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Research Briefing | Global

EM currencies – Know your beta

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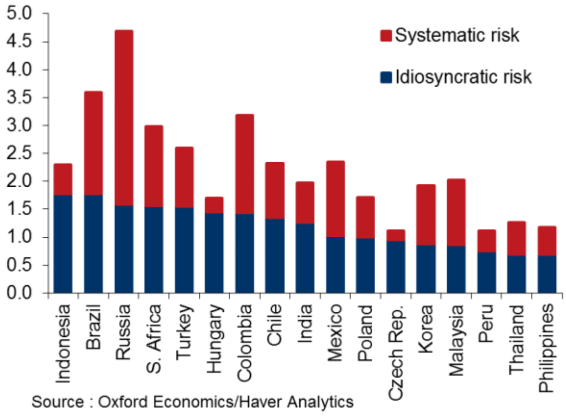
- **Emerging market currencies have become more volatile since the global financial crisis, stoked by an increased sensitivity to a number of global risk factors such as stocks, bonds, commodities and the VIX uncertainty gauge. Our analysis of these risk factors highlights opportunities to minimise currency risk through carefully diversified portfolios.**
- Our in-depth analysis of how different emerging market (EM) currencies react to these global risk factors shows the perils of simplistic characterizations of currency risk and of engaging in certain hedging strategies which are unlikely to offset their impact.
- To get a more nuanced picture, we estimate each EM currency's "factor beta", or its sensitivity to the common risk factors which we have previously identified as being relevant in the post-GFC period. The betas measure the average response of a portfolio or asset to changes in the respective factors, and are instrumental in mitigating potentially unwanted exposures and in building hedged portfolios.
- Our factor beta estimates could enable investors to build exposure to EM assets while minimizing risk from a factor that may be of concern. Our results show that the Turkish lira or the South African rand for example, are most affected by increases in US rates. Latin American currencies, on the other hand, are generally more sensitive than those in Asia, with India, Philippines, and Thailand being essentially immune to such risk factors.
- The Russian rouble and Colombian peso are most vulnerable to risk-off events (i.e., increases in VIX). In addition to the Chilean peso and the South African rand, these currencies are also the most vulnerable to commodity price changes. Emerging European countries, however, have the highest degree of insulation from global risks.

The sensitivity of currencies to global risk factors varies widely across EM countries, but there is also large variation among EMs within each risk factor

EM currencies risk profile



Source : Oxford Economics/Haver Analytics

On average, global factors account for about half of EM currency volatility (measured by standard deviation). This means that around half of EM risk can be considered as being "systematic" in nature, with the remaining half being attributed to "idiosyncratic" factors.

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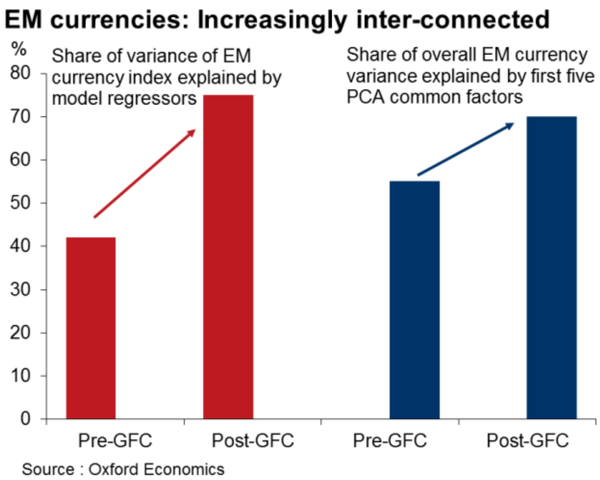
Since the global financial crisis, EM currencies have become considerably more plugged into global financial conditions

As we documented in the first part of our series on EM currencies, these have become a lot more plugged into global financial conditions and the attendant risks since the GFC. More precisely, our modeling work showed that five global factors account for more than 75% of the variance and volatility in our EM currency index since the GFC. Also, the influence of these factors has more than doubled since the pre-crisis period, which, in addition to shifting EM currency risks (which we explored in our second note) imply a very different investment context for the asset class. We extend our analysis in this note, and examine the sensitivities of individual EM currencies' risk to these global factors.

Chart 1



Since the GFC, our EM currency index has become more correlated with developments in global markets. Five variables are particularly relevant: a dollar index against G-3 currencies, VIX, 10-yr interest rates, commodities, and stock market returns. Before the GFC, only VIX and the dollar index had statistically signfiicant associations with EM FX.

To get a more nuanced picture, we estimate each EM currency's "factor beta", or its sensitivity to those common global risk factors. The betas measure the average response of a portfolio or asset to changes in the respective factors. For example, a portfolio with an interest rate beta of 1 will tend to move down (up) by 1% in response to a 1 percentage point increase (decrease) in developed market interest rates (see the box at the end for details of this estimation). While it is common for analysts to refer to "high-beta currencies", concrete efforts to quantify betas have been marred by unreliably narrow estimations that do not control for all key risks to which emerging market currencies are tied[1].

Portfolio implications: understanding the nature of EM currency risk

Our factor beta estimates could allow investors to build exposure to EM assets while minimizing specific factor risk…

Our factor beta estimates could enable investors to build exposure to EM assets while minimizing risk from a factor that may be of concern. For example, investors worried about further increases in 10-year rates in the US, one of the key risks facing EM assets, can construct portfolios with low exposure to this risk by choosing currencies with low interest rate betas. Likewise, factor betas provide an essential input for choosing the optimal mix of risk exposure to EM currencies in multi-asset portfolios. For example, portfolios that are heavy on stock market exposure may consider pruning their exposure to the Brazilian real or Indian rupee, as these have the highest exposure to stock market developments.

Our estimates could also be useful in mitigating risk in hedging strategies. A common strategy is to take a position in an EM currency which can be hedged against price changes common to the entire asset class by taking offsetting positions in other EM

[1] A few notable exceptions are BIS Quarterly Review 1/2007 (which presents a specific case of volatility) and Aizenman et al., 2016) (which focuses on sensitivity to real variables in AM).

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currency (e.g. relative value trades or long-short currency strategies). Large differences in betas reveal that the market neutral, or arbitrage, nature of the strategy is generally elusive. It is only by carefully constructing multi-currency portfolios to achieve similar betas in long and short positions that a true market neutral position can be achieved.

...and to choose the optimal mix of risk exposure to EM currencies in multi-asset portfolios

Relative-value trades should also be informed by estimates of idiosyncratic risk. Even when a specific long-short strategy can hedge most systematic risk, this could lead to a build-up of idiosyncratic risk, which differs across currencies. For example, using the Indonesian rupiah in any long-short currency strategy carries significantly more idiosyncratic risk than using, say, the Korean won or Malaysian ringgit.

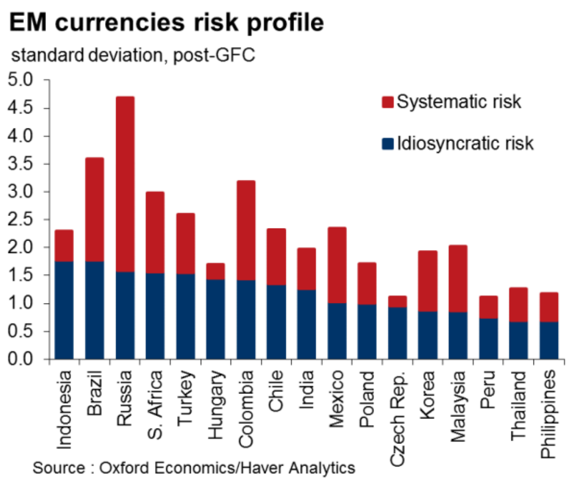
Idiosyncratic risk and factor beta estimates can help investors develop a more comprehensive understanding of each currency's risk profile. For example, given its higher variance, the Brazilian real is often considered to be riskier than its regional peers, such as the Colombian peso. But, according to our results, the peso not only exhibits a similar degree of systematic risk as the real, but also has even greater exposure to commodity prices or bouts of volatility in global markets (VIX). Adding the peso to a multi-asset portfolio would therefore increase its overall risk.

A mixed risk landscape

The bulk of differences in EM FX volatility is due to differences in systematic (non-diversifiable) risk

Although global factors have a great impact on individual currencies, there is nevertheless considerable variation across asset class. On average, these risk factors account for about half of EM currency volatility (measured by standard deviation). This means that around half of EM risk can be considered as being "systematic" in nature, with the remaining half being attributed to "idiosyncratic" factors (see Box). In general, the smaller the share of systematic risk for individual EM currencies, the lower its overall risk, and vice versa. In fact, the bulk of differences in currency risk is explained by systematic risk. For example, Colombia, Brazil, Russia, South Africa and Turkey have different absolute risk but very similar idiosyncratic risk. This implies that riskier currencies do not necessarily become more desirable in a diversified portfolio.

Chart 2



Exposure to EM currencies involves different risks, both in terms of absolute volatility but also with regards to the influence of global factors on FX volatility. The differences in absolute risk are mostly explained by differences in systematic risk.

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Table 1

The sensitivity of EM currencies to global risk factors varies widely across countries, but also within each risk factor

Table 1 shows how widely the sensitivity of currencies to global risk factors varies across EM countries, as well as the large variation among EMs within each risk factor. This is important in order to map the potential pressure points in EM currencies.

Currency betas

	10-yr rates	USD Index	S&P	VIX	Commodities
Brazil	-3.66	-0.91	0.40	-0.02	0.15
Chile	-3.03	-0.42	0.06	-0.04	0.17
China	-0.48	-0.11	0.01	0.00	0.01
Colombia	-3.28	-0.78	-0.20	-0.07	0.27
Croatia	0.41	-0.05	0.00	0.00	0.00
Czech Republic	0.47	-0.34	0.02	0.00	-0.01
Hungary	0.47	-0.34	0.02	0.00	-0.01
India	-2.31	-0.37	0.36	0.01	0.04
Indonesia	-2.97	-0.61	0.08	-0.03	0.01
Korea	-0.49	-0.70	0.20	-0.02	0.06
Malaysia	-3.99	-0.46	0.19	-0.03	0.10
Mexico	-2.88	-0.22	0.29	-0.03	0.16
Peru	-1.93	-0.10	0.09	0.00	0.07
Philippines	-2.82	-0.19	0.16	-0.01	0.05
Poland	0.08	-0.37	0.13	-0.03	-0.01
Romania	-1.07	0.14	-0.01	-0.02	0.04
Russia	-1.81	-0.88	-0.22	-0.08	0.45
South Africa	-4.49	-0.59	0.24	-0.04	0.17
Thailand	-0.01	-0.60	0.03	0.00	-0.02
Turkey	-4.54	-0.48	0.29	-0.03	0.07
Australia	***-2.02***	***-0.91***	***0.21***	***-0.04***	***0.07***

The estimates for US 10-year interest rate betas reveal that some EM currencies seem relatively immune to movements in US rates. This is especially the case for currencies in Emerging Europe and a few in Asia, such as the Korean won and Thai baht. At the other end of the spectrum some currencies are quite sensitive to movements in US long rates, mainly the Turkish lira, South African rand, Malaysian ringgit, Brazilian real and the Colombian peso. For these currencies, a percentage point increase in 10-year US bond yields causes, all else equal, a depreciation of 4% on average.

The average current account deficit in EMs is statistically significant in explaining differences in betas

The large difference in interest rate betas stems mainly from external macroeconomic vulnerabilities. For example, Chart 3 shows that the average current account deficit during the post-crisis period has is statistically significant in explaining differences in betas[2]. Hence, while currency movements can increasingly be explained by external shocks, domestic fundamentals are still capable of amplifying or dampening their effect.

[2] The chart excludes Malaysia, which, with a massive current account surplus, makes it an outlier.

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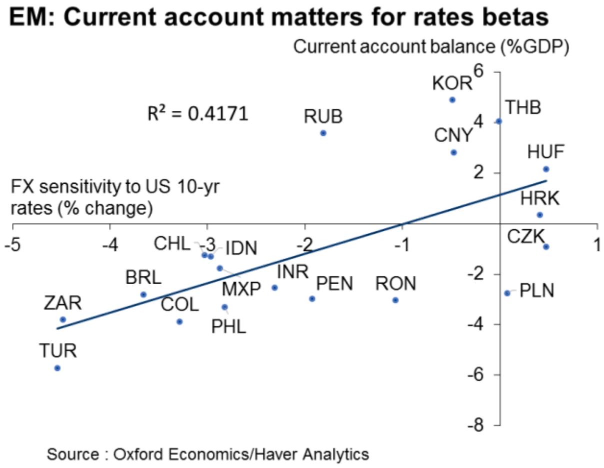
Chart 3



Currencies' sensitivities to changes in US rates differ greatly across countries. These differences can be explained, to some extent, by differences in the average current account deficit post-GFC. Technical factors such as liquidity and the size of foreign exchange and stock markets also play a significant role.

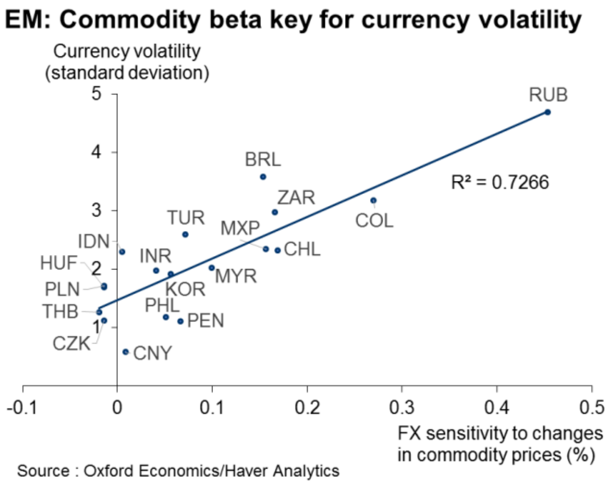
Liquidity and the size of foreign exchange and stock markets also have a material influence in explaining EM FX variation

Technical factors such as liquidity and the size of foreign exchange and stock markets also have a material influence in explaining the variation in EM currencies' interest rate betas. We find that stock market capitalization as a share of GDP is statistically significant in explaining rates beta. Such a link, however, is not significant for overall exchange market turnover, mostly because deep and liquid markets in China, Korea and Russia do not show particularly high sensitivity. In general, this result suggests that the capacity of large and liquid markets to attract non-resident investors tends to result in a stronger propagation of external shocks. However, whether that makes external shocks more relevant than macroeconomic vulnerabilities in explaining that beta variance is still a matter of debate[3].

Currency exposure to commodity prices is unsurprisingly associated with export dependence on commodities

Currency exposure to commodity prices ("commodity betas") is unsurprisingly associated with the commodity dependence of exports. Russia, and to a lesser extent South Africa, Colombia and Chile, exhibit the higher commodity betas in our sample, and have therefore been commonly referred to as "commodity currencies". And while our previous analysis showed that commodity prices do not play a particularly large role in explaining the volatility of our *overall* EM currency index (unweighted average of all EM currencies), they do seem to play the most prominent role in explaining differences in *individual* currencies' volatility.

Chart 4



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[3] The Federal Reserve's Shaghil et al. (2015) also find that both factors have helped to explain currency variations in stress episodes since the crisis, but fundamentals relatively more so. By contrast, others such as Eichengreen and Gupta (2015) find that only market size has been relevant in explaining how behavior differs across countries in stress episodes, such as taper tantrums.

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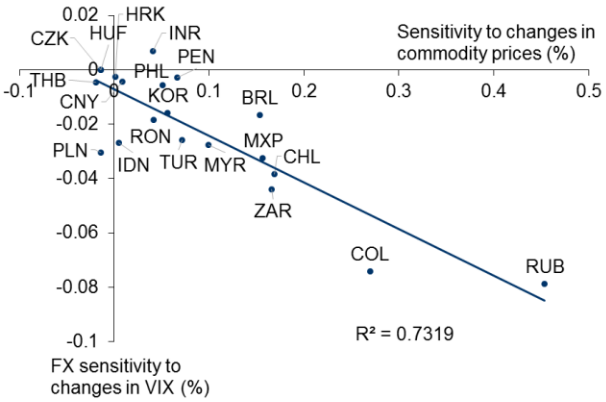
We find that "VIX betas" are highly correlated with commodity betas, and in turn, to overall currency risk

We find that "VIX betas" are highly correlated with commodity betas, and in turn, with overall currency risk. This suggests that the higher-risk currencies that investors sell during risk-off episodes also tend to be those with high commodity dependence. In other words, commodity currencies like Russia, Colombia, Chile and South Africa are most exposed to bouts of market volatility. At the other end of the spectrum, emerging European countries with low commodity dependence tend to be more insulated from global financial volatility, with Poland being a key exception.

Chart 5

EM: VIX and commodity betas closely linked



Source : Oxford Economics/Haver Analytics

VIX betas are highly correlated with commodity betas, suggesting that currencies that face the highest selling pressure during risk-off episodes tend to be commodity currencies. The currencies of Russia, Colombia, Chile, and, to a certain extent, South Africa appear most vulnerable to bouts of market volatility.

Sensitivity of EM FX to USD strength reflects patterns of commercial and financial integration with the US

We also find that the sensitivity of EM currencies to USD strength varies widely across countries, reflecting different patterns of commercial and financial integration with US and exposure to the dollar as a funding currency. For example, the currencies of the Philippines, Peru, Mexico, and China have low betas to USD strength, meaning that when the dollar depreciates against the euro or the yen these currencies tend to depreciate against the euro and the yen by a similar amount. On the other hand, high betas for the currencies of Brazil, Russia, and Thailand imply a higher bilateral risk paring with the USD, thus remaining relatively more stable against the euro or yen then the dollar weakens. There are a number of channels through which dollar strength impacts EM currencies, which we have explored in previous research.

Finally, the variation in these results underscores the perils of using the term "high-beta currency", which implies that there is only one beta relevant to global financial conditions. For example, the Russian rouble (and to a lesser extent the Polish zloty) does not stand out as being particularly vulnerable to developments in 10-year rates or stock market returns, but it is by far the most sensitive to investors' fear gauge (VIX).

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Estimating idiosyncratic risk and factor betas

Our estimations are based on the Arbitrage Pricing Theory (APT), which states that investment returns compensate for systematic risk (i.e., the risk that cannot be diversified). APT represents a multi-beta generalization of the Capital Asset Pricing Model (CAPM), although it does not offer guidance about which specific factors should be used. We focus on global markets which ensure exogeneity (hence more reliable estimations) as opposed to the macroeconomic variables sometimes used in this type of analysis.

Currency factor betas are derived for each currency’s natural pair from a regression using monthly data in the post-GFC period against common global financial factors and lagged variations. The global financial factors used derive from our previous research on the key determinants of our EM currency index, namely: US stock index S&P 500, VIX, benchmark 10-year bond yields, commodity prices (overall index from IMF), and dollar index against G-3 currencies (70% weight for euro, 30% for yen). We measure idiosyncratic risk as the relative size of the variance of the residuals resulting from our model vis-à-vis the variance of currency movements.

We replicated the analysis using common factors derived from principal component analysis (PCA). The results were similar in terms of the computation of systematic risk (except for Eastern European countries, which had generally higher levels, suggesting the relevance of other factors not included in the analysed variables). However, it is more difficult to interpret betas using PCA factors than using the aforementioned variables.

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