

Discount rates for valuation, including taking account of liquidity

Seamus Creedon (Working Party Chairman)

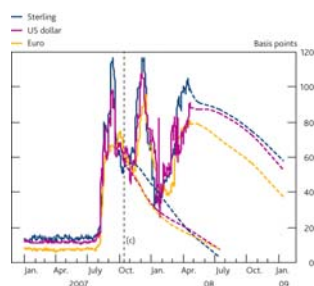
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HILTON DEANSGATE, MANCHESTER

Background

- Extensive feedback to IASB on discount rate elements of DP
- Apparent disagreement between CEIOPS and CRO/CFO Forums
- Controversial ASB/EFRA discussion paper on UK pensions accounting
- Extensive treatment in IAA RMWG paper
(www.actuaries.org/CTEES_RISKMARGIN/Documents/RMWG_Exposure_Draft2.pdf)
- Developments in markets:
 - Widening corporate bond spreads
 - Widening € government bond spreads
 - LIBOR too high or too low?
 - Widening swap spreads

FIRM Board established working party in late 2007 to investigate...

Chart 1.1 Three-month interbank rates relative to expected policy rates(a)(b)



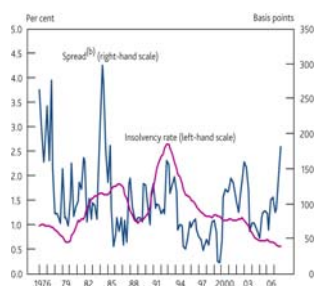
Sources: Bloomberg and Bank calculations.

(a) Spread of three-month Libor to three-month overnight indexed swap (OIS) rates.

(b) Dashed lines show forward spreads derived from forward rate agreements as at 15 October 2007 and 22 April 2008.

(c) October 2007 Report.

Chart 1.17 UK investment-grade corporate bond spreads and insolvency rate(a)



Sources: Companies House, Global Financial Data, The Insolvency Service and Bank calculations.

(a) Provisional 2007 Q4 figure from The Insolvency Service.
(b) Three-month rolling average using end-month observations.

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Taking Account of Liquidity in Valuation Working Party

2008 Working Party Report:

- A summary of the differing liquidity / illiquidity in liabilities and obligations.
- A detailed analysis of the components of reported yields across different asset classes.
- Implications for valuation:
 - Allowance for 'own' credit risk
 - Risk-free rates / reference rates
 - Illiquidity Premia

Work in progress, to be published imminently!

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Liquidity characteristics of liabilities

- Most life insurer liabilities and pension scheme obligations are long-term in nature.
- However, even within long-term contracts, there are significant differences in terms of liquidity:
 - Unit-Linked liabilities.
These can be considered to be exactly as liquid as the corresponding assets.
 - Non-linked liabilities
Annuities are highly illiquid – the timing of outflows for a large portfolio is certain (in adverse scenarios additional assets are required)
Others may depend on explicit/implicit terms of policyholder contract
- However, how can we quantify this illiquidity?
- And how can we allow for it in a valuation?

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Asset markets

- We assessed the information about discount rates available from markets:
 - Government Bonds
 - Corporate Bonds
 - Inter-Bank Deposits
 - Swaps
 - XIBOR-based Swaps
 - XONIA-based Swaps
 - Tailored transactions offered by banks

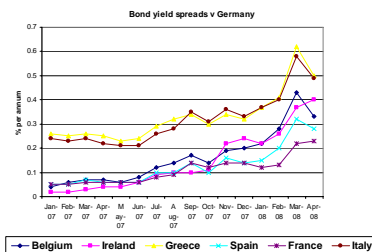
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Government bond yields

- Risk of 'de facto' default
- Benchmark bonds.
- "On-the-run"/"Tap" issues.
- Alternative structures.
- Bid/offer spreads and trading volumes.
- Flight to quality
- Impact of regulation.
- Potential to use as collateral

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Risk on government debt



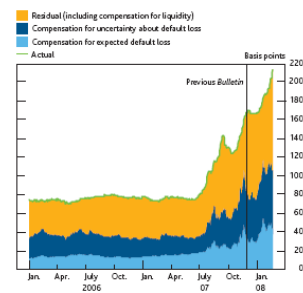
Example of a risk on government debt:
Euro-denominated bonds face uncertainty in the event that an issuing government leaves the Euro zone and seek to redenominate its national debt into a national currency.

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Taking Account of Liquidity in Valuation Corporate Bonds

- Default and downgrade risk.
- Matching benchmark bonds.
- Information asymmetry / “crunch risk”.
- It is not possible with certainty to distinguish credit risk premium from illiquidity premium.
- There appears to be widespread support for the view that the unexplained residual, which includes any 'illiquidity premium', increased considerably in the latter part of 2007 for certain bond and other asset classes.

Corporate bond spreads (investment-grade)

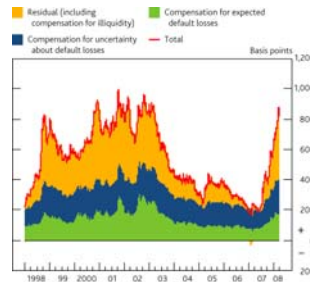


The attached research does not provide a separation of the 'residual' spread into illiquidity premium and other components.

This residual may include weaknesses in the underlying Merton model for capturing the default element.

In addition, the model calibration used assumes that there is no illiquidity component in the equity return assumption.

Chart 1.18 Decomposition of sterling high-yield corporate bond spreads(a)(b)



Sources: Bloomberg, Merrill Lynch, Thomson Datastream and Bank calculations.

(a) Weber, L and Churm, R (2007), 'Decomposing corporate bond spreads', Bank of England Quarterly Bulletin, Vol. 47, 'The Actuarial Profession'.

(b) Option-adjusted spreads over government bond yields.

Decomposition difficulties

- As discussed above, there are significant difficulties in calibrating structural models to 'decompose' credit spreads.
- We might hope to decompose credit spreads using a multivariate model, making estimates of credit risk, liquidity and convenience elements.
- However, the liquidity and convenience components are related to the default risk.
- For example, the liquidity effect is likely to be dominated by asymmetries in relation to defaults in a "crunch".

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Inter-Bank Market Rates

- Term deposits between banks on unsecured basis.
- Very limited secondary market.
- Data collected through a survey of a panel of banks.
- Issues with LIBOR.
- 'General Collateral' and repo rates
- 'Special Liquidity Scheme' from BofE.

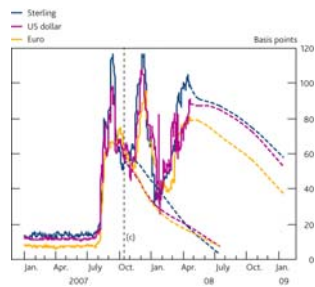
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Taking Account of Liquidity in Valuation Swaps – 'LIBOR' linked

- Used to 'roll-over' inter-bank deposits.
- Variable cashflow linked to publicly quoted index such as 'LIBOR'
- Basis risk as can't fund LIBOR ('offer' rate).
- When considering liquidity characteristics of the swap, we also need to consider the liquidity (and credit) characteristics of the underlying inter-bank rate.
- When comparing a synthetic bond (cash plus receiver swap) to a corporate bond, we need to consider the credit risk 'refresh' for the synthetic investor. The synthetic investor can always reinvest cash with a AA-rated institution. The corporate bond holder does not have that advantage.
- There is however evidence that the 'illiquidity premium' in inter-bank lending increased considerably in the latter part of 2007

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Spreads of term interbank rates relative to overnight



Sources: Bloomberg and Bank calculations.

(a) Spread of three-month Libor to three-month overnight indexed swap (OIS) rates.

(b) Dashed lines show forward spreads derived from forward rate agreements as at 15 October 2007 and 22 April 2008.

(c) October 2007 Report.

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Taking Account of Liquidity in Valuation Swaps – Overnight Indexed

- Unusually high difference in yield between overnight indexed swaps and 'LIBOR' based swaps.
- The key to the difference lies in the 'refreshing' effect, so is at least in part due to 'previsible' credit risk.
- There are indications that the market is switching to overnight index based swap yields as a better benchmark
- Swap yields on overnight indexed swaps are more easily reconcilable to government bond yields (allowing for additional repo yield)

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Tailored off-market 'liquidity-renting' transactions

- Tailored Liquidity transactions between insurance companies and investment banks giving an 'explicit' yield for liquidity.

Worked Example:

- An insurance company holds government bonds that back annuity business (and so the insurance company doesn't need the liquidity of these bonds).
- The insurance company then sells these gilts to generate cash and buys illiquid assets (or swaps gilts for illiquid assets already owned by the investment bank), which are then held by the insurer until maturity.
- The insurance company and the investment bank enter into a total return swap on the assets, so the insurance company keeps its government bond-based return.
- The investment bank provides an additional return to the insurance company for 'liquidity'.
- The investment bank is prepared to pay for this spread in return for the certainty of funding (as the arrangement is in force until the illiquid assets mature).
- The incremental credit risk to the insurance company is small. For example, the transaction would be unwound, with the insurer made good, on the 'default' of any of the illiquid assets.

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Accounting controversy

- There appears to be a lack of consistency in marking some liabilities to fair value and not others – this issue not unique to insurance or pensions.
- Credit standing of insurance liabilities is not objectively observable – regulatory standards may be the best guide.
- Regulatory requirements for insurers are such that in all but exceptional circumstances the amounts allowing for expected default losses are little different from the amounts without such allowance.
- It is desirable that insurance technical provisions be recorded at the same values for both general-purpose accounting and solvency assessment
- In the absence of a coherent and comprehensive framework, different history and context for pensions and insurance may justify differences in general-purpose accounting approaches

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Solvency assessment

- Key issue is asset sufficiency in adverse scenarios
- Definition of technical provisions, including whether to allow for default outcomes and choice of discount rate, of secondary importance
- There may be a 'second order' impact on required levels of assets if solvency is defined as assets required to cover technical provisions with a minimum threshold confidence over a short time horizon

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'Risk-free rate'

- Phrase used far too loosely!
- May mean 'rate derived from market information sources exclusive of any element of compensation for the risk of credit default or deterioration'
- Relevant market sources likely to include:
 - Government bond markets
 - Other bond markets
 - Markets for swap instruments
 - Other fixed-income markets
- **Conclusion:** The degree of relevance of possible sources for reference rates is a function of market characteristics, including particularly scope, depth and liquidity and can vary as between jurisdictions/currencies and over time. Furthermore the rates observable from such sources need to be adjusted in order to meet the suggested definition.

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Taking Account of Liquidity in Valuation Reference Rate

Desirable characteristics of reference instruments:

- Price data is readily available, and consistent across a large number of economies and currencies
- The underlying market has narrow bid-offer spread and can absorb large trades without significantly moving the market price
- The reference curve is widely used for pricing a wide range of instruments.
- The accounting organisation can participate in the trades, as both buyer and seller.
- The dates of cash flows from the financial instruments are conveniently spaced, and extend far into the future, to aid interpolation or extrapolation
- Contracts used in the calibration are homogeneous, minimising distorting effects from special contract conditions.
- The instruments are low in default risk
- There are no institutional limits to supply or demand. A wide range of institutions can buy or sell, borrow or lend in the instruments.

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Issues relevant to choice of reference rate

- Government bond yields
 - Some element of compensation for default risk
 - Differential € government bond yields
 - Negative swap spreads in Japan
 - Can be enhanced by use as repo collateral
- Swap-based yields
 - Fixed leg rate driven by definition of floating leg rate
 - LIBOR distorted by 'credit crunch' increased spreads
 - Swap yields defined by reference to SONIA, EONIA a better but not perfect reference
 - Market players moving in this direction
- Corporate (and other) bond yields
 - Spreads (over Government) reflect complex mix of compensation for:
 - Credit losses associated with default and adverse migration
 - Lack of liquidity, including potential widening of bid/offer spreads
 - Inconvenience, management costs
 - Uncertainty in variation of credit and illiquidity experience
 - Spreads incapable of objective decomposition

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Reference rates to reflect liquidity characteristics of liability

- Liabilities have different liquidity characteristics, reflecting the degree to which timing is or is not certain
- Reference rate for discounting liabilities should reflect yields on assets which replicate these characteristics:
 - Swaps and Government bonds are relatively liquid – can be traded on relatively predictable terms
 - Bonds, mortgages are relatively illiquid – may find dramatic spread widening in adverse circumstances
- Problem is that spreads cannot be decomposed into 'credit loss variation uncertainty' and 'forced sale loss uncertainty' elements – these are in the eye of the beholder
- Analysis by reference to CDS spreads has suggested that there has been an increase in the amount of spread which is not explained by plausible credit loss and credit loss uncertainty influences
- Very live issue in UK context!

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Thanks!

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