CARRY TRADES AND GLOBAL RISK

GEORGE PANAYOTOV

DISCUSSION BY ZSUZSA R. HUSSZÁR
Global **Equity market** daily trad. Vol **$0.2 Trillion**

*From Quarterly figure of 21 trillion*

Most top finance papers focus on equity market, specifically US equities (Karolyi, 2016)

Daily Forex trading volume is **$3 Trillion**

Less than 16% of top papers deal with international topics (Karolyi, 2016)

FOREX/currency market is very important

15 times bigger daily value
US equity market fairly efficient
Anomalies short lived, mispricing get arbitrag ed away

Evident mispricing, or persistent “puzzle” with carry trades

Most top finance papers focus on equity market, specifically US equities (Karolyi, 2016)

Less than 16% of top papers deal with international topics (Karolyi, 2016)
The topic of FOREX and carry trades is important, the author is working on an important topic.

In recent years with globalization more and more MNCs are also jumping on the bandwagon of carry trade.

APPLE Bond issue in 2015 (USDCHF=0.97 in Febr, 2017)

- 10 year maturity bond with 0.28% yield (comparable US treasury yield was 1.92%)
- 15 year maturity bond with 0.74% yield (comparable US treasury rate was 2.3-2.5%)

Corporate financing is beyond the scope of this paper: But, it would be interesting to examine these cross country corporate fund movements (most forex studies, as this paper only concerns with the cross country bank lending).
CARRY TRADES: PROFITS & THEORY

- In parity condition, relative forward rate \((f_t - s_t) \approx i_{\text{foreign}} - i_{\text{domestic}}\) captures that currency with high interest rate expected to depreciate.

\[
\text{If parity conditions (UIP) do not hold, excess return arise: } r_{x_{t\rightarrow t+k}} = f_{t+k} - s_t - \Delta s_{t+k} \text{ (simply } f_{t+k} - s_{t+k})
\]

exploitable: by buying currency in forward market and selling it at the spot a month from now.

- The parity condition has been called into question by “countless” empirical evidence (e.g., Fama, 1984; Lewis, 1995; Engel, 1996; Huszar, Tan, Zhang, 2016). But may hold for some emerging countries, like for Russia from 2001 to 2014 (Vasileyev, Busqin, and Busyain, 2017), this difference of emerging and developed countries may warrant more attention but beyond this paper which concerns only with developed countries (why?).

- Most studies focus on bilateral currency relations, while Lustig and Verdelhan (2007) and Lustig, Roussanov and Verdelhan use a portfolio approach to sort currencies based on cross-sectional interest rate differences (based on all currencies from Datastream) based on 39 currencies.
OBJECTIVE AND CONTRIBUTION

**Objective 1:** Extend Lustig, Roussanov and Verdelhan (2014JFE) framework, into USD invariant carry trades.

**Objective 2:** Identify global risk factor(s) in the currency market, sort of running a horse race among 21 candidate factors from the literature, such as:

- Bond market risk factor, Equity Market Risk, VIX, Financial Uncertainty Measures, Global Uncertainty index (Ozturk and Sheng, 2016); OECD industrial production growth, OECD sales growth, OECD unemployment change, Economic Policy uncertainty measure (Baker-Bloom-Davis MPU index)
- **Global Financial Cycle Risk** (Rey, 2015; Miranda-Agrippino and Ray, 2017)
- Lustig, Roussanov, and Verdelhan (2014)’s DOL.
  - *LRV introduce DOL (dollar carry trade) that short the USD when US interest rates low (in recession) and long when US rates are high (in expansions)*, LRV show that the DOL time variation captures aggregate risk that investors take on by shorting USD in bad times.

*Note 1:* For such an ambitious paper (to identify new global risk factors), the sample may need to be extended to developing countries as well.
CONTRIBUTION BEYOND LRV

The authors modify LRV’s model and provide economic intuition into the relation between the dollar factor and the global carry trade returns (eqs. 9, 10, and 11):

\[
DOL_{t+1} = \frac{\kappa}{2}(z_t - \bar{z}) + \left(\sqrt{\delta} - \sqrt{\delta_i}\right) \sqrt{\delta_i w_{t+1}} + \sqrt{\kappa} \left(\sqrt{z_t - \bar{z}}\right) u_{t+1}^p
\]

\[
r_{t+1}^{\text{carry}} = \frac{\delta_i \bar{z}}{2 \bar{z}} - \frac{\kappa \bar{z}}{2} - \sqrt{\delta_i} \sqrt{\delta_i w_{t+1}} - \sqrt{\kappa} \sqrt{\theta^w} u_{t+1}^p.
\]

\[
COV_{r_t^{\text{carry}}, DOL} = -\frac{\kappa^2}{4} E[(z_t - \bar{z}) w_t] - E \left[\left(\sqrt{\delta} - \sqrt{\delta_i}\right) \sqrt{\delta_i w_{t+1}} \right] - \kappa E \left[\left(\sqrt{z_t - \bar{z}}\right) \sqrt{\delta_i} \right] - \kappa E \left[\left(\sqrt{z_t - \bar{z}}\right) \theta^w \right] - \frac{kN}{N-1} E \left[\sqrt{z_t} \sqrt{\delta_i} \right]
\]

\[
\approx -\frac{\kappa^2 N}{4(N-1)} E[z_t w_t] - E \left[\left(\sqrt{\delta} - \sqrt{\delta_i}\right) \sqrt{\delta_i} \right] \theta^w - \frac{kN}{N-1} E \left[\sqrt{z_t} \sqrt{\delta_i} \right]
\]
CONTRIBUTION BEYOND LRV

Show the DOL successfully play the role of $f_1$ and can be combined successfully with a number of previously identified factors (Tables 4-6). In this setting the DOL should not be a valid factor since its explanatory power for the invariant carry is obtained mechanically in the modified LRV

\[ r_{x_{i+1}} = \alpha + \xi_1 f_{i+1} + \beta_2 f_{i+1} + \xi_2 f_{i+1} + \gamma_{i+1} \]

Let's zoom on the interaction term, conditioning variable, the key takeaway from the paper:

<table>
<thead>
<tr>
<th>DOL</th>
<th>$f_1$</th>
<th>$f_2$</th>
<th>$\alpha$</th>
<th>sig.</th>
<th>$\xi_1$</th>
<th>sig.</th>
<th>$\beta_2$</th>
<th>sig.</th>
<th>$\xi_2$</th>
<th>sig.</th>
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<td>(5)</td>
<td>-0.21</td>
<td>(39)</td>
<td>0.08</td>
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<td>(45)</td>
<td>32.0</td>
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<td>IP</td>
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<td></td>
<td>(7)</td>
<td>-0.19</td>
<td>(35)</td>
<td>0.17</td>
<td>(18)</td>
<td>0.41</td>
<td>(45)</td>
<td>16.2</td>
<td></td>
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<tr>
<td>SAL</td>
<td>1.27</td>
<td></td>
<td>(15)</td>
<td>-0.19</td>
<td>(35)</td>
<td>0.04</td>
<td>(0)</td>
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<td>15.6</td>
<td></td>
</tr>
<tr>
<td>BDI</td>
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<td></td>
<td>(15)</td>
<td>-0.20</td>
<td>(35)</td>
<td>0.02</td>
<td>(0)</td>
<td>0.42</td>
<td>(45)</td>
<td>15.5</td>
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</tr>
<tr>
<td>VIX</td>
<td>1.84</td>
<td></td>
<td>(40)</td>
<td>-0.19</td>
<td>(34)</td>
<td>-0.01</td>
<td>(45)</td>
<td>0.39</td>
<td>(45)</td>
<td>22.8</td>
<td></td>
</tr>
<tr>
<td>FINU</td>
<td>1.42</td>
<td></td>
<td>(25)</td>
<td>-0.20</td>
<td>(33)</td>
<td>-0.06</td>
<td>(40)</td>
<td>0.41</td>
<td>(45)</td>
<td>18.3</td>
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<tr>
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<td></td>
<td>(16)</td>
<td>-0.19</td>
<td>(35)</td>
<td>0.00</td>
<td>(0)</td>
<td>0.42</td>
<td>(45)</td>
<td>15.6</td>
<td></td>
</tr>
<tr>
<td>MPU 1</td>
<td>1.78</td>
<td></td>
<td>(38)</td>
<td>-0.18</td>
<td>(32)</td>
<td>-0.04</td>
<td>(42)</td>
<td>0.41</td>
<td>(45)</td>
<td>18.5</td>
<td></td>
</tr>
</tbody>
</table>
CONTRIBUTION BEYOND LRV

LRV’s average forward discount (AFD) on foreign currencies against the USD

\[
\bar{f}_t^{j} - \bar{s}_t^{j} = \frac{1}{N_t^j} \sum_{i=1}^{N_t^j} f_{t \rightarrow t+k}^i - s_t^i
\]

is used then as a conditioning variable.

Note 2: Including the formula could be useful for the definition as in the LRV paper.
The main contribution: The AFD regimes play an important role in carry trade returns.

- Lower output growth, growing unemployment
- Decreasing financial and global uncertainty
- Stagnant/contracting cross border bank lending
- Dollar carry trade typically short dollar during and after recession, when US rates are low

Static component of carry drives profits (when AFD>0)
- Static component is defined as the contribution by NZD, AUD, NOK (with high forward differentials of 4.3, 3.1 and 2.1%) and CHF and JPY (with low forward differentials -1.5% and -2.4%).

- Is the market really that inefficient?

FOREX market has daily Turnover of $3 Trillion

As a final point the author show that the global financial cycle factor drives out the dollar factor and the MSCI factor, and “has some pricing ability for the carry cross section” p. 33.
The main results that the static component drives the profitability of carry trades suggest that the market is inefficient (or some costs/risk) have not been addressed, such as:

1) Transaction costs – bid-ask spread, margin financing costs, feasibility of the trade, access to borrowing, foreign depositing issues are largely ignored (e.g., The new NZ government prohibits foreign citizens account openings).
   - Bid-ask quotes are ignored because according to one study by Lyons (2001) bid-ask quotes overestimate transaction costs. However, the literature and the base study, LRV use bid-ask spreads.

2) Crash risk and political risk discussion with the AFD factor could link the paper perhaps better with the literature.
   - Will be elaborated in details

3) The major concern – regarding the persistence of the profitability
   - Will be elaborated in details
Implementation of Carry trades: An “all time” favourite pair, Aussie dollar and Japanese Yen

WHAT to do? Borrow in Japan and invest in Australia, pocket the interest rate differentials.

The risk is that Japanese yen appreciates suddenly (or Aussie dollar depreciates)
CARRY TRADES: CRASH RISK

Crash risks (Brunnermeier et al. 2008; Jurek, 2014; Farhi, Freiberger, Gabaix, Verdelhan, 2015)

1. Example: Yen-Aussie carry trade (Nov. 8, 2007)
   - Borrow at 0.87% 3m JPY LIBOR (“funding currency”)
   - Invest at 7.09% 3m AUD LIBOR (“investment currency”)
   - Hope that JPY doesn’t appreciate much

   Violation of UIP - “Forward Premium Puzzle”

2. Large exchange rate movements without news
   Example: October 7th/8th, 1998

Source: Brunnermeier, Nagel, and Pedersen, 2008
Various other FOREX studies use also Tedspread as proxy for funding liquidity and market liquidity.

Small note: would be good to actually spell out exact dates for neg/pos AFD periods.
In mid-June 2014, the benchmark LIBOR interest rates regarding the top currencies for forex trading were:

- U.S. (USD) 0.54%
- Australia (AUD) 3.35%
- New Zealand (NZD) 3.33%
- Switzerland (CHF) 0.18%
- Japan (JPY) 0.33%
- Eurozone (EUR) 0.46%
- Canada (CAD) 1.78%
- U.K. (GBP) 1.03%

Since Australia and New Zealand usually have the highest yields while Japan and Switzerland have the lowest yields, they often provide good trading opportunities. Under the current circumstances, a likely forex carry trade is to buy AUD/JPY or NZD/JPY.

This STATIC strategy in this paper, which drives the carry trade profits
CARRY TRADES PROFITS - EXPLAINED

Return in Rank 1: E.g., Japan, is the 3-month short term rate + change in value of JPY against the USD

CARRY TRADES: EXPLAINED AWAY

Exhibit 2: Currency Carry Trade Failed to Deliver Consistent Results
Average Quarterly Returns, January 2008 – June 2016

CARRY TRADES: EXPLAINED AWAY

Not much going on

Action, high rate currencies depreciate “a lot”

CARRY TRADES STATIC PROFITS - GONE

USDNZD (January 2012 - June 2016)

NZD depreciates by 30%

Source: US Fed, Economics Research Data, Created by the presenter
CARRY TRADES: GOOD OLD TIMES – GONE

It would be interesting to show whether the carry trade profits during neg AFD time disappear because of the long side or the short side.

(This graph implies that long side resulted in large losses during 95-01)

Source: US Fed, Economics Research Data, Created by the presenter
Election runup 1.46 - 1.33 10% appreciation May 1 - Aug 1 (3 months)

USD/NZD

No Maturity Election outcome NZD depreciates about 8% in 1 month

Back to normal, government formed, Currency reversal

Source: US Fed, Economics Research Data, Created by the presenter
It could be interesting to recalibrate the model based on the last 10 years, or 6 years of data, where short term volatility increased.
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AN INSIGHTFUL, TECHNICAL PAPER, ENCOURAGING MORE FOREX AND
GLOBAL ASSET PRICING RESEARCH