Deviations from Covered Interest Rate Parity
by
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Discussion

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## Summary

▶ Revisit the puzzle of covered interest rate parity violations (e.g., Coffey, Hrung, Sarkar (2009)).

▶ Document pervasive CIPV in G10 cross-currency basis, both short-term (1-month) and long-term (5-years), even post crisis, when funding rates are measured relative to LIBOR curves, repo rates, or even KfW bonds.

▶ Establish new facts about CIPV. They:
   ▶ increase for contracts whose maturity straddles end of quarters and thus would have to be held 'on the books.'
   ▶ cannot be explained by CDS spread differential of members of the cross-currency LIBOR panels.
   ▶ largely explained by using Interest on Excess Reserves (IOER) rate as funding rate.
   ▶ are correlated with other anomalies such as the LIBOR basis.
   ▶ are correlated with the level of interest rates in the cross-section.

⇒ Conclude that banking regulatory constraints is major driver of CIPV.

Discussion

## One-month CIP violations
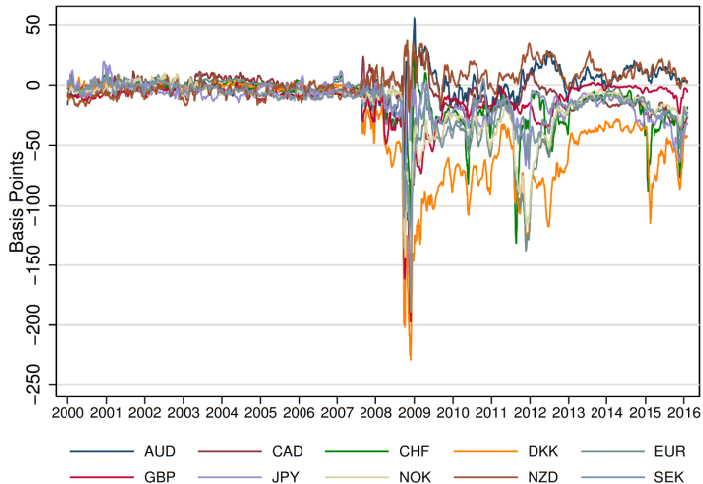
## Long-term (5-year) CIP violations
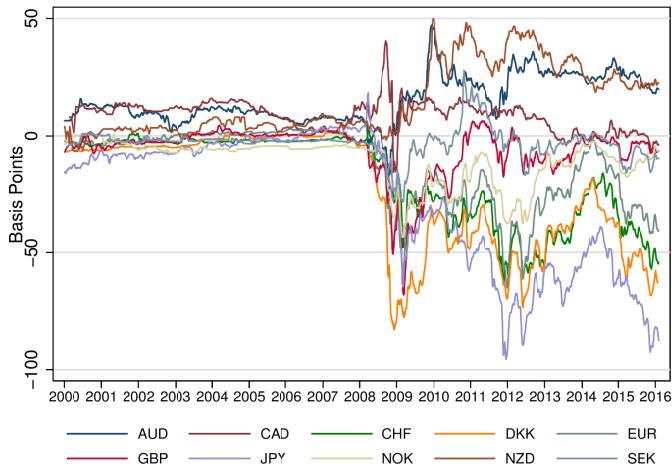


- It does not seem to be an entirely new crisis phenomenon.
- Clearly magnitude of deviations are higher during and post crisis.

## Arbitrage during and post crisis: The new normal?

- ▶ Many 'arbitrage' opportunities during and post crisis:
  - ▶ CIPV on USD transactions (Coffey, Hrung, Sarkar (2009))
  - ▶ Treasury-TIP breakeven vs. Inflation Swap rates (Fleckenstein, Longstaff, Lustig (2011))
  - ▶ Corporate CDS-Cash basis (Bai and CD (2011)).
  - ▶ Sovereign CDS-Cash basis (Buraschi, Sener and Menguturk (2012))
  - ▶ Negative Swap-Treasury Spread (Klingler and Sundaresan (2016)
  - ▶ Treasury notes versus bonds (Musto, Nini, and Schwartz (2014))

- ▶ All these papers point to 'limits to arbitrage' to explain persistence. Nice feature of CIPV: short-maturity!

- ▶ Many papers point to demand imbalances and financial intermediaries balance sheet constraints as "the explanation"

- ▶ Klingler-Sundaresan (2016): US pension fund underfunding creates large demand for long term duration hedging via swaps and balance sheet constraints of intermediaries generate apparent arbitrage opportunity in long term IRS.

- ▶ This paper's story: Large macroeconomic trade imbalances create demand for high interest rate currencies. Balance-sheet constrained banks lend in high-interest rate currencies and hedge their currency risk. This introduces a difference between actual funding rates and synthetic forward-implied rates: the cross-currency basis.

## Mechanism?

- ▶ The evidence is suggestive that banks regulatory constraints may matter:
  - ▶ The basis correlates very highly with the interest rate level. High interest rate countries have positive basis, whereas low interest rate countries have negative basis.
  - ▶ The IOER-FedFund rate spread seem to explain a large part of the basis
  - ▶ The basis seems larger for forward contracts that straddle the end of quarter.

- ▶ But what exactly is the mechanism which (a) creates the distorsion, (b) prevents other arbitrageurs (hedge funds, SWF, family offices) to exploit this (tradable?) arbitrage opportunity? more direct evidence (or a model) would be nice...

- ▶ Could these arbitrage trades actually be implemented by hedge funds? What size could actually be traded before CIP deviations disappear? (basis is 9 to 20bps after t-costs)

- ▶ All papers on crisis arbitrage find that there is high correlation between mis-pricing and illiquidity of the instruments (e.g., bid-ask spreads).
  - ▶ Are CIPV larger for the currency pairs that are more expensive to trade?
  - ▶ are CIPV larger the smaller the size of the liquid repo market?

## Striking link to USD 1 vs 3-month LIBOR basis
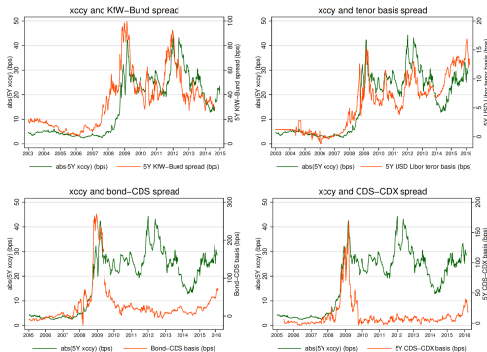


- ▶ CIPV seem distinct from credit anomalies but very related to libor basis.
- ⇒ suggests link to funding cost of intermediaries and illiquidity (perhaps more than global currency imbalances)!
- ▶ What drives 1 vs 3 months LIBOR basis?
  - ▶ 'plumbing' (e.g., how the collateral and margins are posted, what interest is paid on the collateral, typically $\neq$ IOER ...).
  - ▶ 1 vs. 3 months LIBOR affected by dynamics of the 'refreshed' credit risk in the LIBOR panel $\neq$ 5-year CDS.

## Clash of 'Arbitrageurs'?

► Interesting finding: very high negative cross-sectional correlation of the currency basis with the level of rates.

► This implies the arbitrage necessitates borrowing in high interest rate currencies (e.g., dollar) and invest in the low interest rate currencies (e.g., CHF), while at the same time hedging the currency risk forward.

► This is the opposite of the carry trade, which would borrow in low interest rate currencies and lend in high interest rate currencies, betting these will appreciate.

► If you are a hedge fund, what should you rather do?

► The carry trade signal tells you that high interest rate currencies will appreciate relative to low interest rate currencies on average. Why choose to invest now in the low interest currencies that will further depreciate?

► If the carry trade signal is correct then the arbitrage opportunity will likely widen before it converges (Kondor 2009).

## The CDS-Cash Basis

Investment-Grade Bonds
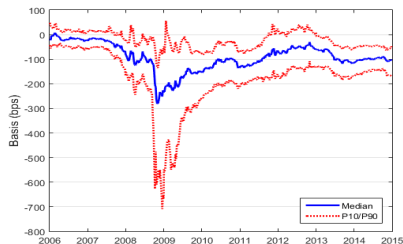


High-Yield Bonds



► The basis is on average -250 bps for IG bonds, and -700 bps for HY bonds during the global financial crisis

► The basis remains significantly negative even after the crisis!

In a frictionless market, negative basis is a free lunch:

$$\left.\begin{array}{l}\text{Borrow at Libor} \\ \text{Buy the bond} \\ \text{Buy protection}\end{array}\right\} \Rightarrow \text{Earn the basis } \textbf{risk-free}!$$

## Trading the CDS-Cash Basis in practice

- In practice, a negative 'basis package' typically consists in:
  - Fund the haircut ($h * B$) at the cost (libor+$f$)
  - Borrow $(1 - h) * B$ at repo rate to purchase the bond
  - Buy protection and post initial margin ($M$) at (libor+$f$).

- Exposure (conditional on trade not converging) to traditional 'limits to arbitrage':
  - funding cost widening (*libor*, *repo*, $f \uparrow$)
  - collateral value deteriorating ($h \uparrow$)
  - trading cost increasing (BAS $\uparrow$)
  - counterparty risk ($\tau_C \leq \tau_B$)

- Further, we find that basis is more negative when the amount of the bond that is onloan in sec-lending market, i.e., that is being shorted by the market is large.

$\rightarrow$ arbitrageurs may be waiting for better entry point.

## Conclusion

▶ A nice study of yet another disclocation 'appeared' during the crisis that seems part of the "new normal."

▶ Evidence seems to suggest that is is linked to funding costs of US financial intermediaries (Interest on excess reserves, similarity to USD basis 1 vs. 3 month LIBOR swaps)

▶ How much money is left on the table?

▶ Similar to the pervasive Bond-CDS basis it seems the 'arbitrage' is clashing with desired speculative positions of other speculators (in FX carry traders, in CDS short bond trades).

▶ What general implications (for policy) can one draw?
  ▶ Should capital requirements for banks be relaxed?
  ▶ What is the social cost of these CIP violations?