CIP Deviations, The Dollar, and Frictions in International Capital Markets

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The views expressed in this presentation are those of the authors and not those of the Federal Reserve Bank of New York or the Federal Reserve System.
Overview

1. The covered interest rate parity (CIP) is a fundamental no-arbitrage relationship in international finance.

2. Persistent breakdown of CIP deviations emerged post-GFC:
   - Bank regulatory reforms increase balance sheet costs for financial intermediaries to supply dollar funding.
   - **Demand** for dollar funding/hedging in the FX swap markets remains steady.

3. In addition, CIP deviations for government bond yields uncover convenience yields, default risk, and market segmentation.
Lecture Plan

- Introduction
- Why do CIP deviations matter?
- Supply of dollar funding/hedging: The role of large global banks
- Demand for dollar funding/hedging
- CIP deviations for government bond yields
Introduction
Where does wholesale dollar funding come from?

### Table 1: List of Dollar Wholesale Funding Instruments

<table>
<thead>
<tr>
<th>Market</th>
<th>Borrower</th>
<th>Lender</th>
<th>Maturity</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial paper</td>
<td>banks, corp</td>
<td>wide</td>
<td>&lt;3M</td>
<td>$1T</td>
</tr>
<tr>
<td>Certificate of depo.</td>
<td>banks</td>
<td>wide</td>
<td>&lt;1Y</td>
<td>$600B</td>
</tr>
<tr>
<td>Fed funds</td>
<td>banks</td>
<td>banks</td>
<td>O/N</td>
<td>$60B</td>
</tr>
<tr>
<td>Eurodollars</td>
<td>banks</td>
<td>wide</td>
<td>O/N</td>
<td>?(110B)</td>
</tr>
<tr>
<td>repos</td>
<td>banks, HFs</td>
<td>wide</td>
<td>mostly O/N</td>
<td>$3T</td>
</tr>
<tr>
<td>FX fwd/swaps</td>
<td>banks, non-banks</td>
<td>wide</td>
<td>mostly &lt;6M</td>
<td>$54T</td>
</tr>
</tbody>
</table>

Source: BIS (2020) “US Dollar Funding: An International Perspective” and BIS Derivatives Statistics
Outsized role played by large banks in segmented markets

Cash-rich Lenders
- Govt MMFs
- Prime MMFs

Large Global Banking Organizations
- US Banks
- Non-US Banks
- Affiliated Repo, FX Swap Dealers

Reserves at the Fed
Repo

Ultimate Dollar Borrowers:
- Banks, Hedge Funds, Institutional Investors, Corporates

Repo, Unsecured

FX Swap
3M IBOR cross-currency basis

\[ x = y^\$ - \left[ y^i - (f - s) \right] \]

- \( x \): cash market $ rate
- \( y^\$ \): synthetic $ rate
- \( y^i \): interest rate
- \( f \): forward rate
- \( s \): spot rate

Graph showing the basis points for various currencies from 2000 to 2020.
Repo and FX swap markets trade closely

- September 16-17, 2019: repo and FX swap market moved in lockstep (Correa, Du and Liao, 2020)

Fed announced repo lending up to $75 bil.

![Chart showing repo and FX swap market movements](chart.png)
Why do CIP deviations matter?
CIP deviations: indicator of offshore $ funding condition

- CIP deviations measure **offshore dollar funding conditions**.
- The more negative the cross-currency basis, the tighter the dollar funding condition for market participants who need to borrow from the FX swap markets.
- Matter for external transmission of U.S. monetary policy.
CIP deviations: shadow costs of balance sheet constraints

- CIP violations represent failure of textbook no-arbitrage.

- Usual culprits (such as credit risk, transaction costs) cannot explain away the arbitrage profits.

- Since arbitrage exists at very short horizon (e.g. overnight), the classical limits to arbitrage due to “convergence risk” (Shleifer and Vishny, 1993) do not apply.

- CIP deviations reflect **shadow costs of balance sheet constraints** on financial intermediaries post-GFC.
The CIP deviations are highly correlated with the broad strength of the U.S. dollar. When the dollar is strong, CIP deviations are wide (Advijev, Du, Koch and Shin, 2019).
Supply of Dollar Funding and Hedging:
The Role of Large Global Banks
Two types of Dollar Funding Intermediation

- **Matched-book vs. Reserve-draining**

Source: Correa, Du and Liao (2020)

- Matched-book intermediation constrained by total leverage.
- Reserve-based intermediation constrained by considerations regarding balance.
#1) Constraints on the size of bank balance sheet:

- Non-risk-weighted capital rules (Basel III LR and the SLR) require banks to maintain capital against all assets, regardless of their risk exposure.

- Matched book dollar intermediation expand the size of bank balance sheets and make the LR requirement more binding.

- GSIB-capital surcharge: In particular, FX swap activities raise several components of GSIB-score.

- Non-U.S. banks deleverage on quarter-ends, resulting in quarter-end spikes in repo spreads and CIP deviations.

- Year-end worse than quarter-ends in recent years since the G-SIB surcharge.
Price Evidence of total leverage constraints

Du, Tepper, and Verdelhan (2018) updated
#2) Constraint on the composition of bank balance sheets

- Reserve-based intermediation is limited by banks’ considerations of intraday liquidity and how liquidity can be allocated across material entities and jurisdictions.

- Reserves have better intraday liquidity than repo and FX swap lending (e.g. Copeland, Duffie and Yang, 2020).

- Resolution planning rules require U.S. G-SIBs to hold sufficient amount of liquidity in material entities at the time of bankruptcy filing to ensure a successful resolution. Banks might prefer to keep liquidity inside the US as opposed to leave it at the ECB/BOJ (Correa, Du and Liao, 2021).
Price Evidence of Balance Sheet Composition Constraints

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Demand for Dollar Funding and Hedging
Demand for dollar funding and hedging

1. Non-U.S. banks without ready access to cash market funding (e.g. Borio et al. 2016; Ivashina, Scharfstein and Stein, 20; Rime, Schrimpf and Syrstad, 2019).

2. Non-bank financial institutions (mutual funds, pension, and insurance)
   ▶ European and Asian investors in dollar assets and hedge their currency exposure into local currencies (e.g. Liao and Zhang, 2020; and Greenwood, Hanson, Stein and Sunderam, 2020).

3. Multi-currency corporate issuers arbitrage funding costs across currencies (e.g. Liao, 2020; Maggiori, Neiman and Schreger, 2020).
CIP deviations and nominal interest rates

- Strong demand for dollar funding and hedging in the swap market from low-interest-rate currencies (CHF, DKK, EUR, JPY).
- Low (negative) demand for dollar funding/hedging in the FX swap market from high-interest-rate currencies (AUD, NZD)
Implications for cross-sectional relationship

- The trading direction for UIP and CIP violations are the opposite to each other.
- Carry trades take advantage UIP violations, which go long in high-interest-rate currencies (e.g. AUD), and short low-interest-rate currencies (e.g. JPY).
- To take advantage of CIP violations, an arbitrageur has to go long in low-interest-rate currencies (e.g. JPY), and short in high-interest-rate currencies (e.g. AUD).
Sophisticated global issuers do issue disproportionately more in high-interest-rate currencies and issue disproportionately less in low-interest-rate currencies.
Corporate issuers can face different funding conditions across different funding markets. Firms shift debt borrowing to the cheaper funding currency on the FX-hedged basis (Liao, 2020).

For example, the ECB QE compressed credit spreads for risky borrowers in Europe, making it more cheaper to issue in EUR and then swap back into USD.

Source: Liao (2020)
Central bank swap lines serve as a liquidity backstop in crisis time (e.g. Goldberg, Kennedy and Miu, 2010; Bahaj and Reis, 2018, 2020; Cetorelli, Goldberg, Ravazzolo, 2020).
CIP Deviations for Government Bond Yields
Libor vs. Govt CIP deviations for developed countries

- Still the world’s safest asset? – U.S. Treasury “convenience” remains at short maturities, but diminished at long maturities post-GFC (Du, Im and Schreger, 2018).

- CIP deviations and spot exchange rate determination (e.g. Advjiev et al. 2019; Jiang, Krishnamurthy and Lustig, 2018; Engel and Wu, 2018).

![Graphs showing Libor vs. Govt CIP deviations for 3M and 10Y maturities.](image-url)
Figure 1: 10Y average hedged spread for G10 over US, by maturity

Source: Du, Im and Schreger (2018) updated
Govt CIP deviations for emerging markets

- CIP deviations between U.S. and emerging market government bonds reflect additional risk and frictions:
  - Sovereign default risk on LC government bonds
  - Market segmentation between domestic and international capital markets.
Where do I start? – Additional Datasets

- Public/vendor datasets:
  - N-MFP: SEC data on month-end portfolio holding of U.S. MMFs at the cusip level
  - International banking data statistics available at the Fed: (Linda Golberg’s slides
  - BIS international banking/debt securities/derivatives statistics
  - IMF Coordinated Portfolio Investment Survey (CPIS)
  - U.S. Treasury International Capital
  - Global Capital Allocation Project (Morningstar/SDC/Factset):
    https://www.globalcapitalallocation.com/
  - EPFR (Emerging Portfolio Fund Research)
  - Markit Securities Finance (securities lending)

- Granular micro data covering different market segments often only available to regulators: find coauthors/internship at central banks and other regulatory bodies
Conclusion

- CIP Deviations have important international macro and finance implications:
  - Shadow costs on intermediary constraints
  - International transmission of U.S. monetary policy
  - Global financial stability, and the role of the Fed as the quasi-global lender/dealer of last resort
  - Dollar asset demand, currency denomination of debt issuance