophisticated domestic bond markets in many EM countries.

With better market infrastructure, global financial integration, as well as increased political stability, EM countries are now more resilient during times of crisis (Montoro and Rojas-Suarez, 2012). For similar reasons they have seen strong economic growth over the past few decades. They are expected to account for 3 of the top 10 countries by GDP in 2022, according to IMF forecasts.[i] To the same degree that EM economies have advanced, as have their debt markets. As we enter the post-pandemic cycle, we believe investors have many reasons to consider EM local currency sovereign debt as an attractive investment option.

- **Low real yield environment:** While yields have risen broadly across all assets as the US Federal Reserve and other central banks embark on a rate hiking cycle, elevated levels of inflation mean that real yields are still negative across many developed economies. EM debt carry remains high and offers opportunity.
- **Diversification benefits:** Investors seeking to build diversified multi-asset portfolios could consider investing in EM local currency sovereigns, exhibiting low correlations to global equities and global bonds **(Figure 1)**. This allocation can also be useful for managing the various risk factors portfolios are exposed to.
- **Growth:** In many EM countries, the size of their equity and bond markets combined makes up only 90% of GDP, compared to 360% of GDP in developed countries. This suggests EM countries are underfinanced and can be supportive for sustainable bond market growth.
- **Currency:** Structurally many EM currencies look cheap relative to the dollar, which could be a driver of returns as these valuation differentials revert over time.

Figure 1 – Forward looking correlation between EM local currency sovereign debt and major asset classes

Asset	Global Treasury	Global IG	Global HY	EM LC	Global EQ
Global Treasury	1.00	0.85	0.34	0.48	0.06
Global IG	0.85	1.00	0.63	0.57	0.27
Global HY	0.34	0.63	1.00	0.73	0.68
EM LC	0.48	0.57	0.73	1.00	0.59
Global EQ	0.06	0.27	0.68	0.59	1.00

Source: Invesco Vision, as of Mar 31, 2022.
Asset class proxy: Global Treasury – Bloomberg Barclays Global Treasury, Global Investment Grade (IG) – Bloomberg Barclays Global Aggregate – Corporate, Global High Yield (HY) – Bloomberg Barclays Global High Yield, Emerging Market Local Currency (EM LC) – JP Morgan GBI-EM Global Diversified Composite, Global Equity (EQ) – MSCI ACWI.

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

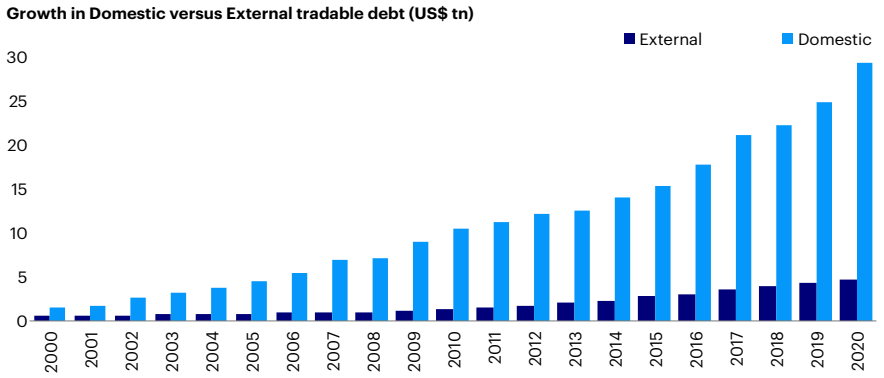
Invesco Investment Insights

In this piece, we discuss how we formulate our long-term CMA for the EM local currency sovereign debt. For various reasons listed above, this asset class is looking increasingly attractive and having such exposure could serve towards a variety of investment goals. Our CMA can help to give investors more insight into how to have the appropriate allocation to this asset class within their portfolios.

EM local currency sovereign debt as an asset class

EM debt markets have grown substantially, so much so that investors can no longer afford to ignore this asset class. It measured USD $35 trillion in market size as of 2020. In 2020, local currency debt made up around 86% of the total emerging markets tradable debt universe. [ii]

Figure 2 – EM debt markets have grown at a rate of 15% per year since 2000

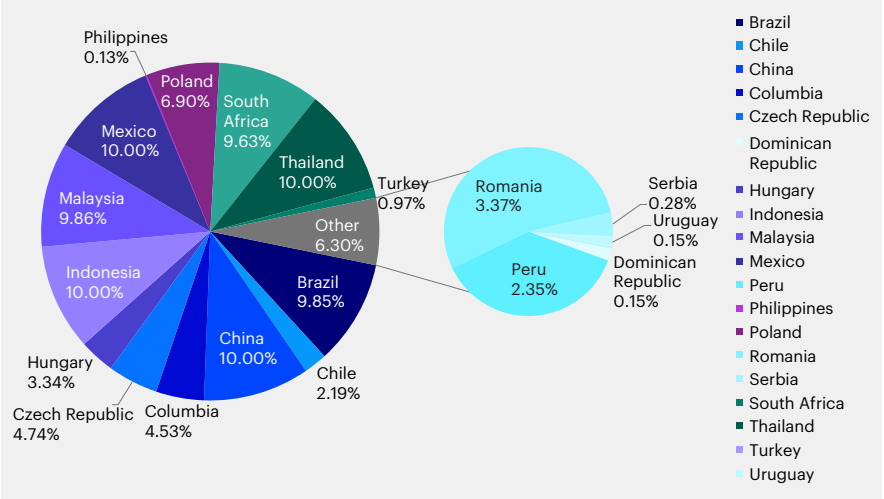


Source: BofA Global Research, BIS. Data as of June 2021.
Note: External refers to EM debt that is issued externally and is governed by the laws of a foreign country. It is denominated in foreign currency, primarily US dollars and Euros. Domestic debt refers to EM debt issued locally, typically denominated in local currency and governed by the local laws of the issuing country.

Hard currency EM debt is USD-based, with risks mainly stemming from movement in US rates and EM credit risk. Local currency EM debt on the other hand is sensitive to movements in local rates and currencies relative to the dollar, alongside the credit risk of underlying sovereigns.

We construct our EM local currency sovereign debt CMA using the JP Morgan GBI-EM Global Diversified Index, which is used widely as a benchmark for this asset class. The index was the first comprehensive local currency EM debt index, launched in 2005 when it was determined that EM countries' yield curves were sufficiently liquid. It contains around 20 countries from four regions including Asia, Europe, Latin America and EMEA (Europe, the Middle East, and Africa). Russia had around 7% weight in the index in December 2021 but was excluded as of Q1 2022.

Figure 3 – Countries in JP Morgan GBI-EM Global Diversified Index



Source: JP Morgan, Bloomberg and Invesco. Data as of March 2022.

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Invesco Investment Insights

Methodology

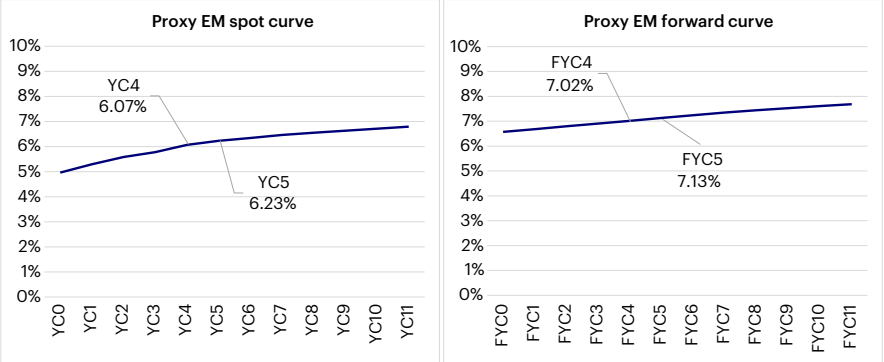
The framework for our EM local currency sovereign debt CMA utilizes a building block methodology, where we identify and isolate the individual drivers of asset class returns. Our building blocks help us to employ a "bottom-up" approach in which the underlying return drivers are used to form estimates, with estimated returns being divided into income and capital appreciation components. The income component is measured by yield, while the capital appreciation component is measured by roll return, valuation change and FX impact. Each of these building blocks are estimated as follows.

- Establish income component with the level of yield;
- Estimate capital appreciation via roll return which captures the effect of a bond moving closer to maturity as time passes;
- Estimate capital appreciation by forming valuation-change estimates based on how expensive or cheap the fixed income index currently is, and;
- Estimate capital appreciation by accounting for the impact of potential currency appreciation/depreciation.

While this framework is consistent with the approach we apply for our fixed income research globally, in constructing our EM local currency sovereign debt CMA we make systematic adjustments to reflect the idiosyncrasies of this unique asset class.

In accounting for the local characteristics, we needed to address a few major complexities. The first concerns the method by which we construct spot and forward curves. The construction of these curves is important when deriving our estimates for yield, roll return and valuation change as we will explore below. As this is a regional level CMA, we must consider the impact of each country's differing spot and forward rates, relative to the index we are modelling against. Hence, we construct proxy "EM spot and forward rates" by taking spot and forward data for all countries in the JP Morgan GBI-EM Global Diversified index and multiplying them by their respective weightings in the index. Using these EM proxy rates, polynomial interpolation is applied between the points to generate spot and forward curves.

Figure 4 – Constructed proxy EM spot and forward rates based on index weights



Source: JP Morgan, FactSet and Invesco. Data as of March 2022.
Note: YC denotes proxy EM spot yield curve and FYC denotes 10-year proxy EM forward yield curve as of March 2022. YC4 and YC5 denote proxy EM spot yields at duration of 4 years and 5 years respectively. FYC4 and FYC5 denote proxy EM forward yields at duration of 4 years and 5 years respectively.

The second complication has to do with our currency-based expected return conversion process. Our standard approach is based on interest rate parity (IRP) where the basic concept is that the future value of an asset denominated in currency X is equivalent to the foreign exchange rate-converted future value of the asset denominated in currency Y using the interest rate differentials between the two currencies. However, we found that IRP does not hold well for emerging markets, where inflation differentials are high and unpredictable. This may be due to transaction costs and political risks arising from differences in tax/tariff structures or capital-control measures (Aliber, 1973; Dooley and Isard, 1980). Long-dated FX forwards for EM currencies also tend to be less liquid than those of DM currencies and command a premium due to the volatility investors take on when having exposure to these currencies. Therefore, we construct active 10-year FX views based on longer term structural drivers of currency valuations for each country in the index and use these to convert our expected returns into USD terms.

For several countries in the index with low weightings (such as Romania and Serbia at approximately 5%), we have excluded them and normalized the weights of the remaining countries in the index due to data availability issues.

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Invesco Investment Insights

Income component: Yield

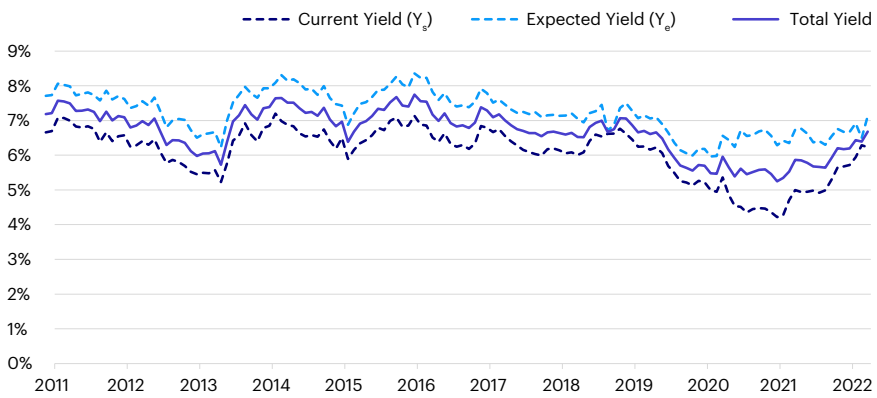
First, the income component is established by calculating the level of yield. This reflects an estimation of the average income to be received when holding a fixed-income security until maturity. For the purpose of our CMA, yield is calculated using the average of starting (current) and ending (estimated) yield levels. In following our global methodology to get ending yield levels, we examine how the current yield curves change over time as a result of two factors. The first factor is a change in government interest rates, which has the potential to affect the position and shape of the future yield curve in terms of its level and slope relative to the starting (current) yield curve (Litterman and Scheinkman, 1991). The second factor involves movement in credit spreads, which historically have exhibited mean-reverting properties (Prigent et al., 2001). In this case however, we assume there is no credit spread since we are modelling against a sovereign index. Thus, future yield is determined solely as a function of the starting yield and expected changes in interest rates.

$$Y_e = Y_s + \Delta Y_{TSY}$$

Y_s = *starting yield*
Y_e = *ending yield*
ΔY_{TSY} = *changes in government interest rates*

Using the proxy spot and forward curves we construct based on the JP Morgan GBI-EM Global Diversified Index country weights, we take the difference in yields at a specific duration between the current and estimated future yield curves. This difference is summed with the current yield to maturity of the index to get an ending yield.

Figure 5 – Total yield is determined as the average of starting yield (Y_s) and expected yield (Y_e)



Source: JP Morgan, Bloomberg, and Invesco. Data as of March 2022. Performance, whether actual or stimulated, does not guarantee future results.

Capital appreciation component:

The capital appreciation component is then estimated by looking at roll return, valuation change, and FX impact.

Roll Return

Roll return reflects the impact of movement along the curve on the return of a fixed income security. It looks at the impact on price assuming all else being equal (yield curve does not shift) as the bond nears maturity. As with our yield computation, we take an average of starting and future roll to obtain the CMA roll return.

$$Roll\ Return = -(t\text{-}1)*\Delta Y$$

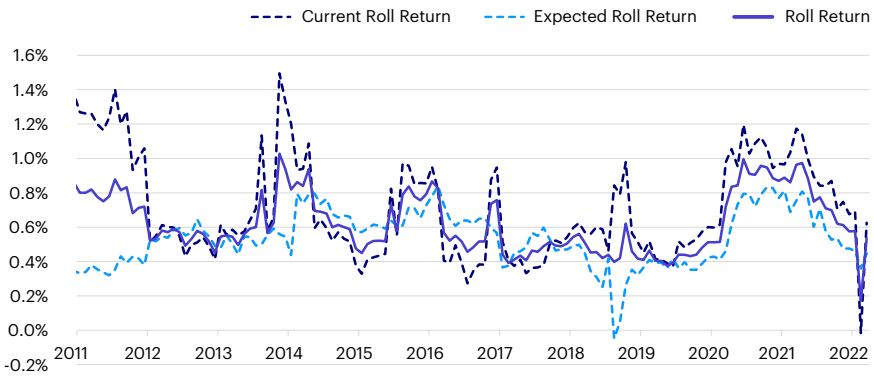
t = *maturity*
ΔY = *interest rate differential between t and t-1*

We find that in some EM countries such as Turkey, the yield curves are inverted at certain time periods. This leads to a negative roll from these countries. However, they have a small weighting in the index and on aggregate the roll return for EM is positive over time as shown below.

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Invesco Investment Insights

Figure 6 – Total roll return is the average of current and future roll return



Source: JP Morgan, Bloomberg, and Invesco. Data as of March 2022. Performance, whether actual or stimulated, does not guarantee future results.

Valuation Change

In the yield building block outlined earlier, we explored how changing interest rates impact income. Valuation change explores the same dynamic but instead looks at the impact on price. In this way, valuation change reflects the capital appreciation or depreciation from the movement of the yield curve itself (instead of along the curve in roll return). Since the forward curve is typically above the spot curve when the yield curve is upward sloping, valuation change tends to have a negative impact.

$$Valuation\ Change = 1-[1-t*(Y_e-Y_s)]^{1/10}-1$$

t = *maturity*
Y_e = *ending yield*
Y_s = *starting yield*

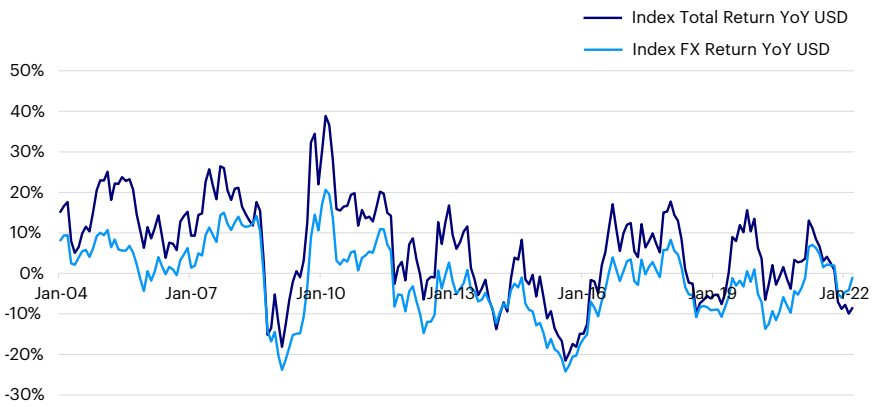
Credit Loss

Documenting sovereigns which have defaulted, the time frame of said defaults and amounts of debt can be challenging (Cruces and Trebesch, 2011). This is especially true for local currency defaults which are often not acknowledged as such by the governments involved. Further, governments are able to service their local currency debt obligations by printing money in turn reducing the real burden of debt through inflation. Extreme examples include Hungary post World War II and Venezuela more recently. Therefore, we assume no credit loss when we come up with our Capital Market Assumption for EM local currency sovereign debt. In the following section we cover how we take care of any potential loss (or gains) due to FX impact.

FX Impact

Currency fluctuations explain significant portion of the volatility in EM local debt returns, therefore representing a dominant driver of performance in the asset class **(Figure 7).**

Figure 7 – FX can be a significant driver of EM LC total returns



Source: JP Morgan, Bloomberg, and Invesco. Data as of March 2022. Performance, whether actual or stimulated, does not guarantee future results.

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Invesco Investment Insights

As discussed earlier, interest rate parity is not an appropriate valuation methodology for EM currencies. Instead, we estimate long-term EM currency returns using a macro-based valuation methodology that better captures the influence of fundamental drivers of currency performance.

Simple valuation methodologies such as relative or absolute purchasing power parity (PPP) work well within developed markets, as these economies have largely converged to a similar development stage and tend to experience similar level of inflation rates. However, emerging market economies present major structural differences relative to developed markets, as well as being quite different from one another, requiring the inclusion of additional economic factors to explain currency performance over the long-term.

We use a regression model based on absolute PPP (purchasing power parity) ratio, productivity, trade openness and long-term inflation expectations. Academic and industry research provides ample evidence of the fundamental and empirical links between currency valuations and these structural economic drivers. [iii] We use the following model to estimate this across all EM currencies:

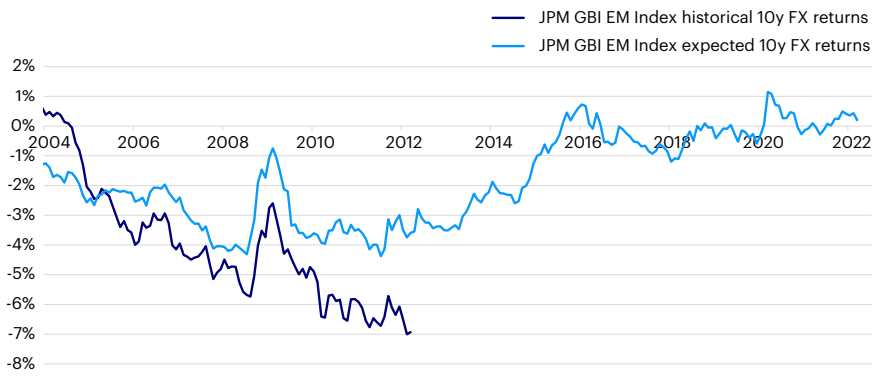
$$EM\ FX/USD = f(PPP\ ratio, productivity, trade\ openness, inflation\ expectations)$$

In this model the variables are expressed as the ratio between the EM country and the United States. In particular:

- **PPP ratio:** Over the long-term nominal exchange rates tend to converge toward the price ratio of the same basket of goods in the two countries.
- **Productivity:** High income / high productivity countries tend to experience higher wage and price levels than low income / low productivity countries, resulting in stronger currencies. Relative productivity levels are estimated using real GDP per capita.
- **Trade openness:** More open economies, with higher import and export levels as a proportion of GDP, tend to have weaker currencies.
- **Inflation expectations:** Countries with higher long-term inflation expectations tend to have weaker currencies, as nominal currency depreciation offsets higher inflation.

After estimating deviations from fair value for each EM currency, we assume a 10-year reversion to fair value, consistent with average historical patterns across our currency universe, and derive annualized expected returns over 10-years. In Figure 8 we plot aggregate index-weighted EM FX expected returns versus realized index-weighted EM FX returns. Historically, our long-term FX return forecasts have been reasonably accurate in capturing fluctuations in realized returns. In addition, our forecasts were within a +/-2% range versus realized returns in 90% of the sample, and within a +/-3% range in 100% of the sample.

Figure 8 – Macro based model good predictor of long-term FX returns



Source: JP Morgan, Bloomberg, and Invesco. Data as of March 2022. Performance, whether actual or stimulated, does not guarantee future results.

As we see in the graph above our long-term return forecast is reasonably accurate. We perform some statistical testing of our forecasts against historical realized forward returns to examine the robustness of our model and find that our regressions are effective and accurate both in terms of direction and level.

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Invesco Investment Insights

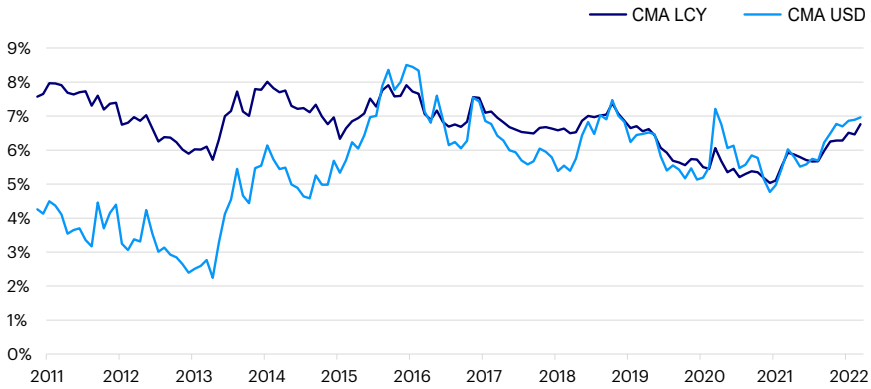
Asset Allocation Impact

In this research we have covered Invesco Investment Solutions' methodology behind deriving long-term expected returns for the EM local currency sovereign debt asset class.

03/31/2022	Yield	Roll Return	Valuation Change	Forecasted 10Y Return (LCY)	Macro FX Model	Forecasted 10Y Return (USD)
EM Local Currency Sovereign Debt	6.68%	0.54%	-0.46%	6.76%	0.20%	6.96%

Source: Invesco, as of March 2022.
These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. These estimates reflect the views of the authors, the views of other investment teams at Invesco may differ from those presented here. "EM Local Currency Sovereign Debt" is based on the JP Morgan GBI-EM Global Diversified Index.

Figure 9 – Invesco's Capital Market Assumption for EM Local Currency Sovereign Debt



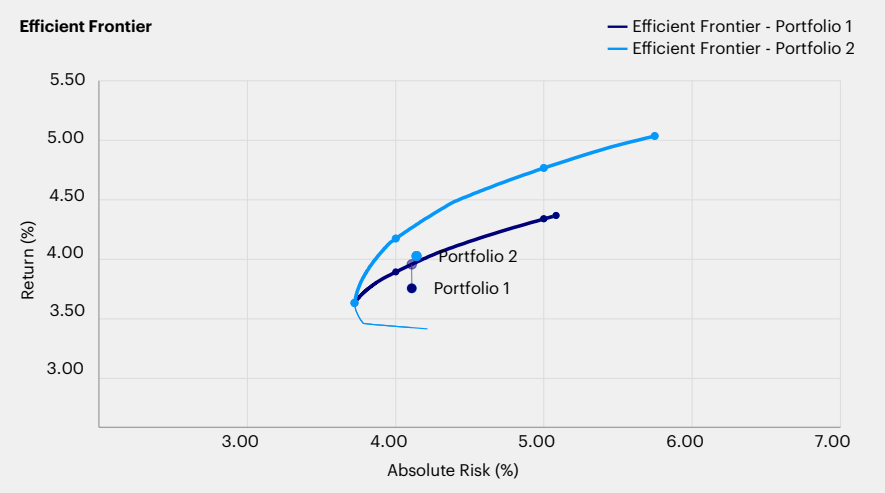
Source: JP Morgan, Bloomberg, and Invesco. Data as of March 2022. Performance, whether actual or stimulated, does not guarantee future results.

Putting this in the context of asset allocation, EM local currency sovereign debt provides meaningful diversification benefits compared to USD-denominated EM debt. We can illustrate this benefit using a simple example by leveraging our proprietary portfolio research and analytics platform Invesco Vision. We can start with the assumption that we have a 100% USD-based portfolio with three asset classes, i.e., 50% in US Aggregate, 20% US High Yield, and 30% in USD-denominated EM debt **(Figure 10)**. From a forward-looking perspective, based on our latest CMA as of March 2022, this portfolio has an expected return of around 3.70%. If we re-allocate 10% of the USD EM debt exposure to EM local currency sovereign debt to form a second portfolio as shown in the below chart, we see that this portfolio has a similar level of risk but the expected return has increased to 3.98% due to diversification effects.

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Invesco Investment Insights

Figure 10. Efficient frontier illustration with/without EM local currency sovereign debt



For illustrative purposes only. Performance, whether actual or stimulated, does not guarantee future results.

Additionally, as shown on the chart, by adding EM local currency sovereign debt in this example, the efficient frontier has been expanded upward, suggesting the potential for allocations with higher risk-adjusted returns.

Conclusion

In this paper we try to come up with long term return expectations for EM local currency sovereign debt based on Invesco's building block approach for Capital Market Assumptions. For FX conversion we use a macro-FX model that is based on purchasing power parity, productivity, trade openness, and inflation expectations, as we believe this approach is more appropriate for analyzing this asset class. As shown in this paper, we believe EM local currency sovereign debt can offer significant diversification benefits for certain portfolios potentially leading to higher expected returns for the same level of risk.

References

[i] World Economic Outlook database, April 2022, International Monetary Fund

[ii] The Emerging Markets Debt Primer, 2021 Edition, June 2021, BofAML Research

[iii] Menkhoff, L., Lucio Sarno, Maik Schmeling, Andreas Schrimpf, 2017, "Currency Value", The Review of Financial Studies, Volume 30, Issue 2, February 2017, Pages 416-441.

Taylor, Alan M., 2002, "A Century of Purchasing Power Parity", The Review of Economics and Statistics, Volume 84, No.1, February 2002, pp. 139-150.

Li, Xiangming 2003, "Trade Liberalization and Real Exchange Rate Movement", IMF Working Paper 03/124, International Monetary Fund

Contact Us

Christopher Hamilton
Head of Client Solutions APAC ex-Japan
Christopher.hamilton@invesco.com

Shu Irikura
Head of Japan Client Solutions
Shu.irikura@invesco.com

Mark Humphreys
Head of EMEA Client Solutions
Mark.humphreys@invesco.com

Capital Market Assumptions (CMA): Emerging Market Local Currency Sovereign Debt Methodology

Invesco Investment Insights

Investment Risks
The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.

Invesco Investment Solutions develops CMAs that provide long-term estimates for the behavior of major asset classes globally. The team is dedicated to designing outcome-oriented, multi-asset portfolios that meet the specific goals of investors.

The assumptions, which are based on 5- and 10-year investment time horizons, are intended to guide these strategic asset class allocations. For each selected asset class, we develop assumptions for estimated return, estimated standard deviation of return (volatility), and estimated correlation with other asset classes. This information is not intended as a recommendation to invest in a specific asset class or strategy, or as a promise of future performance. Estimated returns are subject to uncertainty and error, and can be conditional on economic scenarios. In the event a particular scenario comes to pass, actual returns could be significantly higher or lower than these estimates.