The Share of Systematic Variation in Bilateral Exchange Rates
By Adrien Verdelhan

Discussion by Craig Burnside

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What’s the paper about?

1. Explores the factor structure of bilateral exchange rates
2. Explores the importance of a pricing factor that emphasizes the importance of the US dollar
3. Explores the properties of models that would rationalize the results
Factor Structure of Bilateral Exchange Rates
The paper’s main claim about bilateral exchange rates

- “Changes in exchange rates appear random to most investors, central bankers, and researchers alike, except perhaps at very high or very low frequencies.”

- “To the contrary, [this paper reports] that two variables—the carry and the dollar factors—account for a substantial share of individual exchange rate time-series in developed countries, as well as in emerging and developing countries with floating exchange rates.”
The representative investor, central banker & researcher?
Is everyone this confused?

- Do “people” think exchange rates are “random”?

- If “random” means “difficult to forecast”, then, yes, most people probably feel that there is a lot randomness in exchange rates
  - But they’re right: exchange rates are difficult to forecast

- If it means “uncorrelated with each other” then, no, most people are aware that currencies comove.
  - The covariation of currencies is interesting, but it’s not a discovery!
Covariation at low/medium frequencies
USD/FCU spot exchange rates
Covariation at high frequencies
Month-to-month log changes USD/FCU vs average across all currencies
The main regression re-summarizes what we already know

\[ \Delta s_{t+1} = \alpha + \beta (i^*_t - i_t) + \gamma (i^*_t - i_t) C_{t+1} + \delta C_{t+1} + \tau D_{t+1} + \varepsilon_{t+1} \]

\[ D = \Delta s_{t+1} \quad C = \Delta s^{(6)}_{t+1} + \tilde{i}^{(6)} - [\Delta s^{(1)}_{t+1} + \tilde{i}^{(1)}] \]

- We know that \( \Delta s_{t+1} \) is hard to forecast: so the usual regression with only the interest rate differential is well-known to have a small \( R^2 \)

- We know the data have factor structure: so we’d expect Carry (C) and Dollar (D) to be informative about \( \Delta s_{t+1} \), with Dollar likely to be more informative given the obvious positive correlation in the data

- Classic tests of UIP do not “suffer from an omitted variable bias” relative to this regression.
A (Dollar) Risk Factor in Search of Six Portfolios
Existing factors: Carry trade

- Exchange rates are somewhat predictable, at least in sample, by interest differentials
  \[ \Pr[\text{sign}(\Delta s_{t+1}) = \text{sign}(i^* - i_t)] = 0.519 \]

- Implies that long foreign currency payoff are more reliably predictable
  \[ \Pr[\text{sign}(\Delta s_{t+1} + i^*_t - i_t) = \text{sign}(i^*_t - i_t)] = 0.570 \]

- Motivates carry trades based on the sign of interest differentials vs USD
  - These carry trades are studied by Burnside, Eichenbaum and Rebelo (various) and others
  - Simple carry trade portfolio:
    \[ \text{Carry}_{BER} = \frac{1}{N} \sum_{i=1}^{N} (\Delta s_{t+1} + i^*_t - i_t) \text{sign}(i^*_t - i_t) \]
Lustig, Roussanov and Verdelhan (RFS, 2011) characterize two factors, DOL and HML\textsubscript{FX}.

Based on six long-the-foreign-currency portfolios sorted on interest rates,

\begin{align*}
\text{DOL} &= \Delta \bar{s}_{t+1} + \bar{i}^*_t - i_t \\
\text{HML}\textsubscript{FX} &= \Delta \bar{s}_{t+1}^{(6)} + \bar{i}^{*(6)}_t - [\Delta \bar{s}_{t+1}^{(1)} + \bar{i}^{*(1)}_t]
\end{align*}

DOL and HML\textsubscript{FX} price the cross-section of the sorted portfolios.

But the price of DOL risk is small and statistically insignificant.
Existing factors: VOL, SKEW and Momentum

- Menkhoff, Sarno, Schmeling, and Schrimpf (JF, 2012): a currency volatility factor, VOL
- Rafferty: a currency skewness factor, SKEW
- Momentum:

\[
\text{Pr} \left[ \text{sign}(\Delta s_{t+1} + i_t^* - i_t) = \text{sign}(\Delta s_t + i_{t-1}^* - i_{t-1}) \right] = 0.570
\]

Simple momentum portfolio:

\[
\text{MOM}_{\text{BER}} = \frac{1}{N} \sum_{i=1}^{N} (\Delta s_{t+1} + i_t^* - i_t) \text{sign}(\Delta s_t + i_{t-1}^* - i_{t-1})
\]
Existing factors: “Dollar” carry trade

- Lustig, Roussanov and Verdelhan (Countercyclical Currency Risk Premia) refine the predictability result
- The average interest differential vs USD is a better predictor than that currency’s own interest differential

\[ \Pr \left[ \text{sign}(\Delta s_{t+1}) = \text{sign}(\bar{i}^* - i_t) \right] = 0.547 \]

\[ \Pr \left[ \text{sign}(\Delta s_{t+1} + i_t^* - i_t) = \text{sign}(\bar{i}^* - i_t) \right] = 0.579 \]

- Motivates a “Dollar Carry” strategy based on the average interest differential vs USD:

\[ \text{Carry}_{\text{DOL}} = \frac{1}{N} \sum_{i=1}^{N} (\Delta s_{t+1} + i_t^* - i_t) \text{sign}(\bar{i}_t^* - i_t) = (\Delta s_{t+1} + \bar{i}_t^* - i_t) \text{sign}(\bar{i}_t^* - i_t) \]
### Profitability of currency strategies

**BER data set, 1976M2-2012M6**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Mean (%)</th>
<th>SD (%)</th>
<th>SR  (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carry&lt;sub&gt;BER&lt;/sub&gt;</td>
<td>4.4 (0.9)</td>
<td>5.2 (0.4)</td>
<td>0.85 (0.20)</td>
</tr>
<tr>
<td>MOM&lt;sub&gt;BER&lt;/sub&gt;</td>
<td>4.3 (1.1)</td>
<td>7.3 (0.5)</td>
<td>0.59 (0.16)</td>
</tr>
<tr>
<td>Carry&lt;sub&gt;DOL&lt;/sub&gt;</td>
<td>5.4 (1.5)</td>
<td>9.0 (0.4)</td>
<td>0.61 (0.17)</td>
</tr>
</tbody>
</table>

$\$$ on a log scale (Jan. 1976 = 1)
This paper: *redefine* dollar risk in terms of $\text{Carry}_{\text{DOL}}$ rather than DOL

A new set of portfolios by sorting on the time-varying exposures of currencies to the original DOL factor, but then takes positions in these portfolios based on $\text{sign}(\tilde{i}_t^* - i_t)$

$\text{Carry}_{\text{DOL}}$ prices these portfolios

Suggestion: Is there any ex-ante reason to be interested in these new portfolios? If so, emphasize this.
Do we need all of these risk factors?

- I think these risk factors are useful to the extent that they shrink the set of things we need to explain economically.

Do we need $\text{Carry}_{\text{BER}}$, DOL, $\text{HML}_{\text{FX}}$, VOL, SKEW, MOM, and $\text{Carry}_{\text{DOL}}$?

- Not if what we are interested in is the original interest rate-sorted portfolios: $\text{Carry}_{\text{BER}}$ explains them all with no important marginal contribution from any of the others.

- VOL and SKEW are, in my view, attempts to get at the economics of what’s going on in carry trades, whereas $\text{Carry}_{\text{BER}}$, DOL, $\text{HML}_{\text{FX}}$, and $\text{Carry}_{\text{DOL}}$ are all restatements of their profitability.

- MOM is very different and can’t be explained by the others.
Models
My paper with Jeremy Graveline is a substitute for a discussion of this part of the paper.