Valuing less liquid bonds

A research paper

Asset swap-spread vs Z-spread

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The French Bond Association
Comité de Normalisation Obligataire

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Fixed-rate bond pricing : valuation methods

Scope: Agency rated

Un-callable fixed rate bonds

Residual maturities >18 months
Euro-denominated

Hypothesis: Valuing a bond = Valuing the issuer's Z-spread

(for a given reference zero coupon curve)

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Valuing method : 3 mains approaches

1. Same issuer paper tradable/in supply: shorter + longer-dated maturities

2. Same issuer CDS tradable

3. Comparable liquid paper tradable/in supply (same sector issuers)

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Valuing method
Same issuer paper tradable/in supply (1/3)

Same issuer, shorter & longer-dated maturity paper in supply

- **Data sources** tapping all reliable & available market sources: trading platforms/MTFs, Bloomberg, Reuters, broker-dealers.

- **Interpolation/regression method** from available Z-spread curve

- However Z spread does not anticipate ***jump spread*** *=> Beyond a certain intensity of credit risk Z spread becomes an imperfect measure.*

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Valuing method

Single name CDS approach (2/3)

Bond + CDS protection ≈ "risk-free" synthetic bond asset

Thus in spread terms becomes:

Z-spread   - CDS- spread   ≈ 0 ,

hence ,

Z-spread ≈ CDS - spread

Since no perfect arbitrage,

Basis = CDS - spread - Z-spread

with,

Basis ≈ CDS optional value + implicit repo margin - liquidity value

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Valuing method
Comparable liquid paper tradable/in supply (3/3)

In absence of relevant data on a given issuer
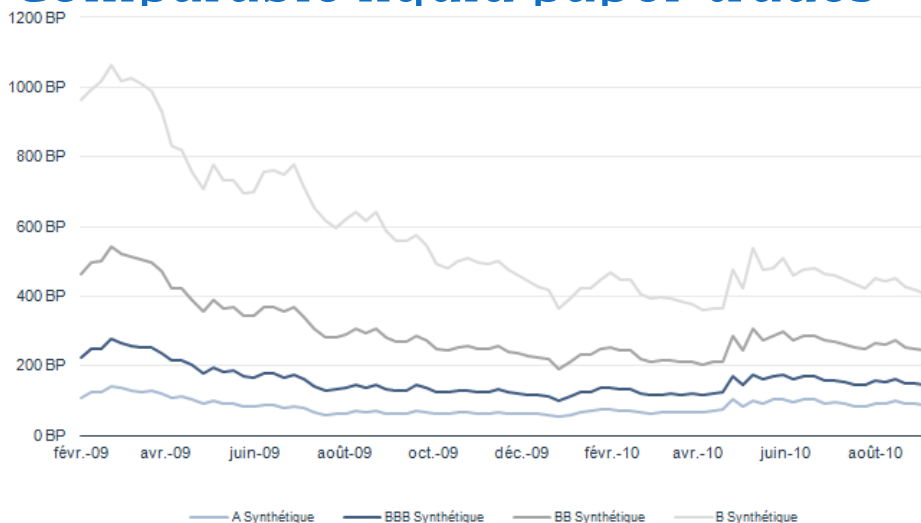=> need to reconstruct Z-spread curves
- via the issuer's rating
- by comparison with peers' paper.

Numerical approach: Regression as of non filtered spread data on different issuer at same maturity according to a numerical credit rating scale.

Ex: Z spread for a given rating ≈ exp^ (a + b*credit scale)

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Valuing method
Comparable liquid paper trades

Reconstructing z-spread rating curve for different credit rating

Daily observation versus regression z-spread curve as of 17sept.10
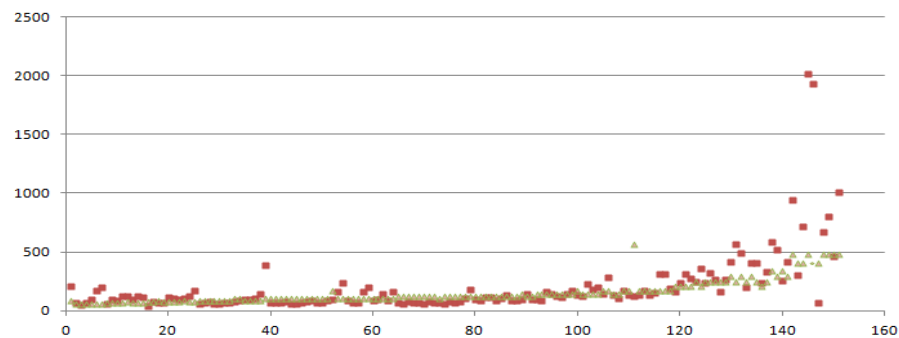
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Asset swap-spread vs Z-spread (1/2)

Asset swap spread is calculated via closed form formula: Difference between value of bond's discounted cash flows on the par swap curve vs. bond's market value, coupon included; this difference is divided by the swap sensitivity of a par swap at the bond's maturity.

Asw = (P swap – Bond Dirty price) / DV01

With,

DVO1 : swap's sensitivity at the bond's maturity
Dirty price: bond's market value, coupon included
P swap: bond's cash flows discounted on the swap curve

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Asset swap-spread vs Z-spread (2/2)

Main difference

- One risk on a vanilla asset
    - => non-payment from the bond issuer (up to bond coupons and principal)
- 2 distinct risks on an asset swap
    - => non-payment from the bond issuer (up to bond coupons and principal)
    - => non-payment from the bank counterparty on the swap flows

Our approach allows a sound estimation of the Z-spread from the asset swap spread, with a proportional rule using two sensitivities:

- S1 : Sensitivity of the Price to the yield of the bond
- S2 : Sensitivity of the Price to the coupon of the bond

The formula is as follows:

$$Z\text{-}spread = asset\ swap\ spread * S1/S2$$

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Sources

References
- For more information on this research paper, please refer to CNO website publications.

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