Covered Interest Parity - RIP

David Lando
Copenhagen Business School

BIS
May 22, 2017
Three main points

- VERY interesting and well-written papers
- Law Of One Price and credit spreads in different currencies (Liao)
- Credit component in LIBOR rates and CIP deviations spreads (DTV)
Credit spreads and the Law of One Price (LOOP)

- Reasonable to say that CIP is based on LOOP principle
- In a frictionless model, we can prove the relationship
- However, it is not true, even without frictions, that credit risky companies should pay the same spread in different currencies
- No-arbitrage models can generate yields spreads and CDS premiums which depend on the currency
- The intuition is most easily grasped for sovereign CDS
- Quanto spreads are well known here
CDS quanto spreads

- Consider two CDS contracts on same reference sovereign entity
  - 1. One protecting against default on 100 USD notional - premium paid in USD
  - 2. One protecting against default on 100 EUR notional - premium paid in EUR

- Assuming same recovery as fraction of notional and same terms, premiums can be (and are) different even without frictions
Quanto spreads for sovereigns

- Euro bonds can be delivered into USD contract (and vice versa) at FX rate prevailing at default
- Assume for simplicity that exchange rate is 1 USD per 1 EUR at initiation
- Assume Euro crashes at default, say, to 0.5 USD per 1 EUR
- Then it will be possible to deliver twice as many EUR bonds into USD contract, i.e., in reality the USD contract delivers 'double protection'
- Therefore, USD CDS premium is higher than the EUR premium
Quanto spreads can be large

Source: Lando and Nielsen (2017)
Correlation instead of crash risk

- There does not have to be crash risk in the currency for a quanto effect to exist
- Correlation between the intensity of default on the sovereign entity and the exchange rate is enough
- This result carries over to corporate bonds
- Correlation between default event and exchange rate will generate currency-dependent yield spread
Crash risk and bonds

- Crash risk can also contribute to yield spread differentials for corporate bonds
- A sovereign 'disaster' may lead to an FX crash while also causing corporate defaults or large changes in default intensities
- Conversion of one bond into a synthetic bond in different currency fails because FX forwards do not cancel
Crash risk and bonds - breakdown in FX hedge

<table>
<thead>
<tr>
<th></th>
<th>( t = 0 )</th>
<th>No default at ( t = 1 )</th>
<th>Default at ( t = 1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long USD Bond</td>
<td>(-P_{\text{dom}})</td>
<td>1 USD</td>
<td>0 USD</td>
</tr>
<tr>
<td>Short Synthetic USD Bond</td>
<td>( P_{\text{synth}} )</td>
<td>(-1) EUR + 1 EUR - 1 USD</td>
<td>1 EUR -1 USD</td>
</tr>
<tr>
<td>Cash Flow L/S</td>
<td>0</td>
<td>0</td>
<td>(-0.5) USD</td>
</tr>
</tbody>
</table>

**Table:** One Period Crash Risk in Synthetic EUR Bond. This table shows the payoffs for a short position in a synthetic EUR bond—which is a short a EUR zero coupon bond and long a forward contract—and a long position in a zero coupon bond denominated in USD. All contracts are initiated at time 0 and mature at time 1. The riskless interest rates are 0 and the exchange rate is 1 at time 0, such that \( P_{\text{synth}} = P_{\text{dom}} \), and the forward exchange rate is 1. In the table the default state is assumed to be associated with a 50 % depreciation in the EUR against the USD.

(from Lando and Nielsen (2017))
FX hedge also breaks down with default risk when FX risk and default intensities are correlated.
The effect is more pronounced for long-dated bonds.
In sum, emphasize LOOP less for yield spread differentials.
Or show, that in realistic arbitrage-free models the generated spreads cannot explain the observed spreads.
Credit risk differentials

- Du, Tepper, Verdelhan (2017) look at - among many things - credit spreads differentials as source of CIP deviations
- Regress changes in Libor basis on changes in CDS premium differences
- It is remarkable that there is a regression coefficient of nearly zero in the regression

$$\Delta x_t^{i,Libor} = \alpha^i + \beta \Delta (cds_t^i - cds_t^{USD}) + \epsilon_t^i$$

- But does this perhaps conceal different regimes?
- Looking at LIBOR - OIS as measure of credit risk suggests that this could be the case
Covered Interest Parity

David Lando (CBS)