

Appraisal of private debt opportunities: A holistic approach for UK pension funds

October 2016

www.macquarie.com

Notes

This document has not been prepared in accordance with legal requirements designed to promote the independence of investment research and is not subject to any prohibition on dealing ahead of the dissemination of investment research.

The case studies within the paper are simulated examples of a sample UK pension fund investing in "Infrastructure Debt" through the Macquarie Infrastructure Debt (UK Inflation Linked) Fund and "Infrastructure Debt" returns are modelled based on the returns for assets sourced in the period between first close (November 2014) and 30 June 2016. The Fund is closed to new investor commitments and past performance is not intended to be an indicator of future performance.

All rates, including Gilt and corporate bond yields, are sourced from Bloomberg as at 22 July 2016.

Important Notice

This document is issued by Macquarie Bank International Limited (MBIL) only to Professional Clients or Eligible Counterparties defined in the Markets in Financial Instruments Directive 2004/39/EC. MBIL is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. MBIL is incorporated and registered in England and Wales (Company No. 06309906, Firm Reference No. 471080). The registered office of MBIL is Ropemaker Place, 28 Ropemaker Street, London, EC2Y 9HD. The information in this document is not, and should not be construed as, an invitation, an offer, a solicitation of an offer or a recommendation to participate in any investment strategy or take any other action, including to buy or sell any product or security or offer any banking or financial service or facility by any member of the Macquarie Group. This document has been prepared without taking into account any person's objectives, financial situation or needs. Recipients should not construe the contents of this document as financial, investment or other advice. It should not be relied on in making any investment decision. Future results are impossible to predict. This document contains opinions, conclusions, estimates and other forward-looking statements which are, by their very nature, subject to various risks and uncertainties. Actual events or results may differ materially, positively or negatively, from those reflected or contemplated in such forward-looking statements. Past performance information shown herein, whether actual or simulated, is not indicative of future results. No representation or warranty, express or implied, is made as to the suitability, accuracy, currency or completeness of all information, opinions and conclusions contained in this document. In prearing this document, reliance has been placed, without independent verification, on the accuracy and completeness of all information available from external sources. To the maximum extent permitted by law,

Contents

1. Executive summary	2
2. Introduction	3
3. Cashflow driven investing (case study)	4
4. Comparing private debt opportunities	8
5. Conclusion	9

About the authors



TIM HUMPHREY

DIVISION DIRECTOR - MACQUARIE INFRASTRUCTURE DEBT INVESTMENT SOLUTIONS (MIDIS)

Tim leads the Investor Solutions team within the Macquarie Infrastructure Debt Investment Solutions business (MIDIS). His team is responsible for fundraising, client servicing and integration of liability matching requirements in the investment process. Tim started his career as an Actuary providing advice to corporates and trustees of large defined benefit pension funds. Tim has also worked at a pension fund buyout insurer – responsible for pricing and structuring de-risking transactions – and in corporate finance advisory across a range of sectors.



ANDREW ROBERTSON

EXECUTIVE DIRECTOR - MACQUARIE INFRASTRUCTURE DEBT INVESTMENT SOLUTIONS (MIDIS)

Andrew is a Co-head of the Macquarie Infrastructure Debt Investment Solutions (MIDIS) business and is focussed on fundraising, strategic client relations, new product development and expanding the MIDIS platform into new markets. Andrew joined Macquarie in 2009 to lead its efforts in developing structured solutions for life insurance clients in Australia and the UK. Before joining Macquarie, Andrew ran a business focussed on development of lifetime income stream products for the Australian retail superannuation and life insurance markets.

Executive summary

Appraisal of private debt opportunities: a holistic approach for UK pension funds

Over the last few years, persistent low interest rates have led pension funds in the UK to make allocations to private debt – including real estate debt, direct corporate lending and infrastructure debt – with a view to earning increased returns relative to their investments in corporate or government bonds.

This white paper highlights a framework for appraising return targets for private debt investments when incorporated within a cashflow driven investment strategy.

By looking beyond simply labelling assets as "liquid" or "illiquid" in setting return targets, this paper looks more holistically at the impact an investment can have on a pension fund's ability to meet their obligations. The ability to source longer duration and/or inflation-linked assets provides quantifiable benefits for a pension fund by mitigating the need for cash and Gilt allocations used to support interest rate and inflation hedging as part of its Liability Driven Investment (LDI) strategy. Also, there are further potential benefits from reducing reinvestment risk, which arise due to pension liabilities extending beyond the term of most fixed income assets.

Compared to other private debt opportunities, UK inflation-linked infrastructure debt is particularly well placed to deliver additional returns derived from LDI benefits – the "LDI Premium" – which supplements the "Illiquidity Premium" typically available within the headline yield on private debt.

This white paper provides a case study for a pension fund seeking to follow a cashflow driven investment strategy with an allocation to Infrastructure Debt which highlights a number of key results:

• The Infrastructure Debt allocation delivers additional returns equivalent to 1.3% per annum above corporate bonds – the "Private Market Premium". This enhancement is the combination of the LDI Premium and the Illiquidity Premium discussed below and compares favourably with many other private debt opportunities, which are often shorter dated and/or lack contractual inflation-linkage.

- The Illiquidity Premium represents the increase in headline yield by moving from corporate bonds to Infrastructure Debt. It has tended to be at least 0.5% per annum net of manager fees
- The LDI Premium of 0.8% per annum represents the additional portfolio returns delivered through holding long-dated inflation-linked assets which reduce the drag on returns caused by allocations to cash and Gilts for interest rate and inflation hedging as well as reducing reinvestment risk.
- Put another way, for each £1 billion that UK pension funds allocate from corporate bonds to Infrastructure Debt, a reduction in pension fund deficits of approximately £270 million can be achieved
- Based on the considerable debt financing requirements for UK infrastructure, this case study highlights the significant role that can be played by this asset class in addressing the record deficits being reported by defined benefit pension funds in the light of historic low levels of Gilt yields.



FOR EACH £1 BILLION THAT UK PENSION FUNDS ALLOCATE FROM CORPORATE BONDS TO INFRASTRUCTURE DEBT, A REDUCTION IN PENSION FUND DEFICITS OF APPROXIMATELY £270 MILLION CAN BE ACHIEVED



2 Introduction

We believe the potential role that private debt can play as part of a pension fund's LDI strategy is more significant than many investors would expect.

With both public and private debt playing a similar role in a pension fund portfolio, when considering the potential benefits of private debt to a UK pension fund the key investment considerations are:

- Potential credit spread achievable (after allowance for default risk)
- Average duration of the potential portfolio
- Type of coupon (fixed, floating or inflation-linked)
- Currency of issuance if non-GBP denominated¹.

When considering private debt opportunities, investors commonly make comparisons based primarily on risk-adjusted yields. However, there appears to be limited consensus amongst pension funds in quantifying the duration and, where relevant, inflation hedging benefits associated with some assets.

Analysis suggests that assets which are longer duration and inflation-linked have a positive effect on supporting a pension fund's LDI strategy and private debt opportunities should be considered in light of these potential advantages.

We outline a framework in this paper to support pension funds in comparing the overall yield enhancement, or "Private Market Premium", of various private debt opportunities taking into account the impact of LDI features on the wider portfolio. To illustrate this framework in practice, Section 3 of this paper considers the Private Market Premium achievable for a case study of a UK pension fund making an allocation to UK inflation-linked infrastructure debt away from corporate bonds of equivalent credit quality. The analysis in this paper will show the following key findings as a baseline for comparison with other private debt opportunities:

- Private Market Premium over corporate bonds of 1.3% per annum, when the increased portfolio returns are expressed as a percentage of the Infrastructure Debt allocation
- Only 0.5% per annum of the Private Market Premium relates to the Illiquidity Premium – in fact the majority of the benefit relates to the LDI Premium
- A pension fund can reduce its funding deficit by 27% of the amount of the Infrastructure Debt allocation.

Section 4 extends the analysis to compare the required Illiquidity Premium for other private debt opportunities of varying durations and coupon types. This highlights that alternative private debt opportunities with no inflation-linkage or shorter duration need to earn significantly higher credit spreads to be as effective on the fund's solvency position as Infrastructure Debt.



Cashflow driven investing

Case study: For many years, annuity providers have invested in high quality fixed income assets on a buy and maintain basis to closely match their liabilities. The predictability of liability cashflows allows these insurers to invest a high proportion of their portfolio in less liquid fixed income assets, without taking material additional credit risk. Like pension funds, the annuity provider's objective is to meet their future liability payments with a high degree of confidence and to minimise volatility of the solvency position.

Pension funds are now increasingly focussed on cashflow profiles of their own assets, seeking greater confidence of meeting benefit payments when they fall due, irrespective of market conditions at a single point in time.

In allocating to private debt strategies, annuity providers have been able to capture an Illiquidity Premium relative to public markets, whilst also experiencing relatively low volatility of their solvency levels, something that pension funds also seek to do. By capturing an Illiquidity Premium through investment in less liquid investment grade debt, annuity providers have historically achieved stable returns above Gilts. In addition, as annuity providers measure their liabilities using a discount rate linked to a prudent estimate of a default-adjusted yield on their underlying fixed income portfolios they experience relatively low volatility of solvency levels – as liability values are deemed to vary in line with asset values where cashflows are matched. This cashflow driven approach of investing to meet future obligations has already been adopted by certain UK pension funds. For these funds, the returns can be sufficient to support a reduction in deficits without the need to carry exposure to risks which typically cause significant volatility of solvency levels (e.g. equities, interest rates). These pension funds have recognised that they can utilise their competitive advantage as investors – in that their ability to buy and hold assets to maturity can deliver additional returns through the Illiquidity Premium.

To help illustrate the potential benefits of an allocation to private debt, to UK inflation-linked infrastructure debt in particular, we consider two different cashflow driven investment strategies and their relative impacts on a pension fund's ability to meet their liabilities.

Pension fund example 1: Corporate bond investment strategy

We start with a pension fund that has invested in a buy-and-maintain portfolio utilising long dated corporate bonds.

We make a number of modelling assumptions for this purpose:

Asset valuation	£75 million
Liability valuation (using Gilt discount rate)	£100 million
Deficit recovery plan (additional contributions from the sponsor)	£1 million per year for 10 years
Liability duration	19 years (PV01: £190k) ²
Inflation-linkage of underlying benefits	70% (IE01: £133k) ³
Target hedging	100% hedged for interest rates and inflation
Corporate bond portfolio ⁴	iBoxx £ Corporates A-rated (10+ years)
Corporate bond spread over Gilts ⁵	143 basis points

2. PV01 measures the sensitivity of the valuation of an asset to changes in interest rates. Or more specifically, it is the change in present value of an asset or liability for a one basis point change in the nominal yield curve used to value the asset or liability. In this analysis this has been calculated on the default risk adjusted cashflows with reference to the Gilt curve.

3. IE01 measures the sensitivity of the valuation of an asset to changes in inflation expectations. Or more specifically IE01 is the change in present value of an asset or liability for a one basis point change in the implied inflation curve used to value the asset or liability (usually the RPI curve).

4. Buy and maintain UK corporate bond portfolio based on holding the current constituents of the iBoxx index.

5. Source: Bloomberg, 22 July 2016.

4

The pension fund has two assumed objectives:

Invest as much of the overall portfolio as possible into investment grade credit assets in order to maximise returns, after allowances for defaults, to close the pension fund's deficit.

The corporate bond portfolio is fixed rate and shorter duration than the pension fund's liabilities. Therefore it is necessary to make an allocation to traditional LDI assets to achieve a 100% hedged position for interest rates and inflation. This LDI allocation would require the pension fund to hold liquidity in order to meet potential collateral calls caused by movements in interest rates and inflation expectations. These assumptions result in the pension fund needing to constrain its corporate bond allocation to 69%.

In making an assessment of the solvency position, the pension fund then projects its asset and liability cashflows to determine its ability to meet future liabilities. The cashflow profile, and resulting solvency assessment, for this pension fund are shown below.



Maintain a 100% hedged position for interest rates and inflation.

JARGON BUSTER - Liability Driven Investment

The case study assumes that the pension fund uses derivatives within a LDI strategy to remove any interest rate and inflation exposure, to the extent this is not already hedged by the bond portfolio. These derivative positions require the pension fund to hold cash or Gilts to meet potential collateral calls in response to changes in interest rate or inflation expectations.

The case study assumes that the cash or Gilts held would be sufficient to cover collateral calls in the event of a 1% movement in both long-term interest rate and inflation expectations.



Pension fund asset and liability cashflows⁶ | Corporate Bonds



6. Notes on methodology: (i) Corporate bond cashflows have been projected based on an assumption of losses of 0.3% per annum, which is approximately three times historic levels, (ii) assuming reinvestment, net of allowances for defaults, at prevailing Gilt yields + 1%. Source: Macquarie.

- 7. The actual outcome may vary due to deviation from assumptions for pension fund liabilities (e.g. longevity), losses on defaults on debt investments and returns on reinvestment of asset income.
- 8. Difference from liabilities stated in hedging calculations is due to incorporation of the rate of return on the fund's credit portfolio, after allowance for defaults, in the liability discount rate.

Pension fund example 2: Corporate bonds plus Infrastructure Debt

We now consider the impact of the pension fund in Example 1 making the following changes to its investment strategy:

- 50% of its allocation to investment grade credit will be moved from corporate bonds to Infrastructure Debt
- The Infrastructure Debt assets purchased are assumed to have a repayment profile with an average maturity of approximately 20 years and 80% inflation-linkage¹⁰ and deliver an increase in credit spread of 50 basis points (0.5%) over corporate bonds (after investment manager fees¹¹).

We continue to assume that the pension fund wishes to maintain a 100% hedged position while at the same time seeking to maximise the allocation to investment grade credit in order to generate returns to close the pension fund's deficit. This approach results in the pension fund being able to allocate 80% of its portfolio to credit assets.

As highlighted in the charts below, the increased duration and inflation-linkage provided by an allocation to Infrastructure Debt has allowed the pension fund to materially reduce its allocation to cash/Gilts which are required to support its LDI strategy. We consider below how this revised allocation impacts the ability of the pension fund to meet its liabilities.





Pension Fund Asset and Liability Cashflows¹² | Corporate Bonds plus Infrastructure Debt¹³

- 9. The actual outcome may vary due to deviation from assumptions for pension fund liabilities (e.g. longevity), losses on defaults on debt investments and returns on reinvestment of asset income.
- 10. This is in line with the investment objectives of the Macquarie UK Inflation Linked Infrastructure Debt Fund which was developed specifically for UK pension funds but is now closed to new commitments.
- 11. This is broadly consistent with the average yield at origination on assets within the Macquarie Infrastructure Debt (UK Inflation Linked) Fund as at 30 June 2016, net of average fees on the fund and factoring fees paid to a corporate bond investment manager.
- Notes on methodology: (i) Corporate bond and Infrastructure Debt cashflows have been projected based on an assumption of losses of 0.3% per annum, (ii) assuming reinvestment at prevailing Gilt yields + 1% net of defaults. Source: Macquarie.
- 13. The Infrastructure Debt cashflows are relatively "lumpy" as the Infrastructure Debt portfolio used for this illustration has a portfolio of around 15 holdings. An Infrastructure Debt allocation built up over a longer period of time might be expected to have a wider distribution of maturity dates. Source: Macquarie.

COMPARING KEY	RESULTS FRO	M EXAMPLE 1	AND EXAMPLE 2
	LEGGEIGTIG		

	Example 1 (69% Corporate Bonds; 31% LDI)	Example 2 (40% Infrastructure Debt; 40% Corporate Bonds, 20% LDI)
Point cashflows are no longer suifficient to meet liabilities	Year 43	-
Assets required to meet benefit payments	£89 million	£81 million
Surplus / (deficit)	£(14) million	£(6) million
Implied Average Portfolio Yield ¹⁴	Gilts + 65 bps	Gilts + 117 bps

By investing 40% of the portfolio into Infrastructure Debt, rather than corporate bonds, the pension fund has been able to enhance its overall average portfolio yield by 52 basis points (0.52% per annum). This can be expressed as a Private Market Premium of 130 basis points for the 40% Infrastructure Debt allocation, which breaks down as follows:

- Illiquidity Premium: this represents 50 basis points of yield uplift to corporate bonds of equivalent credit quality, and therefore represents 38% of the Private Market Premium
- LDI Premium: by increasing the duration and inflation-linkage within the credit portfolio, the pension fund has been able to reduce its allocation to cash/Gilts within the LDI portfolio. This benefit is equivalent to 80 basis points of yield uplift to the 40% allocation, and represents 62% of the Private Market Premium.



14. This is lower than the credit spread on the credit portfolios due to:

- the allocation of proportion of the portfolio to cash/Gilts to support the LDI strategy
- a prudent allowance for defaults
 - assuming reinvestment of income into assets yielding Gilts + 1% net of defaults.



THE PENSION FUND HAS IMPROVED ITS SOLVENCY POSITION BY £8 MILLION BY MAKING A £30 MILLION ALLOCATION TO INFRASTRUCTURE DEBT



4 Comparing private debt opportunities

The approach adopted in the previous case study can be extended across a range of private debt opportunities, allowing comparisons to be made across durations and coupon types¹⁵.

The chart below provides a guide to the return targets that would apply for private debt opportunities to achieve equivalent solvency outcomes to the portfolio in Example 2.

The chart highlights the value delivered by longer duration and inflation hedging. For example:

- **Duration:** Target returns should be approximately 170 basis points higher for debt which matures in 10 years, by comparison with debt maturing in 20 years
- Inflation hedging: Target returns should be approximately 50 basis points higher for fixed rate debt compared with inflation-linked debt. A further 50-100 basis points (depending on maturity) should be demanded for floating rate debt.



This framework may be helpful to a pension fund that is comparing the holistic benefits of different private debt opportunities. For example, considering UK commercial real estate debt opportunities which deliver a portfolio with an average maturity of 10 years with a fixed rate coupon and comparing it to a typical Infrastructure Debt investment.

- The shorter weighted average life relative to Infrastructure Debt would worsen the hedging position for the pension fund and reduce the credit allocation as more cash/Gilts will be required to support the fund's LDI strategy
- Our analysis indicates that investors should be seeking a credit spread (net of defaults) of around 400 basis points above equivalent duration Gilts from an allocation to commercial real estate debt to achieve an equivalent solvency outcome to investing in Infrastructure Debt. This means that the commercial real estate debt asset would need to earn a spread around 230bps greater than the Infrastructure Debt investment to deliver the same expected solvency position.

15. Coupons will typically be a fixed percentage of the loan amount (applied either to fixed or inflation-linked principal) or floating rate (which, for GBP assets, will be based on Libor)



A COMMERCIAL REAL ESTATE PORTFOLIO WITH WEIGHTED AVERAGE LIFE OF 10 YEARS WOULD NEED TO OUTPERFORM INFRASTRUCTURE DEBT BY APPROXIMATELY 230BPS (2.3%) TO DELIVER THE SAME EXPECTED SOLVENCY OUTCOME



5 Conclusion

By looking beyond simply labelling assets as "liquid" or "illiquid" in setting return targets, this white paper looks more holistically at the impact an investment can have on a pension fund's ability to meet their liability obligations. The ability to source longer duration and/or inflation-linked assets provides quantifiable LDI benefits for a pension fund by mitigating the need for cash and Gilt allocations used to support interest rate and inflation hedging. Also, there are further potential benefits from reducing reinvestment risk, which arises due to pension liabilities extending beyond the term of most fixed income assets.

With a number of private debt opportunities available to pension funds, we hope that the framework outlined in this paper contributes to discussion around the relative LDI benefits of each.

It is noted that infrastructure debt is only one of a number of sources of long dated cashflows. However, we believe that UK inflation-linked infrastructure debt is particularly well placed to deliver additional LDI benefits and maximise an asset's Private Market Premium.

In addition there are a number of other potential benefits of an allocation to UK inflation-linked infrastructure debt relative to other private debt investments for the following reasons:

- **Pipeline**: Many infrastructure businesses have inflation-linked revenues and are therefore looking to borrow on an inflation-linked basis
- Credit quality: Infrastructure businesses can benefit from extremely stable revenue streams, which means that borrowers can be creditworthy for longer periods than other sectors. This allows debt to extend 40+ years into the future, continuing to provide high quality, dependable cashflows for pension fund liability matching purposes
- Diversification: Infrastructure businesses who provide essential services and/or have contractual revenue streams are typically immunised against economic downturn, which differentiates infrastructure lending from similar asset classes (i.e. corporate or real estate lending)
- Journey to buyout: Insurers who undertake pension fund buyout transactions are themselves investing a significant proportion of their portfolios into infrastructure debt. By investing in assets which more closely mirror strategies of these insurers, pension funds can expect the valuation of their portfolio to more closely track the premium that would be charged by an insurer for a buyout transaction. In addition, there is significant potential upside to the fund if the insurer is prepared to accept the pension fund's infrastructure debt portfolio as an in specie transfer on buyout
- Valuation: Infrastructure debt valuations are similar to corporate bonds, in that changes in Gilt yields and (where relevant) market-based expectations for inflation feed directly through to valuations. This means that the pension fund solvency position (and its sponsor's IFRS accounting position) is materially protected against short-term fluctuations in market conditions. This is likely to be true of some other private debt opportunities, but for example does differ from other sources of secure income streams being purchased by pension funds where valuations may be less directly affected by interest rate fluctuations (e.g. property markets, unlevered infrastructure equity).

About Macquarie

Macquarie Group (Macquarie) is a global provider of banking, financial, advisory, investment and funds management services.

Macquarie is globally recognised for its deep infrastructure expertise including taking a leading and innovative role in private market financing of infrastructure assets. It has deep relationships with the majority of infrastructure market stakeholders, including sponsors, lending banks, advisers and construction companies. Founded in 1969, Macquarie operates in 64 office locations in 28 countries and employs more than 14,300 people. Assets under management total approximately £278 billion at 30 June 2016.

About Macquarie Infrastructure Debt Investment Solutions (MIDIS)

In early 2012 Macquarie established the Macquarie Infrastructure Debt Investment Solutions (MIDIS) platform to leverage the infrastructure expertise within Macquarie into an investor-aligned global infrastructure debt investment management business. MIDIS's strategy is to focus on the investment needs of pension funds and insurers seeking a highly engaged, client service driven manager. A core pillar of MIDIS's strategy is to deliver customised solutions to its investors.

Macquarie has been deliberate in its dedication of resources to MIDIS in order to create an institutional-grade funds management business which caters for the specific needs of long term investors:

• Senior management with extensive experience across the global infrastructure sector as members of the Investment Committee

- An Investment Team with a comprehensive lending track record across multiple infrastructure subsectors in international markets
- A dedicated and independent risk function with deep infrastructure credit experience
- An Investor Solutions Team with specific pensions and insurance regulatory, capital and liability management experience
- Access to infrastructure specialists within Macquarie providing market insights and intelligence and an avenue into Macquarie's unrivalled sector coverage
- A full-service Account Management Team to ensure institutional-grade asset management, reporting and servicing.

For more information, please contact the following:



Tim Humphrey

Head of Investor Solutions, MIDIS Phone: +44 20 3037 5449 tim.humphrey@macquarie.com

Andrew Robertson

Co-Head of MIDIS Phone: +41 79 201 8850 andrew.robertson@macquarie.com