

Credit Migration and Covered Interest Rate Parity

Discussion

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- Basic Theory

- ① LOOP

- In frictionless markets, if there is no arbitrage, then the law of one price (LOOP) holds.
 - If the LOOP does not hold, then there are frictions or there are arbitrage opportunities.

- ② CIP – no-arbitrage relationship between spot S and forward F , USD/EUR

- $F = S \frac{1+r_D}{1+r_E}$

- This paper

- Can deviations from no arbitrage relationships in two markets be related to each other?
 - Can deviations from no arbitrage relationships in two markets interact with each other?
 - Who are the agents driving the interaction and what are the decisions they are making?

Paper Outline

- Empirical evidence connecting deviations from CIP to deviations from LOOP in corporate bond markets. Possible example of how deviations from no arbitrage relationships in two markets be related to each other.
- Theoretical model to help us understand how deviations from no LOOP and CIP interact with each other via decisions made by firms.
- Model suggests firms bond issuance in different currencies connects FX and corporate bond markets.

Why do we care?

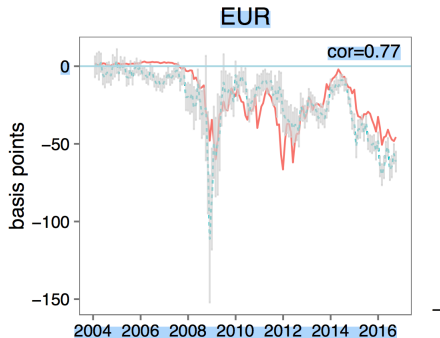
- Size of the US corporate market: 5 to 6 trillion USD range.
- Size of FX market: average daily turnover was 3.98 USD trillion in April 2010 (compared to 1.7 trillion USD in 1998). Of this 3.98 USD trillion, 1.5 USD trillion was spot transactions and 2.5 USD trillion was traded in outright forwards, swaps, and other derivatives. (Source: BIS)
- If these markets violate no arbitrage relationships, what about the rest?

Matrix pricing

- Use matrix pricing to compare EUR debt credit spreads with USD equivalent.

- Empirics is well explained and sensible – no substantive suggestions

Empirical Evidence I

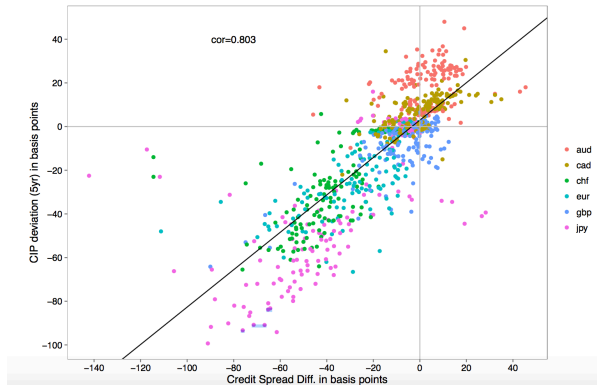


Residualized credit spread differentials (dotted blue) and CIP deviations relative to USD (solid red). Credit spread differentials are in dotted blue. Vertical bars (grey) represent the 95% confidence interval for the estimated credit spread differentials.

Empirical Evidence II

Figure 6 Credit spread differential and CIP violation

This figure presents the residualized credit spread differential and CIP violations relative to USD for EUR, GBP, JPY, AUD, CHF and CAD. Details of each measures' construction are provided in Section 1.2 and 2.



Model Summary (Static)

- Firm: decides whether or not to issue USD debt ($\mu = 1$) or EUR debt ($\mu = 0$). Amount of USD debt issued is μD . Amount of EUR debt issued is $(1 - \mu)D$ (is this in USD or EUR?)
 - effectively trade in both FX and bond markets – act as cross arbitrageurs
- Local bond investors (mean-variance preferences): one for USD, one for EUR
- Currency swap traders: trade against CIP violations

Model I

- Firm: compares cost of borrowing in EUR v cost of borrowing in USD
 - c is EUR credit spread (in USD) minus USD credit spread
 - b is USD borrowing cost of debt converting into EUR minus EUR borrowing cost in EUR

$$(1) \quad b = \frac{S}{F}(1 + r_U) - (1 + r_E)$$

- $b - c$ should be net EUR borrowing cost – twin-market deviation
- if $b - c > 0$, issue in USD, i.e. $\mu = 1$

$$(2) \quad \mu = I_{\{b-c>0\}}$$

- issues with FX conversions

Model II

- Local bond investors, $i \in \{EUR, USD\}$. Face segmented bond markets.

$$(3) \max_{X_i} E[(1 - \pi)Y_i - \pi L - r_i]X_i - \frac{1}{2\tau} V X_i^2$$

- X_i , wealth invested in local currency units
- local currency bond yield, Y_i
- π physical default probability
- loss given default, L
- FOC

$$(4) X_i = \frac{\tau}{V} [(1 - \pi)Y_i - \pi L - r_i]$$

Model III

- Currency swap traders. Choose s to maximize

$$(5) \quad bs + f(W - \gamma|s|)$$

- s , size of swap position; $\gamma|s|$, capital set aside
- capital invested elsewhere $W - \gamma|s|$
- $f(I) = \phi_0 I - \frac{1}{2} I^2$
- FOC

$$(6) \quad b = \text{sign}(s)\gamma(\overbrace{\phi_0 - W}^{=0} + \gamma|s|)$$

$$(7) \quad = \text{sign}(s)\gamma^2|s|$$

$$(8) \quad = \gamma^2 s$$

Model IV

- Market clearing
 - debt markets

$$(9) \quad X_U = \mu D$$

$$(10) \quad X_E + \underbrace{\epsilon_c}_{\text{exog shock}} = (1 - \mu)D$$

- exog shock from QE
- Do we need it? If X_E is in EUR and D is in USD, could we use FX rate to convert D into USD?
- After some algebra obtain

$$(11) \quad c \approx \frac{V}{\tau} ((1 - 2\mu)D - \epsilon_c)$$

- Derivation relies on expression $Y_E - Y_U = c + (r_E - r_U)$. Not sure units are correct – c is the difference between spreads, both in USD terms; $r_E - r_U$ is not in USD terms – if it were it would be a multiple of $-b$.
- I think you should use $Y_E \frac{F}{S} - Y_U = c - \frac{F}{S}b$

Model V

- FX swap market

(12)

$$b = -\gamma^2(D(1 - \mu) + \epsilon_b)$$

- exog FX swap demand shock ϵ_b

Model Implications

- Shocks to one market are transmitted to the other through capital flows. Credit spread differential c and CIP deviations b both fall when there is a positive ϵ_c or ϵ_b .
- Cheaper net cost of issuance in euro induces more issuance flow in euro and less issuance in dollar. $c - b$ falls means μ lower.
- $b - c$ falls when D is higher. Borrowing constraints will lead to larger twin-market deviation.
- More risk averse credit investors, larger $|b|$ and $|c|$.
 - Time varying risk aversion could explain dynamics of $|b|$ and $|c|$

Comments: Units and Swaps

Units

- Economists not as careful with these as physicists
- Unclear which expressions are denominated in which currency.
- Not sure market clearing is done correctly

Swaps

- Aren't swaps in zero net supply?
- Who are the currency swap traders trading with?

Comments: Arbitrage

- Arbitrage opportunities interesting if long lived
- Cannot study this in static model
- All effects are instantaneous

Comments: Segmentation

- USD bond investors stick to USD bonds.
- Is this realistic?
- There are plenty of global fixed income funds (globale Rentenfonds!). For example, BlackRock Global Corporate Bond Fund. See also Schroders, Pimco, Morgan Stanley etc.
- What happens when bond investors can invest in both types of bond? Would c be zero?

Summary

- Interesting to understand role of firms and debt issuance from an arbitrage perspective and connect credit spreads to CIP violations
- Model need to be clearer in terms of assumptions and notation
 - Evidence for segmentation assumption
 - Be careful about units in FX
 - Counterparties in FX swaps
- Is a dynamic model possible?