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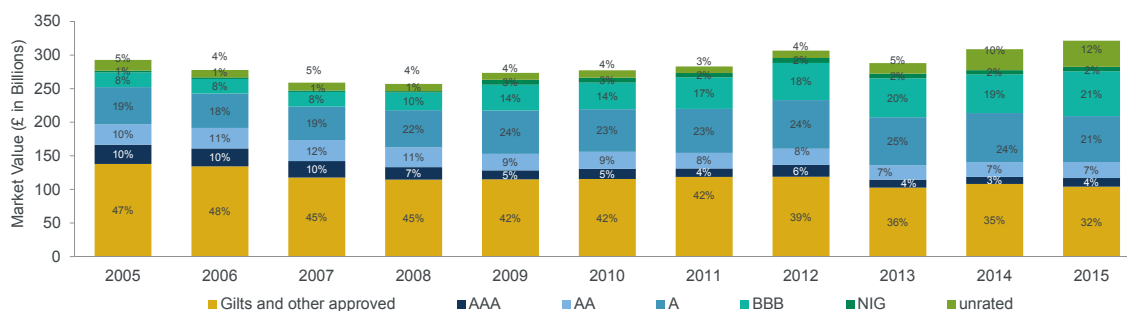
How to create an efficient private credit asset portfolio on UK life insurance balance sheet

Munawer Shafi, Aviva Investors

Sidd Bhat, Citigroup Global Markets

November 2017

Growth of unrated assets in Insurance Companies' balance sheets



1. Government and supra holdings decreased
2. Average credit quality decreased from AA / A to A / BBB
3. Credit spread duration is expected to have increased
4. Credit risk the major driver of 'market' risk capital
5. Loss of diversification benefit between credit and longevity risk

UK Insurance companies have put on a greater percentage of illiquid/ unrated assets on their balance sheets over the past 5 years.

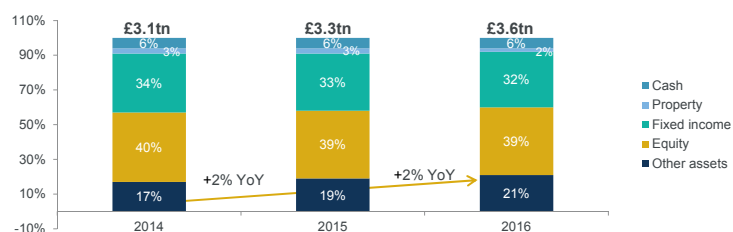


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November 2017 Source: FSA / PRA returns from 2005–2015.

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Broader trend towards a shift to “other assets” in UK Real Money Investors



What is included in “other assets”?

✓ Private Markets (PM)

- Private Equity (PE)
 - Seeking superior risk adjusted return to public equities via direct investments or funds
- Private Credit (PC)
 - Stable, secure income derived from private, illiquid credit
- Real Assets (RA) (excl. Property)
 - Equity derived, stable long duration inflation linked cash flows including Infrastructure, Transportation & Energy

✓ Solutions Driven Investments

- Multi-Asset Products/ Funds
- Derivative Based Investments
- Repackaged Swaps
 - Looking for long duration nominal or index linked exposure

✓ Esoteric Assets (EA)

(Looking for uncorrelated or less correlated return profiles to current investment portfolio)

- Commodities
- Healthcare/ Drug Royalties
- Insurance Linked Securities
- Municipal Securities



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Source: Citi, Asset Management in the UK- The Investment Association Annual Survey, Sep 2017

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General characteristics of Private Credit Asset Classes

	Infrastructure Lending	Corporate Lending	Commercial Real Estate Lending	Asset Backed Securities
Security	Infrastructure assets	Companies cash flows	Commercial property	Various loans
Key sectors	<ul style="list-style-type: none"> • Energy • PPP/PFI • Transportation • Accommodation 	<ul style="list-style-type: none"> • Leveraged loans (LL) • Private placement bonds (PP) 	<ul style="list-style-type: none"> • Office • Industrial • Retail 	<ul style="list-style-type: none"> • RMBS • CMBS • CLOs • Credit cards
Typical maturity	10-30 years	5-8 years for LLs 10-12 years for PPs	3-7 years for floating 7-10 years for fixed	3-10 years



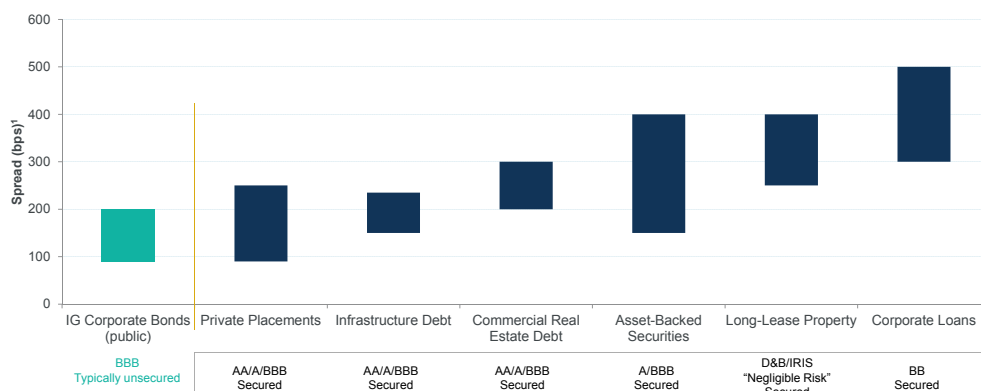
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Source: Mercer SCIF

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Why Insurance Companies have been attracted to Private Credit Asset Classes



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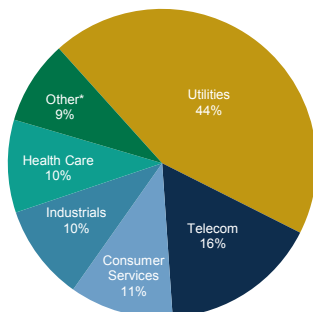
¹ Spread to Libor or Gilts, as appropriate. Spreads are indicative only. Gross of fees
Source: Standard Life Investments, June 2017

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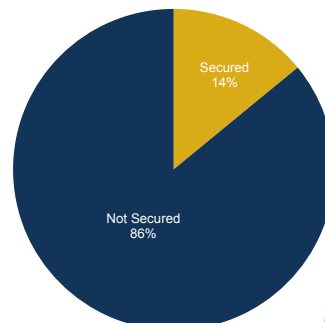
Current Myths and Assumptions re Private Credit Asset Classes (1/4)

1 Are Private Credit Asset Classes really giving exposure to new forms of risks?

iBoxx GBP Corp ex-fins 15y+ - Sectors breakdown



iBoxx GBP Corp ex-fins 15y+ - Secured vs Unsecured



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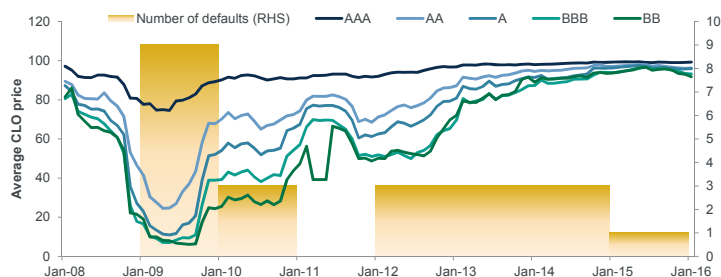
Source: Bloomberg
*Other includes Consumer Goods (4.5%), Oil & Gas (2%), Basic Materials (1.5%) and Technology (1%)

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Current Myths and Assumptions re Private Credit Asset Classes (2/4)

2 Is mark-to-market volatility correct measure for assessing risk of Private Credit Asset Classes?

Euro CLO Prices vs Number of Defaults



Euro CLO Number of defaults

Original rating	Number of defaults (1993-2015)
Aaa	0
Aa	0
A	0
Baa	2
Ba	19
B	1
Caa	0



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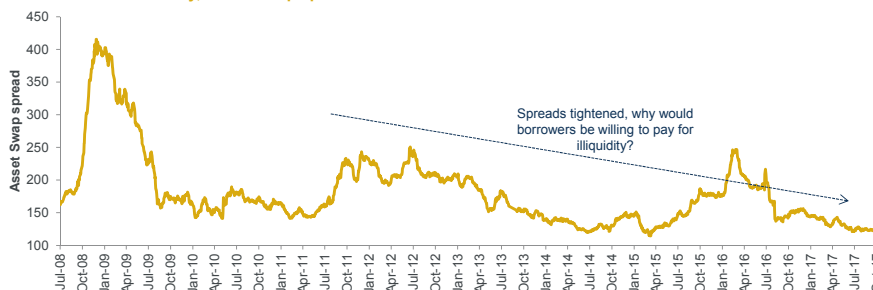
Source: Moody's Investors Service,
Citi average monthly CLO 1.0 prices from Jan-08 onwards

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Current Myths and Assumptions re Private Credit Asset Classes (3/4)

3 Why would borrowers pay illiquidity premium when credit spread are at all time low?

iBoxx GBP Non-fins 10-15y, Asset-Swap spread



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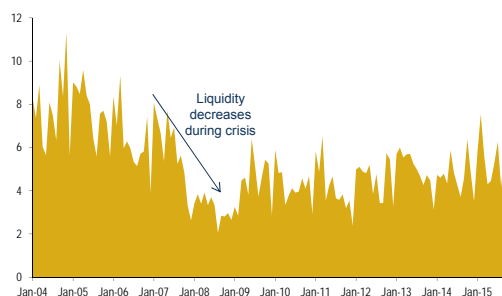
Source: Citi Velocity

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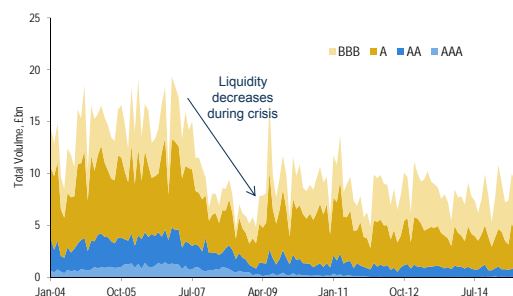
Current Myths and Assumptions re Private Credit Asset Classes (4/4)

4 Are liquid credit markets actually (il)liquid?

Total Monthly Bond Turnover in £ iBoxx, non-financials



Total Monthly Bond Turnover in £ iBoxx, Broad rating



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Source: Citi Velocity

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What should Insurance Companies try to achieve in Private Credit Portfolios?

- 1 Focus on the **objective function** (not minimise volatility but minimise expected losses and credit rating downgrades)
- 2 Capture and apply **the right/additional risk factors** across liquid and private credit assets for security selection
- 3 Maximise the return for every unit of expected loss and rating downgrade across the investment portfolio



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Portfolio construction across Private Credit Assets

Traditional approach

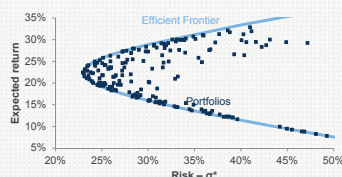
Markowitz's Modern Portfolio Theory

- Any investor's goal is to **maximize return for any level of risk**

Portfolio's expected return : $E[R_p] = \sum_i w_i E[R_i]$

Portfolio's risk (variance): $\sigma_p^2 = \sum_i w_i^2 \sigma_i^2 + \sum_{i \neq j} w_i w_j \sigma_i \sigma_j \rho_{ij}$

- Risk can be reduced by creating a **diversified** portfolio of uncorrelated assets.
- The **Efficient Frontier** is the set of optimal portfolios with the highest return and the lowest risk



Solvency II

- Investor's goal is to **maximize return for given level of capital**.

Capital is defined as 1-200 event, VaR (99.5%) or $2.58 \times \sigma_p$ (assuming normal distribution)

Where it fails for Private Credit Portfolios

- The objective function is different from minimizing volatility: **minimize expected losses or rating downgrades**
- What does volatility mean for Private Credit Asset Classes?
- All assumptions cannot be applied to the Private Credit market (no short selling etc.)
- Can not easily trade in and out of the asset class, sizeable book building is a key issue
- Other risks such as illiquidity are not fully captured by Markowitz



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Factor-based approach

Traditional approach

Fama-French 3-factors model

- A portfolio's expected return can be explained by different factors' returns:

$$E[R_p] = R_f + \beta_1 E[R_1] + \beta_2 E[R_2] + \beta_3 E[R_3]$$

In the equity standard model:

- ✓ R_1 is the Size Premium
- ✓ R_2 is the Value Premium
- ✓ R_3 is the Market Risk ($R_m - R_f$)

- Define factors that make sense for Private Credit Portfolios:

- ✓ Spread
- ✓ Loss severity/Credit change
- ✓ Maturity profile

Where it fails for Private Credit Portfolios

- The objective function is different from minimizing volatility: **minimize expected losses**
- Certain types of factors are not captured:
 - ✓ Political risk
 - ✓ Legal risk
 - ✓ Accounting risk
 - ✓ Regulatory risk
 - ✓ Illiquidity risk
 - ✓ Credit mitigation risk
- This is not a portfolio optimisation model but rather a factor-based asset selection model



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Focus on creating a framework around drivers of risk and return in order to minimize expected loss

Strategic

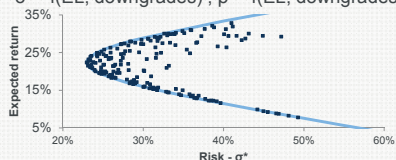
- We know our expected return and know that the volatility and correlations can be calculate using a function of **expected losses (EL), credit rating downgrades, risk aversion and Illiquidity Premium**

$$\sigma = f(\text{EL, downgrades, risk aversion, Illiquidity Premium})$$

$$\rho = f(\text{EL, downgrades, risk aversion, Illiquidity Premium})$$

- In order to optimise against our objective function, we can adjust the volatility function to **remove the risk aversion and Illiquidity Premium factors**

$$\sigma^* = f(\text{EL, downgrades}) ; \rho^* = f(\text{EL, downgrades})$$



Tactical

- Fama French factor-based model to tactically allocate amongst asset classes
- We can re-write the model using factors that make sense for private credit. For example:
 - ✓ Political risk – R_1
 - ✓ Legal risk – R_2
 - ✓ Accounting risk – R_3
 - ✓ Regulatory risk – R_4
 - ✓ Illiquidity risk – R_5
 - ✓ Credit mitigation risk – R_6

$$E[R_p] = R_f + \beta_1 E[R_1] + \beta_2 E[R_2] + \beta_3 E[R_3] + \beta_4 E[R_4] + \beta_5 E[R_5]$$



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Things to keep in mind from an insurer perspective

- 1 Focus on the **objective function** and create a **risk framework** that accurately capture it
- 2 Apply consistently the factor-based risk assessment across both public and private credit
- 3 A multi-factor based approach to decomposition of returns will enable tactical/opportunistic investments



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Questions?



Don't follow the crowd, understand the risks



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Appendix- Academic research on asset allocation for Alternative Investments

- Can Cao and Jerome Teiletche, August 2007 - *Reconsidering asset allocation involving illiquid assets*
- Niels Pedersen, Sebastien Page, CFA and Fei He, CFA, May/June 2014 - *Asset Allocation: Risk Models for Alternative Investments*
- Douglas Cumming, Lars Helge Haß and Denis Schweizer – *Strategic Asset Allocation and the Role of Alternative Investments*
- Mercer, February 2015 – *Setting an appropriate liquidity budget: Making the most of a long investment horizon*
- Dirk Broeders, Kristy Jansen and Bad Werker, April 2017 – *Pension Fund's illiquid assets allocation under liquidity and capital constraints*



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