How Much Discretion is Needed In the Hedging Process

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OVERVIEW

• The market seems to be facing substantial uncertainty

• But market pricing seems to imply a benign environment

• Why is market volatility generally so low and
  • Why is FX vol diverging in a positive direction?

• What are things to consider when structuring hedges
  • And ways that structured options may reduce costs
THE WORLD HAS BEEN A VOLATILE PLACE

• Over the past few years there were several large swings in markets
  • The EURCHF plunge at the beginning of last year
  • The JPY lost 20% in 2015 and gained it back this year
  • The GBP plunge in the wake of BREXIT
  • And the EUR also plunged against the USD on BREXIT
AND RISKS ARE NOT GOING AWAY

• The UK continues to move forward on BREXIT
• Greek debt remains dangerously high
• The SNB continues to intervene in CHF
• The uncharted waters of negative interest rates
• Chinese growth continues to slow
• An unprecedented US election ahead
• And when will the Fed hike rates?
BUT MARKETS ARE UNUSUALLY CALM

1-Month Realized Volatility

- Realized SPX volatility is near all-time lows – US bond volatility also low
- FX volatility is roughly in line with historic average
- This is the past, what about expectations?
AND PRICED FOR THE CALM TO LAST

3-Month Implied Volatility

- SPX implied Vol (VIX) is approaching historic lows – through the election
- In line with realized vol, FX implied vol is well within historic ranges
- Why is equity outlook so benign? Why the divergence for FX?
CENTRAL BANK EXTREME EASING
BEARISH FOR VOLATILITY

• Low yields are bearish for bond volatility because there is still resistance to dipping into negative territory so bond rates are squeezed into a narrow range as they approach or go below zero.

• Volatility is covariant across markets so anything that depresses volatility in bonds tends to weigh on volatility in equity and currency markets.

• Equity volatility is directional, rising in bear markets and falling in bull markets. Low bond yields also depress equity volatility as they imply an extension of central bank accommodation.

• The convergence of short-term rates at close to zero depresses volatility in all markets – especially currencies.
LOW RATES ARE CRUSHING EQUITY VOLATILITY

10Y UST Rate and Realized SPX 1M Volatility

Source: Thomson Reuter Eikon
FX VOLATILITY PULLED BOTH UP AND DOWN

As rate spreads widen there is more incentive for capital to cross borders
EUR implied vol tends to track the absolute spread in rates
But also being held down by low volatility in other markets.

Source: Thomson Reuter Eikon
SOME HEDGING ISSUES TO ADDRESS

• We will assume no discretion in decision to hedge
  – But that still may leave room for maturity and structure of hedge
  – We will base this on measurements of cheap and dear pricing
  – But this does leave several interesting issues we will not address
    – e.g. ….

• Defining exposure
  – Accounting convention can affect exposure
    • And management of dynamic changes in exposure
  – Do you itemize or aggregate exposure
    • If latter do you take a portfolio approach

• Incorporating global views and forecasts
  – How best to reflect market views via hedges
SO IS FX VOLATILITY ACTUALLY CHEAP?

<table>
<thead>
<tr>
<th>Currency</th>
<th>3M Implied Vol</th>
<th>3M Implied Vol / Realized Vol</th>
<th>1Y/3M Implied Vol Curve</th>
<th>5Y/1Y Implied Vol Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>Percentile</td>
<td>Value</td>
<td>Percentile</td>
</tr>
<tr>
<td>EURCHF</td>
<td>4.95</td>
<td>44.01</td>
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<td>EURSEK</td>
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<tr>
<td>EURCAD</td>
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<td>1.16</td>
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<tr>
<td>EURUSD</td>
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<td>EURGBP</td>
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<tr>
<td>EURAUD</td>
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<td>28.55</td>
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<td>95.52</td>
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<tr>
<td>EURNZD</td>
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<td>33.42</td>
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<td>78.23</td>
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<tr>
<td>EURJPY</td>
<td>11.35</td>
<td>76.41</td>
<td>0.61</td>
<td>0.89</td>
</tr>
</tbody>
</table>

Blue is bottom 25th percentile and red is top 25th percentile

- Most vols are historically mid-range on an outright basis
- But tend to be expensive relative to where vols are realizing
- The exceptions are EURGBP and, especially, EURJPY
  - Options are potentially an attractive alternative for hedging

Source: Thomson Reuters Eikon
DOES SKEW PROVIDE ANY INFORMATION?

<table>
<thead>
<tr>
<th>Currency</th>
<th>3M Risk Reversal skew</th>
<th>3M Risk Reversal skew / Implied Vol (%)</th>
<th>3M Risk Reversal skew / Implied Vol (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EURCHF</td>
<td>-1.71</td>
<td>-30.44</td>
<td>13.52</td>
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<tr>
<td>EURSEK</td>
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<td>42.98</td>
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<tr>
<td>EURUSD</td>
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<tr>
<td>EURCAD</td>
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<tr>
<td>EURNOK</td>
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<td>EURGBP</td>
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<tr>
<td>EURJPY</td>
<td>-2.02</td>
<td>-17.16</td>
<td>32.27</td>
</tr>
</tbody>
</table>

Blue is bottom 25\textsuperscript{th} percentile and red is top 25\textsuperscript{th} percentile

- Not surprisingly EURCHF is skewed for EUR puts
- Only other interesting skew is for EURGBP calls – RR offers good tradeoff
- JPY put skew is large outright so option buyers should consider low delta strike

Risk Reversal P/L vs Forward

EURGBP at Expiry

Source: Thomson Reuters Eikon
### SCANNING FOR MATURITY BIAS

<table>
<thead>
<tr>
<th>Currency</th>
<th>1Y Annualized Net Carry</th>
<th>1Y Annualized Net Carry</th>
<th>1Y Net Carry / Implied Vol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net Change</td>
<td>Value</td>
<td>Percentile</td>
</tr>
<tr>
<td>EURCAD</td>
<td>-0.04</td>
<td>1.45</td>
<td>95.28</td>
</tr>
<tr>
<td>EURNOK</td>
<td>-0.02</td>
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<td>80.36</td>
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<tr>
<td>EURGBP</td>
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<td>55.87</td>
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<tr>
<td>EURJPY</td>
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<tr>
<td>EURCHF</td>
<td>-0.01</td>
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<td>50.00</td>
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<td>EURSEK</td>
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<tr>
<td>EURAUD</td>
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<tr>
<td>EURNZD</td>
<td>-0.02</td>
<td>2.95</td>
<td>8.55</td>
</tr>
<tr>
<td>EURUSD</td>
<td>0.04</td>
<td>-1.69</td>
<td>2.55</td>
</tr>
</tbody>
</table>

Source: Thomson Reuters Eikon

- Extreme levels of carry can help determine a bias on maturity
- EUR buyers should be short maturity for CAD and JPY exposure and...
- ..long maturity for exposure in USD and maybe SEK
TAILORING EXECUTION TO LIQUIDITY CONDITIONS

Heat Map of Average Liquidity Over Course of the Day

Heat Map of Today’s Relative Liquidity

- Liquidity dries up in the US afternoon – except for MXN
- Monday was a low volume day for most currencies
COMPENSATING FOR HIGH BRL CARRY

Forward vs One-Touch Probability

USDBRL Spot = BRL 3.22
Notional Exposure = USD 10M

1) 6M ATMF BRL 3.41 USD Call = 5.0% = $500K
   - At expiry spot moves 15% = BRL 3.70
   - At maturity net payout = $350K

2) 6M BRL 3.41 one touch with net $350K payout = $257K or 2.6%.
   - Could ladder strikes – e.g. another one-touch for 20% move - or use payout to buy more protection

- Forwards and vanilla options are fixated on the expected rate at expiry
- But one-touches can benefit from wedge between forwards and spot
- An equivalent cash payout can be cheaper to achieve via one touches
  - And less up front means less lost if hedge proves unnecessary
• Market tends to price quick mean reversion of vols after events
• Not that dramatic for the US Election
• But it did work well for BREXIT
In April Forward implied vol for July was over 5% pts below June
And was only marginally higher than pre-BREXIT
July implied vol tested 20% in wake of the BREXIT yes vote
FINAL CONCLUSIONS

• Volatility generally headed to record lows
  • But FX volatility has been slower to decline
  • Aggressive central bank easing is bearish for volatility
  • But divergent policy is bullish specifically for FX volatility

• Even without discretion, hedging may require strategy
  – Carry levels can help determine hedge duration
  – Options are more attractive when vol is cheap
  – Extreme risk-reversal skew can create positive P/L bias
  – Liquidity maps can help guide preferred times to trade
  – And non-traditional options can reduce negative carry burden and help hedge specific event risk
QUESTIONS?

Foreign Exchange trading has entered a new age.