EM FX Vol Carry Portfolios

Evaluating EM FX Vol Carry portfolios; a great addition to a cross-asset risk-premia portfolio

- In this Note we evaluate the characteristics and performance of EM FX Vol Carry portfolios by looking at the liquidity, vol risk premium, and performance of the asset class. We also explore the best choice of financial instrument to harvest that risk-premium, and we look at portfolio construction techniques to enhance the returns and risk-profile of the strategy.
- We show that the vol risk premium is wide in EM FX vol, at around 1.3 vol pts in the 1M ATM space (2003-2024 average), which is around 1 vol point higher than in G10.
- The liquidity has also broadly improved in EM FX vol during the last 20 years by looking at the 30-day average of bid-ask/mid for 1M ATM vol.
- Looking at the performance of the EM FX Vol Carry portfolio (USD/EM), our benchmark strategy* would have yielded a Sharpe of around 1.2 (after costs) from 2003 to 2024 (Figure 1 and Figure 2).This performance is greatly above that of a G10 FX Vol Carry portfolio that would have yielded a Sharpe of 0 during the same time.
- Recent performance of the EM FX Vol Carry portfolio* is also shown to be impressive, achieving a Sharpe ratio of 2.1 in the period 2022-2024, and annualized returns of 22%. Further, this occurred during a time marked by rising rates/inflation, and geopolitical and macroeconomic uncertainties.
- We also show the outperformance of EM FX Vol Carry portfolios versus other risky assets, as well as the limited correlation between the two. This makes EM FX Vol Carry portfolios a great addition to a cross-asset risk-premia portfolio.
- We discuss the benefits, drawbacks, and sensitivities of using different financial instruments to harvest the EM FX vol premium. We conclude that a vanilla replication of var swaps seems the best option in practice.
- Finally, we look at different portfolio construction techniques that may be used to complement EM FX Vol Carry portfolios. We conclude that the Sharpe and risk metrics of the strategy can be enhanced using these techniques. This can increase the Sharpe of the strategy to up to 1.7.

Global Quantitative and Derivatives Strategy

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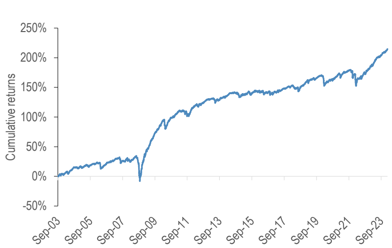
Figure 1: Performance of EM FX Vol Carry portfolio (USD)*



Source: J.P. Morgan. *10 USD/EM pairs (BRL, MXN, TRY, ZAR, PLN, HUF, KRW, CNH, SGD and RUB); short 1M 25delta strangles (delta-hedged).

Figure 2: Statistics of EM FX Vol Carry portfolio (USD)*

Return	10%
Vol	9%
Sharpe	1.2
Skewness	-4.9
Kurtosis	61.4
Max DD/vol	-4.9

Source: J.P. Morgan. *10 USD/EM pairs (BRL, MXN, TRY, ZAR, PLN, HUF, KRW, CNH, SGD and RUB); short 1M 25delta strangles (delta-hedged).

See page 16 for analyst certification and important disclosures.

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Introduction: why is shorting EM FX vol an attractive proposition?

The volatility carry risk premium arises from the empirical fact that implied volatility is on average over time above realized volatility. This observation is persistent across asset classes and products, and is a well known notion among market participants. The volatility risk premium is the result of investor's willingness to seek protection via the purchase of optionally in order to protect their portfolios and/or cashflows. They are thus willing to pay an extra premium and obtain a negative expected return in order to benefit from such protection.

This opens up the possibility of taking the opposite side of the trade by harvesting the risk premium and delivering attractive long-term returns. This has rendered short-volatility strategies a popular investment vehicles over time, both for hedge funds and, more recently, institutional investors.

For the FX asset class, a proxy portfolio of short-volatility strategies confirms the presence of a vol risk premium, although possibly tighter than for equities and other markets (Timing FX short-vol strategies, 2019, Ravagli and Duran). To benefit from this we have designed a number of strategies surrounding the notion of volatility risk premium in FX (see here). This includes short vol Global FX portfolios, signal based portfolios (such as our risk filtering approach or our nominal carry/short vol portfolios - see here), as well as portfolios that use portfolio construction techniques (Markowitz, Inverse Volatility, etc)- see here.

In this Note we explore the benefits (and also the drawbacks) of short vol portfolios using exclusively Emerging Market currencies. We look at measures of the EM volatility risk premium, at the liquidity of the EM FX options, at the performance of EM FX Vol Carry portfolios and its comparison and correlation to other assets. We also explore the financial instruments that can be used to harvest this risk premium. Lastly, we look at different portfolio construction techniques that may be used to complement the strategy.

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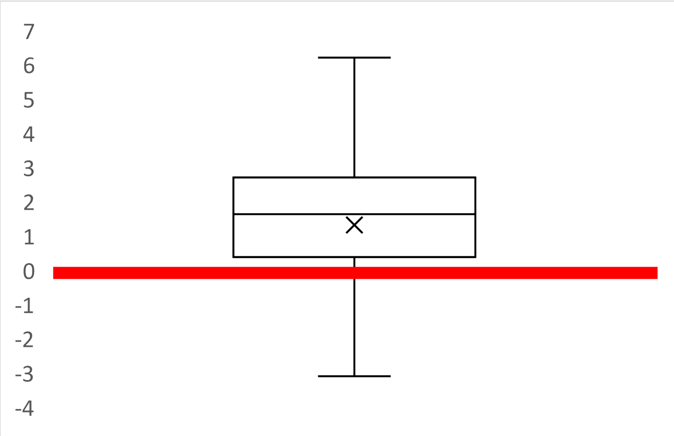
EM FX volatility risk premium and liquidity

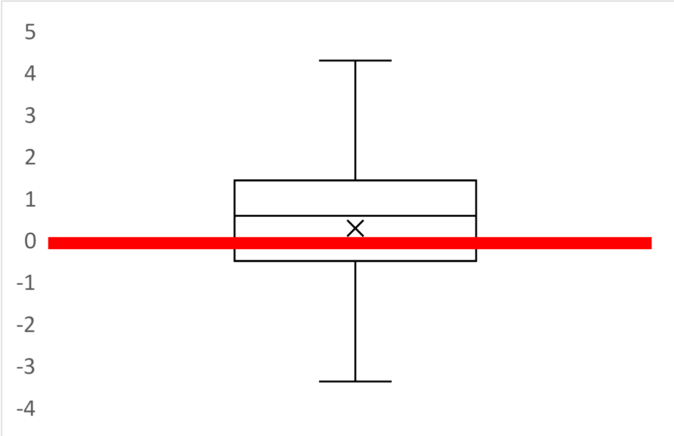
While many FX investors might be comfortable with the notion of selling volatility in G10 FX, selling volatility in EM currencies is oftentimes regarded as somewhat riskier. In this section we are going to explore the liquidity of the EM FX options market and the volatility vol premium in EM FX to better understand the asset class.

Figure 3: Box and whisker plot for 1M EM vol carry - excluding outliers (vol pts)



Source: J.P. Morgan.

Figure 4: Box and whisker plot for 1M DM vol carry - excluding outliers (vol pts)



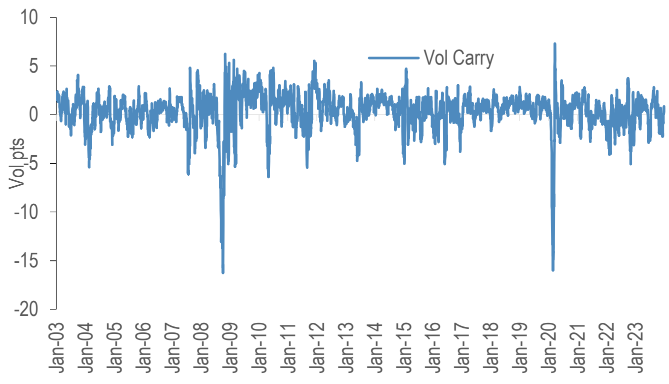
Source: J.P. Morgan

In order to evaluate the appropriateness of selling EM FX vol, one of the first things to evaluate is a measure of the volatility risk premium. That is how much lower is the ex-post realized volatility versus the ex-ante at-the-money implied vol. For that we look at the 1 month ATM implied and 1 month realized vol across EM (looking at 10 different currency pairs). We also look at the G10 currencies for comparison. As one can see in Figure 3 and Figure 4, the volatility risk premium is around 1 vol point higher in EM than in G10 (2003-2024) - on average it is 0.27 vol points in G10 and 1.32 vol pts in EM. Further, in EM even the 25th percentile is above zero vol points while it is below zero in G10.

However, even though on average the volatility risk premium is wide in EM FX, there has been a number of episodes in the last 20 years where this vol carry has turned to be significantly negative (see GFC, Euro crisis, Covid or the Ukraine-Russia war onset) - Figure 5. In later sections we will explore how this would have affected the performance of a EM FX Vol Carry portfolio versus the drawdowns suffered by other asset classes.

Figure 5: Vol Carry in EM over time

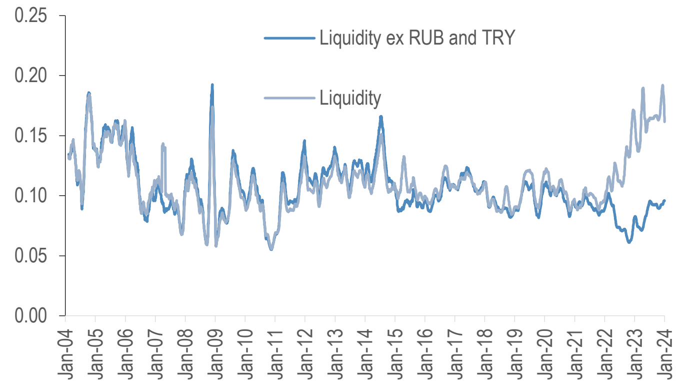
1M Vol Carry in EM FX for 10 currencies pairs



Source: J.P. Morgan

Figure 6: Liquidity in EMFX Vol has improved over time

30 day average of bid-ask/mid for 1M ATM vol (y-axis) for 10 EMFX vol pairs with and without including RUB and TRY



Source: J.P. Morgan, Bloomberg Finance L.P.

Another important factor that investors might consider when approaching EM FX Vol Carry strategies is the liquidity of the asset class. Traditionally associated with wide bid/ask spreads, we have seen the liquidity improving over the last 20 years (see Figure 6). This is extremely beneficial, as not only you pay tighter costs at inception, so you expect to have a higher PnL at Expiry, you can also unwind the position more easily in case a large market downturn makes it necessary.

However, there are two notable exceptions to this improved liquidity - RUB and TRY. In those currencies, because of idiosyncratic factors at play (Ukraine-Russia geopolitical conflict, Türkiye inflationary crisis) we have seen the liquidity substantially worsen there, bringing the EM FX average with them. However, as we will see in next sections there are ways around this issue when it comes to portfolio construction. Finally, the fact that the vol risk premium is wide enough in EM FX vol, and the liquidity has (broadly) improved encourages us to explore further the performance of the asset class.

Performance of EM FX Vol Carry portfolios

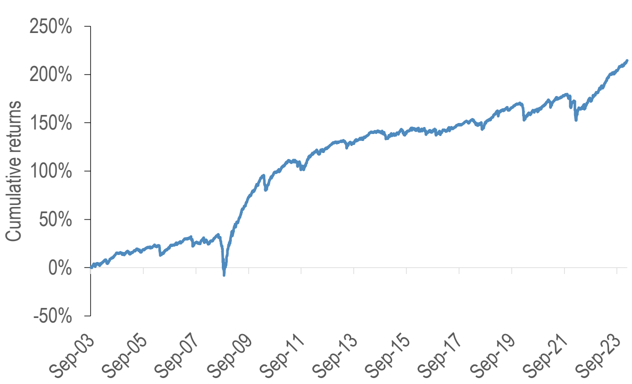
In this section we look at the performance of the EM FX Vol Carry portfolios and its comparison to G10 FX Vol Carry portfolios and other assets. The portfolios are configured in the same way the benchmark is configured in the original note that contemplates Global FX short vol portfolios (see here).

That is, we rely on 1M 25delta strangles (delta-hedged) as the benchmark short-volatility strategy. On a daily basis, we cumulate positions by entering a new trade, keep in the book until expiry: notionals are chosen as to ensure that options have the same Vega at inception. 1M options were selected because they offer a wide vol premium, good liquidity and the possibility of granting a reactive rebalancing. 25delta strangles were selected given the liquidity of the strike and the exposure to the vol-of-vol risk premium versus ATM straddles, see following section for more details on this. Generally, one would expect different implementations to lead to similar results, but there is going to be a certain level of PnL dispersion as a result for the choice.

Given the wider liquidity found on the OTC space for the FX market, all FX options backtests herein presented refer to J.P. Morgan internal pricing system. We monitor a set of the 18 most liquid US dollar pairs, 9 G10 and 10 EM (BRL, MXN, TRY, ZAR, PLN, HUF, KRW, CNH, SGD and RUB). All starting dates for the backtests herein presented refer to 2003, with the exceptions of TRY (2005) and CNH (2011). Final date for all backtests is February 2024. Costs are included hereafter in all backtests unless stated otherwise. The universe of currencies considered is kept constant unless stated otherwise. The performance of the portfolios is shown in the timeseries charts hereafter as cumulative returns (%), by executing a cumulative sum across time axis, indexed at zero at inception. Portfolios hereafter are constructed using USD pairs unless stated otherwise.

First of all, in Figure 7and Figure 8we see that in the 2003-24 period a EM FX Vol Carry portfolio (USD) (only considering the 10 EM currencies above) yielded a very satisfactory Sharpe of 1.2, with a return of over 10% per year and a volatility of 9%. Hereafter we may refer to this strategy as our “benchmark” or the “EM FX Vol Carry portfolio”, any other variation in the portfolio will be stated. By comparison - Figure 9 and Figure 10- we can see the striking difference with a G10 Vol Carry portfolio, that has returned 0% after costs over the last 20 years, while having a similar volatility. The Skewness is also comparable, while the Kurtosis is higher in EM FX than in G10 and the drawdown profile is worse for G10. All in all, this is consistent with the vol carry analysis in the previous section and highlights the essential contribution of EM FX vol to global short vol portfolios.

Figure 7: Performance of our benchmark EM FX Vol Carry portfolio (USD)



Source: J.P. Morgan.

Figure 8: Statistics of EM FX Vol Carry portfolio (USD)

		EM						
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis	Max DD	Max DD/vol
Short-vol	2003	10%	9%	1.2	-4.9	61.4	-0.4	-4.9

Source: J.P. Morgan.

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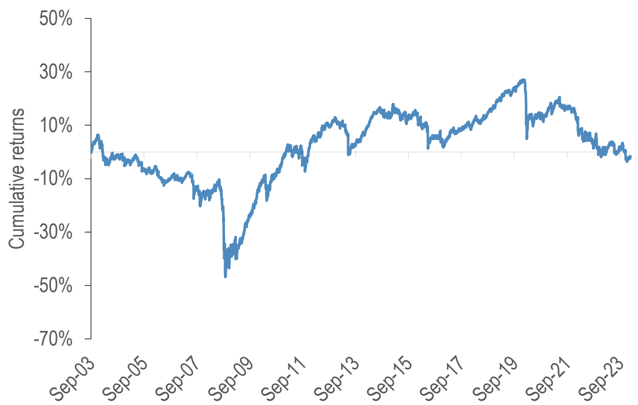
Figure 9: Performance of G10 FX Vol Carry portfolio (USD)



Source: J.P. Morgan

Figure 10: Statistics of G10 FX Vol Carry portfolio (USD)

		G10						
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis	Max DD	Max DD/vol
Short-vol	2003	0%	9%	0.0	-4.5	49.4	-0.5	-6.2

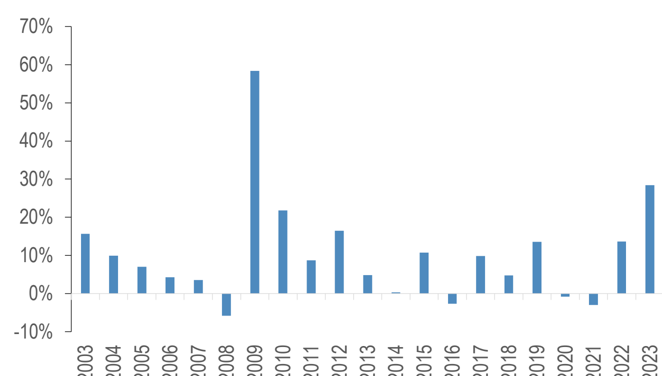
Source: J.P. Morgan.

If we look more closely at the breakdown of performance by currency and year (Figure 11 and Figure 12) for a EM FX Vol Carry portfolio, we can observe several things. First, the performance has concentrated around strong returns shortly after the global financial crisis in 2009, as well as a strong performance in 2022-2024 - see performance during the latter time period in Figure 13 and Figure 14. Indeed, the recent performance of a EM FX Vol Carry portfolio achieved a Sharpe ratio of 2.1 in the period 2022-2024, and annualized returns of 22%. This occurred during a time marked by rising rates/inflation, and geopolitical and macroeconomic uncertainties.

The common factor in 2009 and during 2022-2024 time period is the compression in vol carry risk premium after a prior repricing higher by a market shock (GFC in 2008 and Covid / inflation shocks in 2020 and 2022).

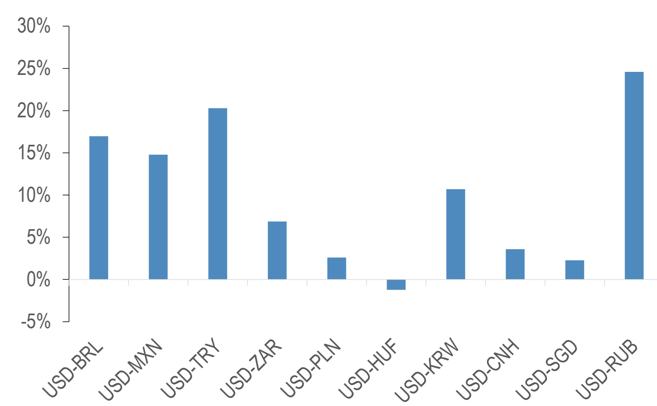
It is also important to note that over the last 21 years the returns have been positive for 17 years and only negative for 4 years. In the currency space, we note that the performance also concentrates strongly around high yielders such as RUB, TRY, BRL and MXN, while the strategy does poorly in low yielders such as SGD or CNH.

Figure 11: Breakdown of returns of the EM FX Vol Carry portfolio (USD) by year



Source: J.P. Morgan.

Figure 12: Breakdown of returns of the EM FX Vol Carry portfolio (USD) by currency



Source: J.P. Morgan.

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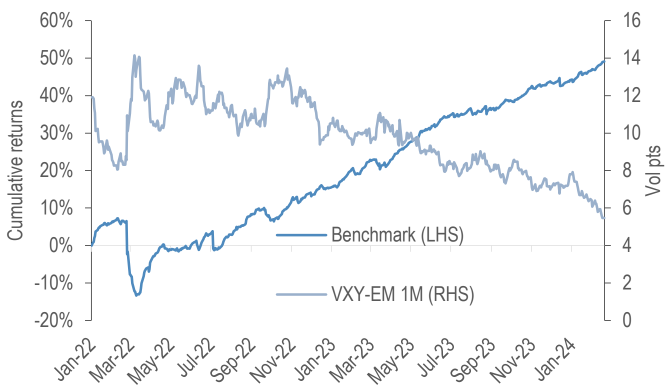
Figure 13: EM FX Vol Carry portfolio (USD) - latest performance (2022-2024)



Source: J.P. Morgan

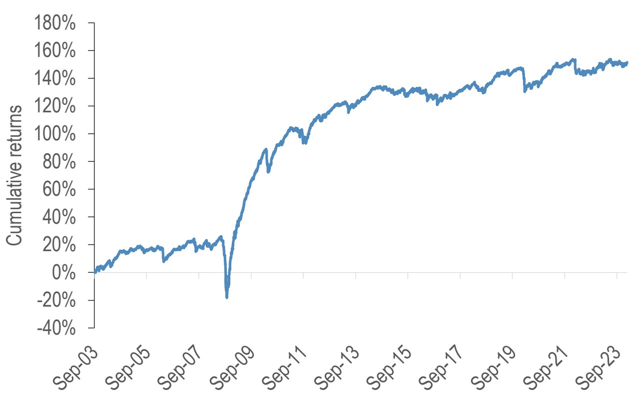
Figure 14: EM FX Vol Carry portfolio (USD) - latest performance statistics (2022-2024)

		Statistics by Asset				
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis
EM short Vol	2022	22%	10%	2.1	-7.0	81.0

Source: J.P. Morgan

The results in Figure 12 highlight the reliance of the strategy on several currencies, and in particular on RUB and TRY. This is worrying given the lack of liquidity in these two currencies lately, as highlighted on the previous section. In order to tackle this issue we explore the performance of the strategy excluding these two currencies, see Figure 15 and Figure 16. The performance goes down from a Sharpe of 1.2 to a Sharpe of 0.9, while the returns go down from 10% to 7%. However, the volatility, skewness and kurtosis of the portfolio measures improve, this is not so however for the drawdown measures, which worsen.

Figure 15: Performance of EM FX Vol Carry portfolio (USD) ex RUB and TRY



Source: J.P. Morgan.

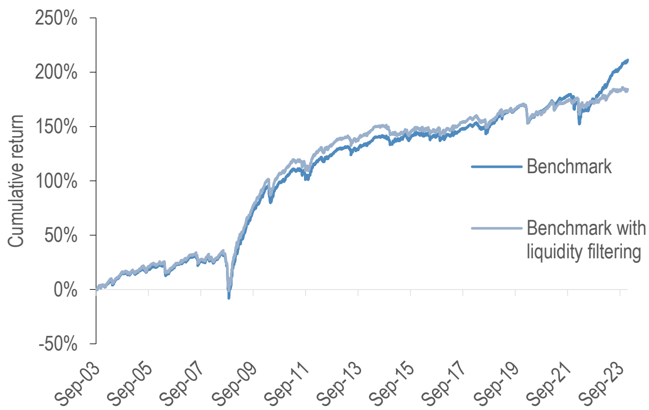
Figure 16: Statistics of EM FX Vol Carry portfolio (USD) ex RUB and TRY

		EM ex RUB and TRY						
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis	Max DD	Max DD/vol
Short-vol	2003	7%	8%	0.9	-3.3	37.8	-0.4	-5.5

Source: J.P. Morgan.

However, excluding the RUB and TRY altogether from the portfolio is too conservative, as the currencies in question have been perfectly liquid for long time periods over the past 21 years. For that reason, we create a liquidity filter which allows a more realistic performance assessment by excluding trades in currencies when liquidity is thin. To be precise, the liquidity is assessed by looking at the bid-ask/mid for 1M ATM vol for the 10 EM FX vol pairs. We take the average 90th percentile worse liquidity metric over the last 20 years for each currency, and we then average the metric over all currencies, if the liquidity is worse for a given day and currency than this final metric then the currency in question is excluded - i.e a trade is not entered for the day in question.

Figure 17: Performance of EM FX Vol Carry portfolio (USD) with and without liquidity filtering



Source: J.P. Morgan.

Figure 18: Statistics of EM FX Vol Carry portfolio (USD) with and without liquidity filtering

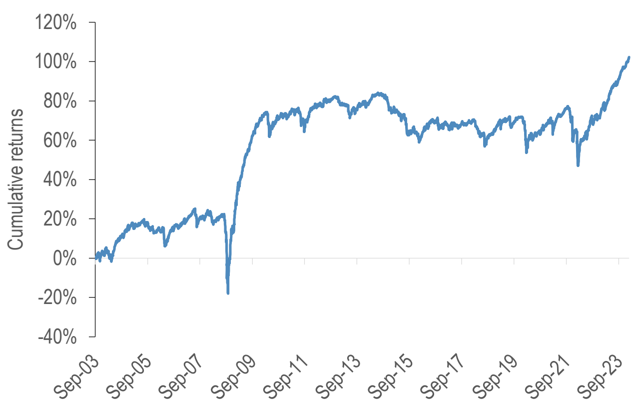
		EM						
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis	Max DD	Max DD/vol
Short-vol	2003	10%	9%	1.2	-4.9	61.4	-0.4	-4.9

		EM with Liquidity Filter						
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis	Max DD	Max DD/vol
Short-vol	2003	9%	8%	1.1	-3.5	38.8	-0.4	-4.5

Source: J.P. Morgan.

As we can see above (Figure 17and Figure 18), the annualized returns decrease from 10% to 9% after the liquidity filtering, as does the Sharpe ratio that goes from 1.2 to 1.1. By contrast, the volatility, skewness, kurtosis and drawdown metrics improve. This means that the liquidity filtering makes potentially for a more realistic representation of a EM FX Vol Carry portfolio and that avoiding currencies with no liquidity is also beneficial for some aspects of the risk profile of the portfolio, much like risk filtering. However, please note that there is a certain degree of backward looking bias in the filtering procedure as the liquidity threshold is calculated over the entire 20 year period.

Figure 19: Performance of EM FX Vol Carry portfolio (EUR)



Source: J.P. Morgan.

Figure 20: Statistics of EM FX Vol Carry portfolio (EUR)

		EUR/EM						
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis	Max DD	Max DD/vol
Short-vol	2003	5%	9%	0.6	-4.1	63.9	-0.4	-5.0

Source: J.P. Morgan.

For the sake of completion, we also look at the performance of the EUR-EM FX Vol Carry portfolio (Figure 19 and Figure 20). The portfolio is constructed in the same way as in the USD format but using EUR-crosses instead. In the 2003-24 period, the portfolio has yielded a Sharpe of 0.6 after costs versus 1.2 is its USD format. This is mainly due to a very underwhelming return performance during the 2010-2021 period, in which the strategy had a negative performance. Over the entire period, compared with the USD/EM portfolio, the annualized returns are halved while the volatility level is maintained, the rest of the metrics are comparable.

Figure 21: Correlation of daily returns of EM FX Vol Carry portfolio (USD) to other assets*

Asset	EM FX Vol Carry	G10 FX Vol Carry	FX Carry	SPX Index	GBI Local Ccy Index
EM FX Vol Carry	1.0	0.6	0.3	0.2	-0.1
G10 FX Vol Carry	0.6	1.0	0.3	0.2	-0.1
FX Carry	0.3	0.3	1.0	0.3	-0.2
SPX Index	0.2	0.2	0.3	1.0	-0.2
GBI Local CCY Index	-0.1	-0.1	-0.2	-0.2	1.0

Source: J.P. Morgan. *SPX Index and GBI Index do not consider costs

Figure 22: Comparison of performance statistics by asset*

		Statistics by Asset				
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis
EM FX Vol Carry	2003	10%	9%	1.2	-4.9	61.4
G10 FX Vol Carry	2003	0%	9%	0.0	-4.5	49.4
FX Carry	2003	8%	9%	0.9	-0.3	11.4
SPX Index	2003	9%	19%	0.5	-0.3	13.6
GBI Local CCY Index	2003	2%	3%	0.7	0.0	3.2

Source: J.P. Morgan. *SPX Index and GBI Index do not consider costs

Something else to consider when investing in EM FX Vol Carry portfolios would be its correlation to other risk assets (see Figure 21). As one can see the correlation to FX Carry is 0.3 while that to the S&P 500 index is a mere 0.2. This implies that EM FX Vol Carry portfolios would be a good asset to include in a cross-asset risk premia portfolio. It is also negatively correlated to a bond portfolio (-0.1) and has a limited correlation with a G10 FX Vol Carry portfolio (0.6).

Indeed, while some differences exist, as mentioned early, the volatility risk premium is a feature present across asset classes (see for instance Optimal option delta-hedging, 2018, Ravagli et al.), this permits a substantial reduction of risk via diversification into a cross-asset portfolios (see here). Thus, given the results in Figure 21, EM FX Vol Carry portfolios can be a great addition to these diversifying efforts.

Further, in term of returns, EM FX Vol Carry portfolios obtain higher annualized returns and risk adjusted returns than the other risk assets considered (see Figure 22). However, the skewness and kurtsosis profiles of the strategy are somewhat worse than the other risk assets considered.

What instrument to use to harvest volatility carry in EM FX?

Another important aspect to consider when approaching the harvesting of volatility carry in EM FX is what financial instruments to use for that purpose. In Figure 23and Figure 24, we empirically answer this question for a single currency (USD/BRL), using three possible instruments 25 delta strangles, ATM straddles, and variance swaps. For the 25 delta strangles, the setup is the same as the one described in the prior section (but for an individual currency). For the straddles, the setup is the same as the one described on the previous section but using ATM straddles instead of 25 delta strangles. For the variance swaps, we sell a 1-month tenor variance swap on a daily basis, and we keep it in the book until expiry, we assume transaction costs of 0.3 vol pts per trade.

As we can see in Figure 23and Figure 24, from a purely empirical point of view for BRL, the Strangle (16%) outperforms in terms of annualized returns both the Straddle (15%) and the Variance Swap (14%). In terms of volatility, the lowest volatility is that of the Straddle (16%), followed by the Strangle (17%) and the highest goes to the Var Swap (22%). The highest Sharpe is that of the Strangle (1.0) with the Straddle coming second (0.9) and the Var Swap coming last (0.6). In terms of skewness and kurtosis, the values are significantly worse for the variance swap than for the vanilla instruments, and the straddle seems to be slightly more negatively skewed and has higher kurtosis than the Strangle. Generally, one would expect different implementations to lead to similar results, but there is going to be a certain degree of PnL dispersion as a result of the choice, particularly for a single currency.

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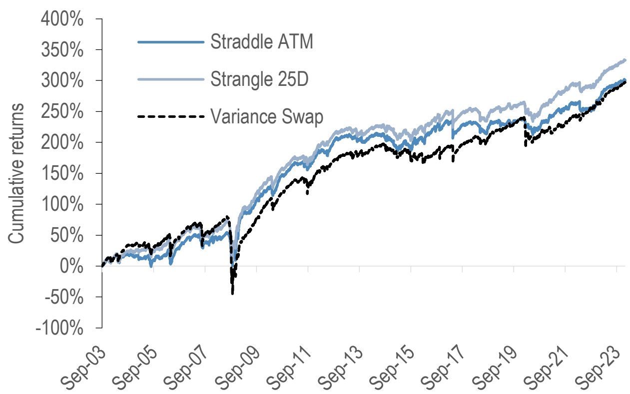
Figure 23: Performance of short vol in USD/BRL using different instruments



Source: J.P. Morgan.

Figure 24: Statistics of short vol in USD/BRL using different instruments

		Comparison of instrument				
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis
Straddle ATM	2003	15%	16%	0.9	-5.7	130.0
Strangle 25D	2003	16%	17%	1.0	-5.1	103.0
Var Swap	2003	14%	22%	0.6	-7.8	143.8

Source: J.P. Morgan.

In the back-testing above we have included 3 possible strategies for capturing the vol risk premium - although there are arguably many other formats (e.g. Vol Swaps). Indeed, there is a wide variety of ways to harvest the EM FX vol premium, and so there is a degree of arbitrariness in the choice of instrument.

The first instrument that we considered is selling 1M ATM delta-hedged straddles and keeping it in the book until expiry. It is a well know way of capturing the volatility premium, see (Linking the performance of vanilla options to the volatility premium, 2022, Daviaud et al.). Indeed the paper by Daviaud et al. shows the PnL breakdown by component for the strategy both theoretically (see Equation (4) in that paper) and empirically ("Empirical results" section in that paper).

The PnL attribution is thus broken down into a number of factors, of which, in the 1M space, the volatility premium component is the largest. In the note, the author notes that the volatility premium component of the performance is very close to the ex-post volatility premium (empirically), thus straddles have a performance component which behaves similarly to a volatility swap. There are however, other smaller contributions such as Gamma covariance effect, a dGamma term and a residual drift linked to the volatility of volatility. Also, the differences between the theory and the practical implementation yield a "Residual P&L" that can be tracked to the difference between continuous delta hedging vs daily hedges; the lack of constant interest rates in reality; and FX rate jumps.

The second instrument that we track in Figure 23and Figure 24, is the 1M 25 delta Strangle (delta-hedged). The set up is similar to the one with Straddles but using 25 delta vanillas instead of ATM vanillas. The key difference to what this implies can be found in (Trading vol-of-vol risk premium, 2021, Ravagli et al.). The piece is dedicated to strategies that scoop an extra "vol convexity" premium from volatility smiles. In that paper it is explained how the Volga Greek letter that measures an option's sensitivity to fluctuations in volatility levels, is also associated with a negative time decay. That is, there is mismatch between implied and a realized vol-of-vol, just like there is in the first order implied and realized vol.

Hence, as discussed on that paper, a wider premium can be extracted by selling short-dated Out-of-The-Money (OTM) options vs At-the-money (ATM) options. That is

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because the OTM options benefit exclusively from the volatility premium, while the ATM options have a higher expected return due to its exposure to the vol-of-vol risk premium. It is also argued that Strangles also benefit from more stable Delta, Gamma profiles, implying a lower path sensitivity for the PnL generation and a reduced impact of delta-related trading cost. (Trading vol-of-vol risk premium, 2021, Ravagli et al.).

The third and final instrument that we consider in this section are variance swaps. A variance swap is an over-the-counter exotic derivative that offers exposure to the future variance of an underlying asset. They are also convex in volatility: a long position profits more from an increase in volatility than it loses from a corresponding decrease. For this reason, variance swaps normally trade above ATM volatility. That means the fair strike of a variance swap is typically higher than that of a volatility swap, making the product attractive to volatility sellers who can sell at a higher strike. However, sellers of the instruments are exposed to greater losses if volatility surges. They are also instruments which offer investors straightforward and direct exposure to the volatility of an underlying asset without the path-dependency issues associated with delta-hedged options.

The statistical expected value of a short variance swap payoff can be approximated as:

$$E_{sta}(VarSwap) = N_{var}\left(\left(\sigma_{imp}^2 - \sigma_{sta}^2\right) + \sigma_{imp}^2 \frac{T}{2}\left(v_{imp}^2 - v_{sta}^2\right)\right) (1)$$

Where,

$Vol\ risk\ premia,\ \sigma_{imp} - \sigma_{sta}$

$Vol\ of\ vol\ risk\ premia, v_{imp} - v_{sta}$

Variance notional, N_{var}

$Time\ to\ maturity, T$

The compact formula (1) above, obtained from (Trading vol-of-vol risk premium, 2021, Ravagli et al.). shows that a variance swap is in principle exposed to both vol and vol-of-vol risk premia, and that the sensitivity on the latter rises in case of large maturity, and elevated smile convexity.

Variance Swaps are thus an attractive option to capture both the vol and vol-of-vol risk premia without the path-dependency issues associated with delta-hedged options. However, the issue in the EM FX vol space is that the liquidity and tradability of this type of instrument is scarce.

The good news is that a given the quadratic expression of the payoff, the variance swap can be the replicated through a static portfolio of vanilla options (More Than You Ever Wanted To Know About Volatility Swaps, 1999, Demeterfi et al.). In that paper it is shown that a variance swap can be theoretically replicated by a hedged portfolio of vanilla options with suitably chosen strikes, as long as prices evolve without jumps. They also derive analytic formulas for theoretical fair value in the presence of realistic volatility skews. These formulas can be used to estimate swap values as the skew changes. The authors also examine the modifications to these theoretical results in instances where certain strikes are unavailable, or when prices undergo jumps.

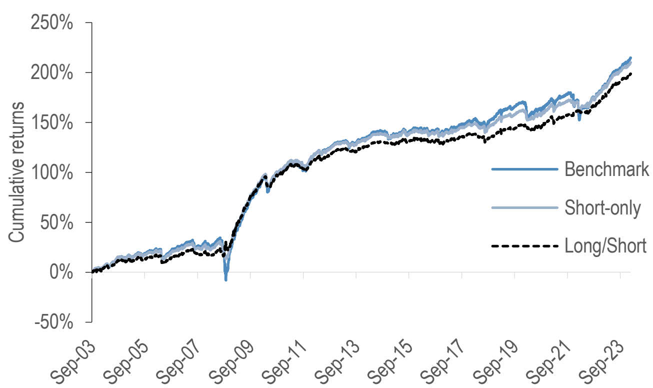
To conclude, theoretically, given the exposure to vol and vol-of-vol risk-premia and the lack of path dependency, the best instrument to use would be variance swaps - even if this is not empirically true for the single currency example above. However, given the lack of liquidity, in practice the best solution is to replicate that instrument via vanilla options. One possibility for investors that do not have the capacity to replicate the strategy themselves could be, for instance, to make use of those pre-packaged by QIS departments of investment banks.

Portfolio construction and signals

In this section we review different signals and portfolio construction techniques that may be used to complement the EM FX Vol Carry portfolios. To do so, we leverage on strategies and signals that have been shown to perform well in Global FX short vol portfolios and we apply it exclusively to EM FX.

We first look at our risk filtering approach, which was first introduced here. The model applies risk-on/off filters. This is done by monitoring cross-asset market variables, supplemented with asset-specific information that we collect from volatility surface, to adjust the allocation to the underlying assets in the portfolio. The aim is to improve the Sharpe ratio and to reduce the volatility and the drawdowns of the strategies. Full details on the calculation are contained in the original note. The strategy has been running successfully out of sample since 2019.

Figure 25: The tactical filtering approach applied to EM FX Vol Carry portfolios (USD)



Source: J.P. Morgan.

Figure 26: Statistics on the tactical filtering approach applied to EM FX Vol Carry portfolios (USD)

		EM						
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis	Max DD	Max DD/vol
Benchmark	2003	10%	9%	1.2	-4.9	61.4	-0.4	-4.9
Short-only	2003	10%	6%	1.6	-3.7	35.4	-0.2	-2.8
Long/Short	2003	9%	6%	1.7	-2.3	37.5	-0.1	-1.9

Source: J.P. Morgan.

The performance of the framework is indeed very satisfactory (see Figure 25 and Figure 26). The Sharpe ratio of the portfolio increases from 1.2 to 1.6 when filtering is applied, and even to 1.7 in a more aggressive version of the filtering that allows for long vol trades. The improvement in Sharpe ratio comes mostly from the reduction of the volatility rather than substantially higher returns. The filtering also reduces the skewness and kurtosis, and improves the drawdown profile of the strategy.

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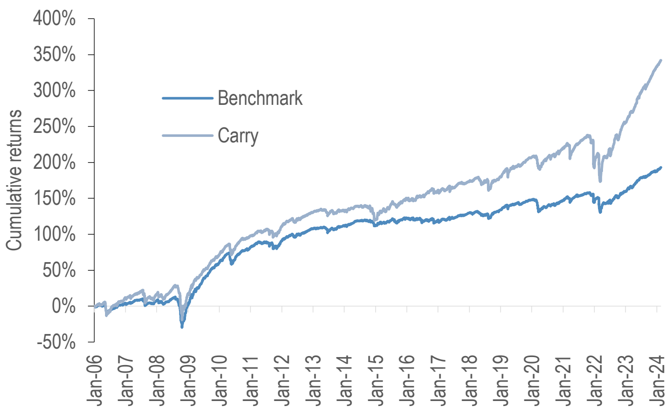
Figure 27: Nominal Carry - EM FX Vol Carry portfolio (USD)



Source: J.P. Morgan.

Figure 28: Statistics on Nominal Carry - EM FX Vol Carry portfolio (USD)

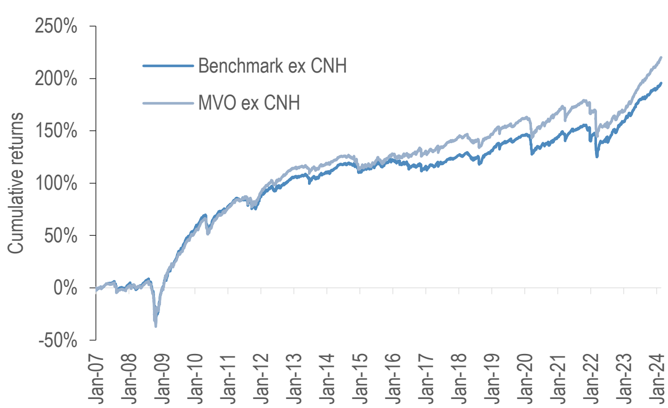
		Statistics by Strategy				
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis
Benchmark	2006	11%	9%	1.2	-4.8	57.7
Carry	2006	19%	16%	1.2	-11.6	285.5

Source: J.P. Morgan.

On a different framework that came out in 2022, we also introduced the notion of shorting vol in Global FX portfolios with a tilt towards the highest yielders (see note and methodology here). In that note we argued that such approach could lead to improvements in the returns of the strategy. Today we apply the same notion to EM FX, thus shorting only the volatility of the Top 3 nominal yielders in the EM universe considered, while keeping everything else the same. The carry signal is rebalanced on a monthly basis, thus at the start of each month you may have a different set of higher yielders. The strategy in this case starts in 2006 instead of 2003 due to data availability.

In Figure 27 and Figure 28 we can see that the “Nominal Carry - EM FX Vol Carry” portfolio does indeed increase the returns of the ‘simple’ EM FX Vol Carry portfolios from 11% to 19% per year, although the risk adjusted returns are broadly the same given the increase in volatility. However, this improvement in returns comes at the heavy price of greatly increased skewness and kurtosis. It is also true that the spectacular returns obtained by the strategy since 2020 might not be realistic given the lack of liquidity of some of the top yielders, including RUB and TRY, during that period - as discussed earlier.

Figure 29: Mean-variance optimization applied to EM FX Vol Carry portfolio (USD)



Source: J.P. Morgan.

Figure 30: Statistics on mean-variance optimization applied to EM FX Vol Carry portfolio (USD)

		Statistics by Strategy				
Strategy	Start year	Ret	Vol	Sharpe	Skewness	Kurtosis
Benchmark ex CNH	2007	11%	10%	1.1	-5.1	64.1
MVO ex CNH	2007	12%	10%	1.2	-5.2	83.2

Source: J.P. Morgan.

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Finally, in 2021 we put out a research note on Building FX Vol portfolios. There we explored a number of portfolio construction techniques for hedging and trading purposes. Among the techniques considered was a Mean-Variance Optimization (MVO) algorithm applied to short vol Global FX portfolios. There we saw the MVO technique significantly improving the performance of the strategy in terms of Sharpe ratio, mainly because the algorithm was tilting the portfolio towards EM FX vol. It is important to note that the fact that option returns distributions are non-normal implies that mean-variance optimization's assumptions are breached.

In this section we also applied the same MVO algorithm (details of the strategy in the original note) but only to the EM universe. CNH is removed from the universe and the strategy starts in 2007 due to data availability issues. As we can see in Figure 29 and Figure 30, the improvement in performance is more limited this time - most likely because the algorithm has in this case less ability to modify the portfolio given the more limited number of assets. Nonetheless, the returns of the strategy increased from 11% per year to 12% while the volatility is kept the same, thus yielding a higher Sharpe ratio. The skewness of the portfolio is kept at a similar level while the kurtosis worsens.

To conclude, as seen in this section, all of these portfolio construction techniques and signals can enhance the already attractive returns and risk profile of the EM FX Vol Carry asset class, thus making it even more attractive to a wide array of investors.

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Conclusion

In this note we have explored the benefits (and the drawbacks) of short vol portfolios using exclusively Emerging Market currencies. We first looked at measures of the EM volatility risk premium, and at the liquidity of the EM FX options. We show that the vol risk premium is wide enough in EM FX vol, and that the liquidity has broadly improved in the last 20 years.

Secondly, we examine the performance of EM FX Vol Carry portfolios and its comparison and correlation to other assets. We see that the performance of our benchmark strategy (USD/EM) would yield a Sharpe of around 1.2 (after costs) from 2003 to 2024. This performance is greatly above that of the G10 FX Vol Carry portfolio that would have yielded a Sharpe of 0 during the same time period.

Recent performance of the EM FX Vol Carry portfolio is also shown to be impressive, achieving a Sharpe ratio of 2.1 in the period 2022-2024, and annualized returns of 22%. Further, this occurred during a time marked by rising rates/inflation, and geopolitical and macroeconomic uncertainties. In that section, we also show the limited correlation and the outperformance of EM FX Vol Carry portfolios versus other risky assets. This highlights that EM FX Vol Carry asset class can be a great addition to a wider cross-asset risk-premia portfolio.

Thirdly, we also explore some of financial instruments that can be used to harvest the EM FX vol risk premium. We discuss the benefits, drawbacks, and sensitivities of using ATM straddles (delta hedged), 25D strangles (delta hedged) and variance swaps. We conclude that given the lack of liquidity in EM FX in our preferred instrument choice - variance swaps - a vanilla replication of this instrument seems the best option in practice.

Lastly, we look at different portfolio construction techniques that may be used to complement EM FX Vol Carry portfolios. We conclude that the Sharpe and risk metrics of the strategy can be enhanced using filtering, optimization and/or other market signals. This can increase the Sharpe of the strategy to up to 1.7.

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