Managing the Risk of a Strategic USD-Asian Exposure

A Markowitz Approach to Proxy Hedging
Introduction

Framework

- A **Asian Asset Manager** holds some **USD assets** and wants to hedge the resulting FX exposure.

- A **3-month horizon** is considered as the flexibility to rebalance the hedges is key.

- The current **interest rate differential** between USD and home currency (5.25% against 1.50%) implies a **high cost of hedging** this position.

- A potential solution to **mitigate the cost of the carry** on the hedge is to **hedge** the underlying exposure **with a proxy**.

- We analyze the various proxy alternatives and try create a framework for analyzing the proxy hedging strategy.
Definition

- When a proxy is used for hedging, the hedger bears the **risk that the variations on the proxy do not offset the variations of the underlying FX exposure**.

- Proxy hedges can be evaluated along 2 axis:
  
  - **The carry**: The difference in carry between the proxy and the hedged exposure represents the gain of entering the proxy rather than a normal hedge.
  
  - **The tracking error** of the proxy compared to the underlying exposure: The tracking error is an indication of the hedging power of the proxy.
Proxy Currency Selection

- It is possible to differentiate two categories of proxies:
  - **Single currency proxies**: a derivative in a third currency pair is entered to hedge the underlying exposure.
  - **Proxy Baskets**: Alternatively, a portfolio of forwards or a basket option can be used to hedge a single currency exposure.

- The only advantage of a single currency proxy is its ease of use and monitoring.

- **Proxy Baskets** gives the hedger **more flexibility** than single currency proxies.

- In addition, the use of multiple currencies enables to mitigate the specific risk of the proxy currencies themselves.
Proxy Currency Selection

Currency Selection

- A closer look at the interest rates and correlations enables to exclude some currencies from the final proxy subset:
  - JPY and CNY: interest rates are too low. It would not make sense to hedge an exposure with a proxy if the proxy has a worse carry than the currency it is suppose to replace.
  - AUD: the correlation is too low.
  - HKD: due to its controlled exchange rate, HKD has an almost perfect correlation with the USD when measured against third currencies.
- This leaves a **subset 6 currencies:** KRW, THB, INR, SGD, PHP and IDR
As discussed in the introduction on proxy hedging, the quality of a proxy depends on 2 criteria:

- **The Carry** (defined as the interest rate differential between the currencies and the USD).

- **The expected Tracking Error** (defined as the residual error between the exposure hedged with the proxy and the exposure fully hedged).

An efficient proxy is a proxy with the **highest carry for a given expected tracking error** or similarly the proxy with the lowest expected tracking error for a given carry.

This proxy basket selection methodology is similar to the mean-variance portfolio selection in the **Markowitz framework**.
## Optimisation Framework

### Data

- **Correlation Matrix (5-years of weekly data)**

<table>
<thead>
<tr>
<th></th>
<th>TWD</th>
<th>KRW</th>
<th>INR</th>
<th>THB</th>
<th>SGD</th>
<th>PHP</th>
<th>IDR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TWD</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>KRW</strong></td>
<td>64%</td>
<td></td>
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</tr>
<tr>
<td><strong>INR</strong></td>
<td>38%</td>
<td>31%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>THB</strong></td>
<td>65%</td>
<td>61%</td>
<td>34%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGD</strong></td>
<td>58%</td>
<td>61%</td>
<td>29%</td>
<td>67%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PHP</strong></td>
<td>28%</td>
<td>32%</td>
<td>10%</td>
<td>37%</td>
<td>34%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IDR</strong></td>
<td>23%</td>
<td>28%</td>
<td>11%</td>
<td>36%</td>
<td>40%</td>
<td>34%</td>
<td></td>
</tr>
</tbody>
</table>
Set of Efficient Proxy Hedges
(5 year Correlation Data)
Set of Efficient Proxy Hedges
(5 year Correlation Data)
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