Unconventional Monetary Policy and International Risk Premia

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Introduction

Study the relationship between monetary policy, FX risk premia and term premia at the zero lower bound.
Static, reduced-form approach analysis

- Construct currency carry trade portfolios using U.S. and foreign daily interest rate.
- Estimate the contemporaneous effects of U.S. monetary policy announcements on excess returns.
Static, reduced-form approach analysis

- Construct currency carry trade portfolios using U.S. and foreign daily interest rate.
- Estimate the contemporaneous effects of U.S. monetary policy announcements on excess returns.

Dynamic, structural VAR

- Identification by a variant of “external instruments”, avoids dubious assumptions.
Data

- VAR analysis: mix of daily, intra-daily and monthly data
  - 3-month, 5-year and 10-year zero coupon US yields
  - 3-month and 10-year foreign zero coupon yields (UK, Germany, Japan)
  - Log exchange rate
  - Log employment and core CPI
  - BAA-Treasury spread
  - January 1990 to March 2015 (January 1999 to March 2015 when the euro area as foreign country)
Carry Trade Analysis
Construct 5 carry trade portfolios sorted in increasing order of the 3-month interest rate differential (with quarterly rebalancing).

- Calculate daily returns to the carry trade strategy of going long the foreign bond and short the U.S. bond.
- Investigate the relationship between excess returns and U.S. monetary policy using an event-study approach.
Excess Returns Definition

Hold-One-Day Excess Return (H1D)

\[ H1D_t = (m - (1/260))i_{t+1} - mi_t - [(m - (1/260))i^*_{t+1} - mi^*_t] + s_{t+1} - s_t \]
Excess Returns Definition

Hold-One-Day Excess Return (H1D)

\[ H1D_t = (m - (1/260))i_{t+1} - mi_t - [(m - (1/260))i^*_{t+1} - mi^*_t] + s_{t+1} - s_t \]

which is approximately

\[-[\text{daily foreign bond ret} - \text{daily U.S. bond ret}] + \text{the FX ret} \]

\[-[m(i^*_{t+1} - i^*_t) - m(i_{t+1} - i_t)] + s_{t+1} - s_t.\]
Portfolio Allocation by Country

The chart shows the allocation of portfolios in different countries, with each country represented on the x-axis and the percentage allocation on the y-axis. The portfolios are indicated by different shades of grey, with the legend at the bottom indicating Portfolio 1 to Portfolio 5.
Excess Returns

- Full Sample
- Pre ZLB
- ZLB

Portfolio 1 Portfolio 2 Portfolio 3 Portfolio 4 Portfolio 5

Percentage Points
Excess Returns and MPS

We study the relationship between monetary policy actions and carry-trade portfolio returns:

\[ H1Dt = \beta MPS_t + \varepsilon_t \]  \hspace{1cm} (1)
## OLS Regression: Excess Returns on MPS

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>All Ctrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: One-Day Excess Returns (H1D)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZLB</td>
<td>0.067***</td>
<td>0.071***</td>
<td>0.037***</td>
<td>0.040***</td>
<td>0.038***</td>
<td>0.051***</td>
</tr>
<tr>
<td></td>
<td>(8.79)</td>
<td>(6.41)</td>
<td>(5.56)</td>
<td>(3.83)</td>
<td>(3.50)</td>
<td>(8.41)</td>
</tr>
<tr>
<td></td>
<td>[0.51]</td>
<td>[0.50]</td>
<td>[0.24]</td>
<td>[0.21]</td>
<td>[0.21]</td>
<td>[0.43]</td>
</tr>
<tr>
<td>Pre-ZLB</td>
<td>0.026***</td>
<td>0.025***</td>
<td>0.023***</td>
<td>0.028**</td>
<td>0.025</td>
<td>0.025***</td>
</tr>
<tr>
<td></td>
<td>(3.24)</td>
<td>(4.40)</td>
<td>(2.73)</td>
<td>(2.44)</td>
<td>(1.51)</td>
<td>(3.61)</td>
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<tr>
<td></td>
<td>[0.24]</td>
<td>[0.24]</td>
<td>[0.20]</td>
<td>[0.19]</td>
<td>[0.08]</td>
<td>[0.26]</td>
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<tr>
<td><strong>Panel B: Two-Day Excess Returns (H2D)</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ZLB</td>
<td>0.087***</td>
<td>0.095***</td>
<td>0.063***</td>
<td>0.077***</td>
<td>0.038</td>
<td>0.072***</td>
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<tr>
<td></td>
<td>(5.89)</td>
<td>(3.69)</td>
<td>(4.91)</td>
<td>(3.80)</td>
<td>(2.27)</td>
<td>(5.09)</td>
</tr>
<tr>
<td></td>
<td>[0.46]</td>
<td>[0.38]</td>
<td>[0.27]</td>
<td>[0.21]</td>
<td>[0.08]</td>
<td>[0.34]</td>
</tr>
<tr>
<td>Pre-ZLB</td>
<td>0.026</td>
<td>0.023</td>
<td>0.022*</td>
<td>0.038***</td>
<td>0.057***</td>
<td>0.033***</td>
</tr>
<tr>
<td></td>
<td>(1.62)</td>
<td>(1.63)</td>
<td>(1.72)</td>
<td>(3.75)</td>
<td>(2.87)</td>
<td>(3.26)</td>
</tr>
<tr>
<td></td>
<td>[0.08]</td>
<td>[0.07]</td>
<td>[0.09]</td>
<td>[0.26]</td>
<td>[0.23]</td>
<td>[0.20]</td>
</tr>
</tbody>
</table>
VAR Analysis
VAR Analysis

VAR Identification

- VAR in monthly data: \( A(L)Y_t = \varepsilon_t \).
- Errors: \( \varepsilon_t = R\eta_t; \ \eta_t = (\eta_{1t}, \eta_{2t})' \).
- Define \( Z_t \) as intraday change in five-year futures bracketing monetary policy announcements.
- Define \( X_t \) as daily (or intradaily) change in \( Y_t \) bracketing monetary policy policy announcements.
  - Set \( X_t = \varepsilon_t \) for variables with only monthly data.
VAR Identification

VAR in monthly data: $A(L) Y_t = \varepsilon_t$.

Errors: $\varepsilon_t = R \eta_t; \; \eta_t = (\eta_{1t}, \eta'_{2t})'$.

Define $Z_t$ as intraday change in five-year futures bracketing monetary policy announcements.

Define $X_t$ as daily (or intradaily) change in $Y_t$ bracketing monetary policy announcements.

- Set $X_t = \varepsilon_t$ for variables with only monthly data.

Assumption A1: $E(\eta_{1t} Z_t) = \alpha$ and $E(\eta_{2t} Z_t) = 0$.

Assumption A2: $E(Z_t (\varepsilon_t - X_t)) = 0$. 
VAR Identification

Identification methodology combines event-study methodology (RSW (2014)) with external instruments (Olea, Stock and Watson (2013), Mertens and Ravn (2013)).

Identifying assumptions are quite mild.

Compute impulse responses to shock that lowers five-year ZC yield by 25 basis points.
Main objective is to measure effects of monetary policy shocks on risk premia, defined as follows:

\[ TP_t^D(m) = r_t(m) - E_t(1^{m/3} \sum_{i=0}^{m/3-1} r_t + 3i(3)) . \]  

\[ TP_t^F(m) = r_t^*(m) - E_t(1^{m/3} \sum_{i=0}^{m/3-1} r_t^* + 3i(3)) . \]  

\[ FP(m) = \frac{1}{m/3} \sum_{i=0}^{m/3-1} \left[ E_t r_t^* + 3i(3) - E_t r_t + 400(E_t s_t + 3i + 3 - E_t s_t + 3i) \right] . \]
Risk Premia

Main objective is to measure effects of monetary policy shocks on risk premia, defined as follows:

**Domestic Term Premium**

\[
TP_t(m) = r_t(m) - E_t(\frac{1}{m/3} \sum_{i=0}^{m/3-1} r_{t+3i}(3)).
\]  

(2)

**Foreign Term Premium**

\[
TP^*_t(m) = r^*_t(m) - E_t(\frac{1}{m/3} \sum_{i=0}^{m/3-1} r^*_{t+3i}(3)).
\]  

(3)

**Foreign Exchange Risk Premium**

\[
FP(m) = \frac{1}{m/3} \sum_{i=0}^{m/3-1} \left[ E_t r^*_t(3) - E_t r_{t+3i}(3) + 400(E_t s_{t+3i+3} - E_t s_{t+3i}) \right].
\]  

(4)
Effects of US MPS at ZLB on FX

- Pound
- Euro
- Yen
VAR Analysis

Effects of US MPS at ZLB on Yields

- **UK: 3-month**
- **UK: 10-year**
- **Germany: 3-month**
- **Germany: 10-year**
- **Japan: 3-month**
- **Japan: 10-year**
Effects of US MPS at ZLB on FX Risk Premia
We find that US monetary policy easing surprises may lower foreign exchange risk premium.

Opposite direction to the failure of conditional UIP found by EE (1995) and others.
We find that US monetary policy easing surprises may lower foreign exchange risk premium.

Opposite direction to the failure of conditional UIP found by EE (1995) and others.

IMF (2013) argues that unconventional monetary policy easings shift risk-reversals in the direction of skewness towards dollar depreciation.

If policy easings give the dollar more “crash risk”, then risk premium on foreign asset should fall.
### Regression of 2-day change in risk reversals on US monetary policy surprises

<table>
<thead>
<tr>
<th>Risk Reversal</th>
<th>Maturity</th>
<th>Euro</th>
<th>Pound</th>
<th>Yen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 month</td>
<td></td>
<td>1.18***</td>
<td>0.80**</td>
<td>1.60**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.32)</td>
<td>(0.34)</td>
<td>(0.69)</td>
</tr>
<tr>
<td>3 months</td>
<td></td>
<td>1.07***</td>
<td>0.64**</td>
<td>1.52**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.30)</td>
<td>(0.28)</td>
<td>(0.72)</td>
</tr>
<tr>
<td>6 months</td>
<td></td>
<td>0.85***</td>
<td>0.54**</td>
<td>1.07**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.23)</td>
<td>(0.24)</td>
<td>(0.51)</td>
</tr>
<tr>
<td>1 year</td>
<td></td>
<td>0.70***</td>
<td>0.47**</td>
<td>0.83*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.20)</td>
<td>(0.24)</td>
<td>(0.44)</td>
</tr>
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</table>
Effects of US MPS at ZLB on Domestic Term Premia

<table>
<thead>
<tr>
<th></th>
<th>Point Estimate</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five-year</td>
<td>-21.5</td>
<td>(-27.0,-12.6)</td>
</tr>
<tr>
<td>Ten-year</td>
<td>-20.5</td>
<td>(-25.8,-10.8)</td>
</tr>
</tbody>
</table>
## Effects of US MPS at ZLB on Foreign Term Premia

<table>
<thead>
<tr>
<th>Country</th>
<th>Point Estimate</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>-13.6</td>
<td>(-22.6, -7.1)</td>
</tr>
<tr>
<td>Germany</td>
<td>-10.3</td>
<td>(-13.8, -7.1)</td>
</tr>
<tr>
<td>Japan</td>
<td>-5.4</td>
<td>(-10.0, -1.0)</td>
</tr>
</tbody>
</table>
Effects of US MPS on carry-trade returns

![Portfolio 1](image1)
![Portfolio 2](image2)
![Portfolio 3](image3)
![Portfolio 4](image4)
![Portfolio 5](image5)
Monetary Policy Shocks before the ZLB

Can apply methodology to monetary policy shocks before the ZLB.

Monetary policy surprise $Z_t$ is change in fourth eurodollar contract.

Effects of US MPS pre-ZLB on FX

- **Pound**
  - Y-axis: -1 to 2
  - X-axis: 5 to 20

- **Euro**
  - Y-axis: -3 to 3
  - X-axis: 5 to 20

- **Yen**
  - Y-axis: -2 to 3
  - X-axis: 5 to 20
Effects of US MPS pre-ZLB on Yields

- UK: 3-month
- UK: 10-year
- Germany: 3-month
- Germany: 10-year
- Japan: 3-month
- Japan: 10-year
Effects of US MPS pre-ZLB on FX Risk Premia

VAR Analysis
Non-US MPS

Can redo the same analysis for BOE, ECB and BOJ monetary policy shocks.

External instrument is change in ten-year yields for UK and Japan and change in ten-year Italian/German spread for ECB.
Effects of foreign MPS on FX

- Pound
- Euro
- Yen
Effects of foreign MPS on Yields

UK Shock: 3–month US rates

UK Shock: 10–year US rates

Euro Shock: 3–month US rates

Euro Shock: 10–year US rates

Japan Shock: 3–month US rates

Japan Shock: 10–year US rates
Effects of foreign MPS on FX Risk Premia
Conclusions

- We estimate effects of MPS on excess returns to currency carry trade portfolio at HF.
- We employ a dynamic, structural VAR analysis, using MPS as the external instrument.
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We estimate effects of MPS on excess returns to currency carry trade portfolio at HF.

We employ a dynamic, structural VAR analysis, using MPS as the external instrument.

- We have not found irreproachable evidence on how these shocks affect foreign exchange risk premia, although MPS easings tend to lower foreign exchange risk premia during the ZLB.
Conclusions

We estimate effects of MPS on excess returns to currency carry trade portfolio at HF.

We employ a dynamic, structural VAR analysis, using MPS as the external instrument.

- We have not found irreproachable evidence on how these shocks affect foreign exchange risk premia, although MPS easings tend to lower foreign exchange risk premia during the ZLB.

- On the other hand, there is consistent evidence that unconventional U.S. monetary policy easing shocks significantly lower domestic and foreign bond term premia and lead to dollar depreciation.