For professional investors - Marketing communication - August 2019

A PRACTICAL GUIDE TO CASHFLOW DRIVEN INVESTING

BNP PARIBAS
ASSET MANAGEMENT

The asset manager for a changing world

CONTENTS

1 INTRODUCTION

With UK Defined Benefit pension schemes turning increasingly cashflow negative and traditional Liability Driven Investment (LDI) portfolios offering lower returns, schemes are turning to cashflow driven investing (CDI) to better match cashflow while generating higher risk-adjusted returns.

Many of the underlying asset classes that comprise CDI portfolios are contractual in nature, have lower default rates than equivalently rated investment grade credit (e.g. infrastructure debt[1]), are backed by tangible collateral and are marked to model, lowering overall portfolio volatility.

At BNP Paribas Asset Management (BNPP AM) we are able to offer investors a broad blend of underlying private market and real assets exposure, a unique dual proprietary origination model, co-investment with the BNP Paribas Group, holistic cashflow management and bespoke investment solutions to clients needs.

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Julien is Head of Pension Solutions at BNP Paribas AM having joined in April 2018 from Mercer where he spent 6 years as Principal. Prior to that Julien worked for Goldman Sachs, Aon, P-Solve and Lazard. With investment banking and consulting experience stretching over 26 years Julien has spent over 15 years advising institutional clients on structuring and implementing pensions and insurance solutions for national and cross-border clients.

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Philip is Head of UK Sales (UK & Ireland) at BNP Paribas AM having joined in November 2017 from Allianz Global investors where he spent 16 years working with institutional clients. During his time with the Allianz Group, Philip was involved in the creation of a number of new products across multi-asset, listed and private markets, inc. the launch of the first UK fund to facilitate primary greenfield transactions in infrastructure debt for institutional investors.

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[1] Moody's 'Default and recovery rates for project finance bank loans, 1983-2010', 31 January 2012.

2 THE VALUE OF CASHFLOW DRIVEN INVESTING (CDI)

WHAT IS CASHFLOW DRIVEN INVESTING?

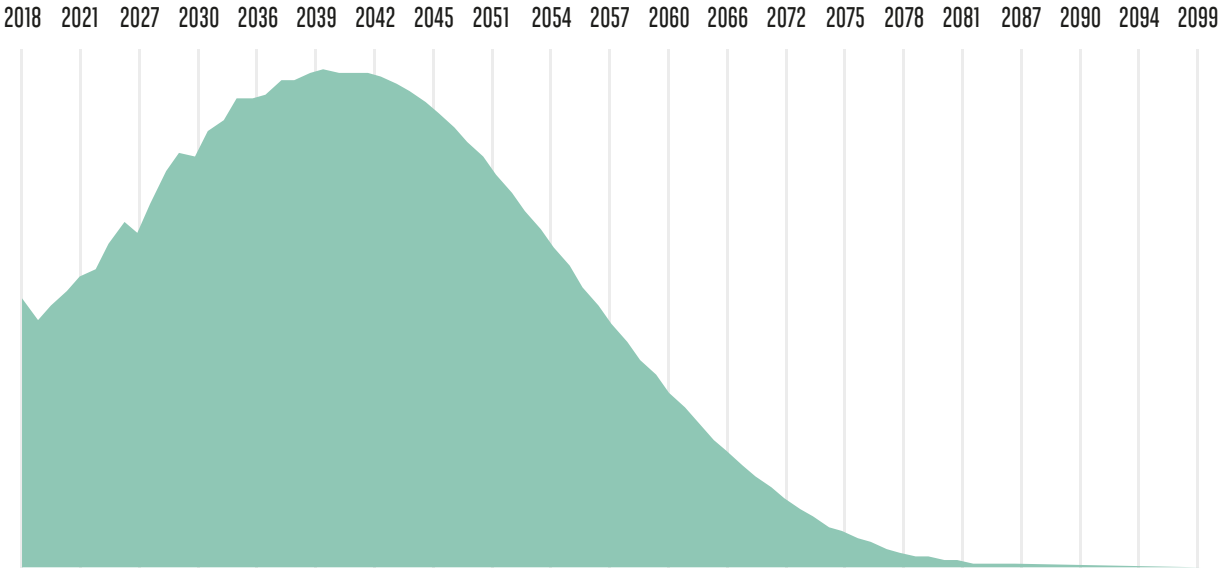
The rise of liability driven investment (LDI) has reflected the need of institutional investors to lower the volatility associated with pension funding levels.

Recognising that funding levels represent the interaction between assets and liabilities, trustees have sought investments, linked to inflation, interest rates and duration that behave in the same way, leading to a rise in partially funded liability hedges (e.g. swaps), backed by cash and gilts, with the balance invested in growth assets.

Cashflow driven investing involves using additional sources of credit in order to better match the liabilities. At present, for example, many pension schemes, being cashflow negative, are forced sellers of liquid assets in order to meet their increasing income requirements.

Typically for most early proponents of CDI approaches this has meant investing in buy-and-hold investment grade credit to supplement cashflows. Increasingly however, more sophisticated solutions are available that involves supplementing liquid credit with illiquid private credit.

Pension Liability Cashflow



BNPP AM, November 2018

THE BENEFITS OF A PRIVATE CREDIT APPROACH TO CDI

At BNPP AM, we believe a portfolio of secure private credit and real assets provides investors with a better match of liabilities as well as other tangible benefits that liquid strategies do not.

The incremental benefits of a private credit approach to CDI can be summarised as follows:

- Additional returns above gilts and investment grade credit
- Cashflows backed by high quality collateral
- Cashflows that provide inflation linkage
- Long-term cashflows
- Highly covenanted, secure income streams
- Limited market exposure
- Lower default rates

WHAT ARE TYPICAL CDI ASSETS?

The universe of CDI assets available to pension schemes has expanded rapidly over the past decade.

More stringent capital requirements on banks have seen the disintermediation of traditional financing models by asset managers and institutional investors across a broad range of asset classes such as:

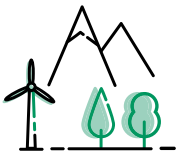
- Senior infrastructure debt
- Commercial real estate debt
- Mid-market loans
- Asset backed securities
- Mortgage backed securities
- Social housing
- Ground rents

In creating a diversified portfolio of secure income generating assets, diversification is of critical importance.

Often idiosyncratic in nature, the underlying asset classes diversify well against each other and traditional liquid components of institutional portfolios, minimising tail risks.

Equally, a holistic multi-asset approach with active asset allocation minimises timing risks and reduces the potential for opportunity costs that traditional static allocations can suffer from.

3 OUR APPROACH TO PRIVATE CREDIT AND REAL ASSETS



EXPERIENCE IS EVERYTHING

BNP Paribas Group has been financing the real economy for **150 years** with market leading positions in real estate and infrastructure financing. For both the Group and BNPP AM, our goal is to provide quality investment solutions for our clients, building strong, lasting relationships based on confidence and trust.

Within private markets and real assets this confidence and trust helps support origination as our specialist investment teams have a reputation for rigour, scale and execution.

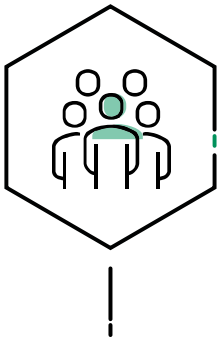
Whilst private markets can be illiquid we believe active portfolio management significantly mitigates the associated risks. Across asset classes, a focus on diversification and strict credit risk assessment offers institutional investors access to high quality assets and co-investment opportunities that deliver long-term performance.

A RESPONSIBLE INVESTOR

BNPP AM has been involved in responsible investment since 2002. ESG criteria are systematically incorporated into the investment processes of our private debt solutions. An initial ESG filter is applied, followed by an in-depth analysis. The definition and implementation of a specific taxonomy for each asset class makes it possible to refine the ESG analysis from a qualitative perspective.

50

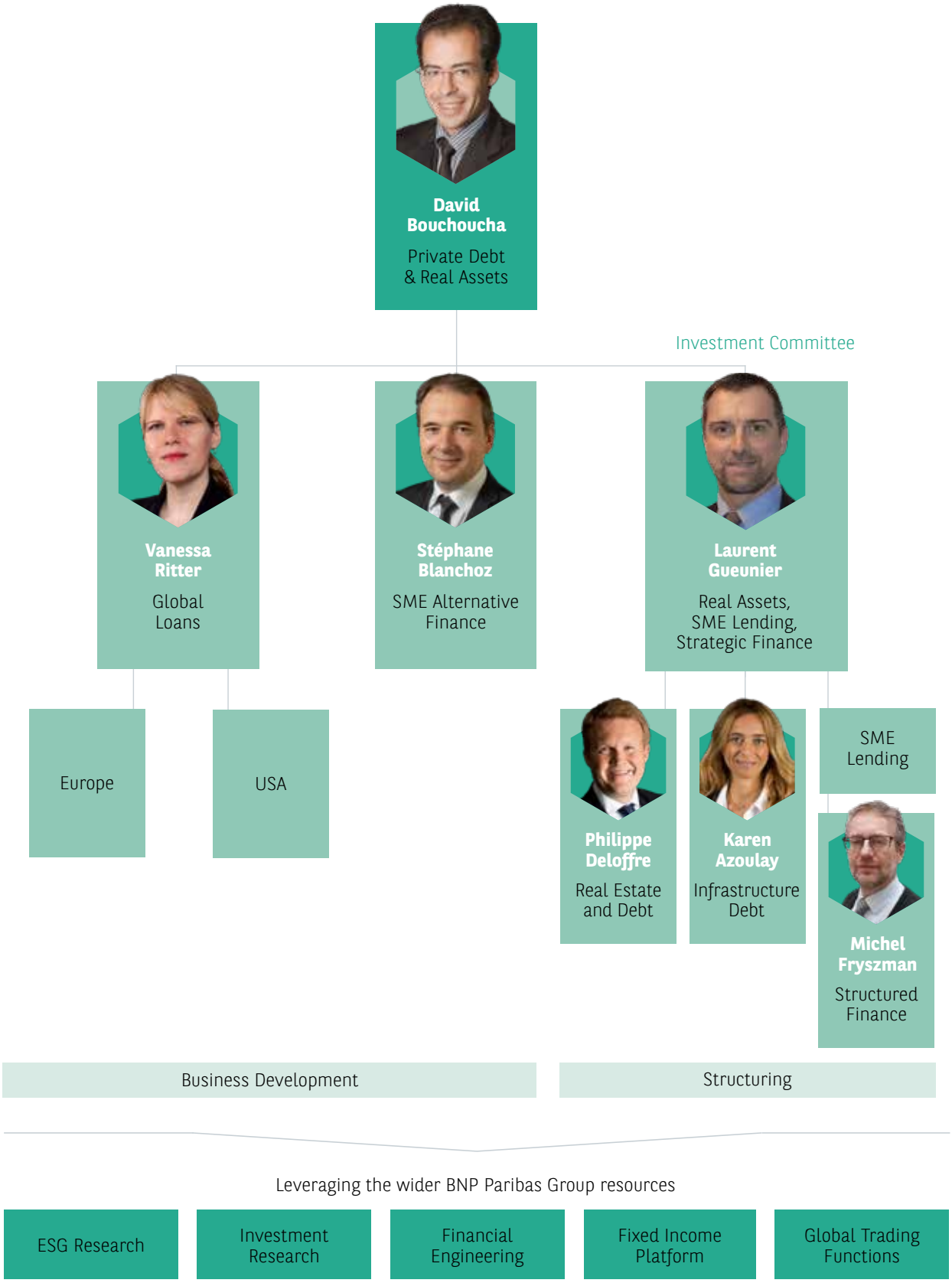
PRIVATE DEBT AND REAL ASSET PROFESSIONALS



BNPP AM's CDI strategy leverages the specialist investment teams that comprise the Private Debt and Real Assets (PDRA) investment group of over **50 investment professionals**.

BNPP AM's approach to CDI relies on specialist investment teams to access the underlying asset classes, namely Global Loans, SME Lending, US Mid-Market Lending, Structured Finance, Infrastructure Debt and Commercial Real Estate Debt. Each team offers a long-term track record in the technical under-writing of private credit with established networks of project sponsors offering sustainable origination, supplemented by proprietary BNP Paribas Group origination partners.

THE PRIVATE DEBT AND REAL ASSETS INVESTMENT GROUP ORGANISATION CHART:



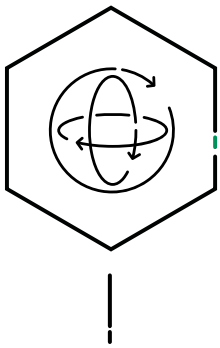
Source: BNPP AM, December 2018

CASHFLOW ASSET EXAMPLE 1: INFRASTRUCTURE DEBT

BNPP AM created its infrastructure debt team to offer investors direct access to private infrastructure transactions which can be used to generate stable and predictable long-term cashflows.

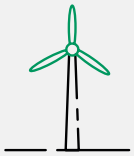
Offering attractive spreads, lower default rates and higher recovery rates relative to equivalently rated corporate bonds, infrastructure debt has an appealing risk / return profile that can be used to enhance fixed income and matching portfolios.

A
DIVERSIFIED UNIVERSE
OF PROJECTS
AND COMPANIES



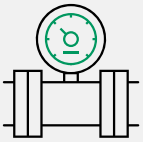
Physical assets include:

1



Renewable energy
Solar, on-shore/off-shore wind, biomass, hydro

2



Conventional energy
Storage facilities, gas power plants, pipelines, LNG

3

Utilities
Gas, electricity & heating networks, waste & water treatment

BNPP AM focuses on essential physical assets across a diversified universe of projects and companies that have a stimulative effect on the real economy.

Typically the activities financed benefit from regulated revenues with low technological risk offering resilience through the economic cycle.

Further assurance of potential future revenues is reinforced by the strong contractual frameworks, exhaustive security packages and the transference of risk through concession or availability based contracts.

The strategy targets **LIBOR +200-250bps** across sectors with a weighted average life (**WAL of 8-10 years**).

4

Transport
Roads, bridges, tunnels, airports, ports & railways

5

Social infrastructure
Universities, schools, hospitals, prisons, stadiums

6

Telecoms
High speed networks, telecom towers

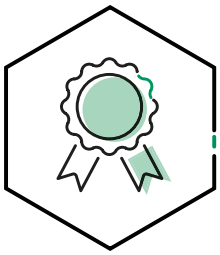
No assurance can be given that any forecast, target or opinion will materialise.

CASHFLOW ASSET EXAMPLE 1: INFRASTRUCTURE DEBT (CONTINUED)

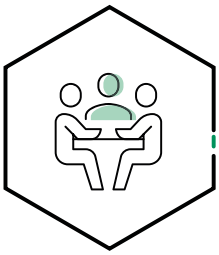
The management team benefits from an innovative dual track asset sourcing capability:

- **Proprietary extensive sourcing capability** established thanks to a working practice with main infrastructure players such as financial and industrial sponsors, financial advisors and banks' origination and syndication teams.
- **Privileged access** to BNP Paribas Group's extensive origination capabilities. It is an innovative opportunity to benefit from a Tier One bank active in the infrastructure market and have access to a **privileged pipeline** from a **team of experienced investment professionals**.

BNP Paribas Group participated in 14 transactions across Europe in H1 2018 placing it fifth in the league table of loan arrangers. Source; InfraNews, 2018.



TIER ONE
GLOBAL BANK



ACCESS TO A PRIVILEGED PIPELINE FROM
EXPERIENCED INVESTMENT PROFESSIONALS

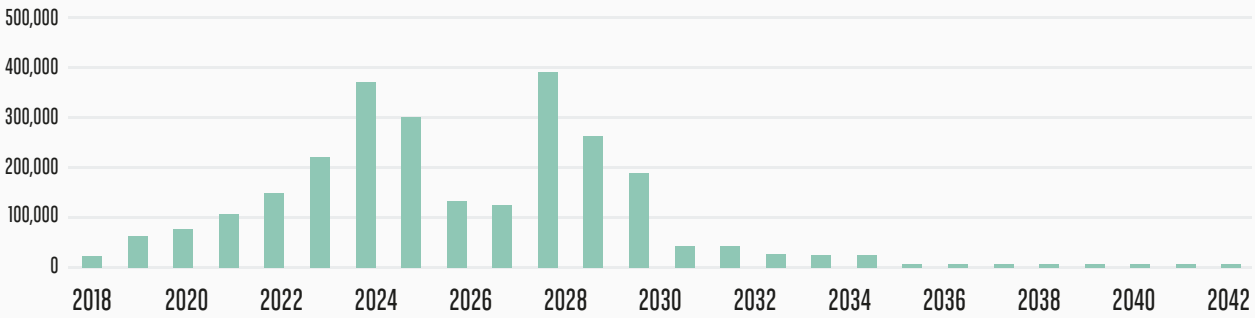
Infrastructure debt is an ideal source for potential CDI assets as the asset class benefits from the following characteristics:

- Highly secure, covenanted, contractual long-term cashflows (WAL of 9 years)
- Prepayment protection and modified spens protection
- Lower default rates and higher recovery rates than equivalently rated investment grade credit
- Floating rate, fixed rate and index-linked tranches available, particularly as assets can be structured via the BNP Paribas Group

CASHFLOW ASSET EXAMPLE 1: INFRASTRUCTURE DEBT (CONTINUED)

THE RESULTANT CASHFLOW PROFILE:

Cashflow per GBP 1 Mln



• Infrastructure debt

BNPP AM, November 2018

Features

- Unlisted / private market debt to finance specific infrastructure projects (greenfield / brownfield various sectors)
- Participation in limited number of projects in various Western European countries
- Coupon is defined as spread over LIBOR therefore participation in yield rise bonds participate in yield rise
- Low default probability, high recovery rate resulting in stable cashflows (Core+)

Methodology

- Spread and Weighted Average Life based on fund manager targets. Cashflows based on the characteristics of actual and potential future projects
- Typical ramp-up period of 4-5 years with largest capital calls in the first two years
- Expected return based on our long term views on yield curves and funds outperformance target. Expected risk based on propriety factor model and Sharpe ratio assumption (link with return target)
- Solvency Capital Ratio (SCR) based on unrated qualified infrastructure investments with spread duration of approx. 9 years (favourable treatment)

Metrics

Spread over Libor	2.0%
Effective duration (interest rate sensitivity)	0.25%
Weighted Average Life (WAL)	9.0%
Expected return (ER)	3.8%
Expected risk (standard deviation)	5.1%
ER / Stdev	74.9%
SCR (solvency capital ratio)	12.0%
ER / SCR	31.7%

No assurance can be given that any forecast, target or opinion will materialise.

BNPP AM, August 2018

CASHFLOW EXAMPLE 2: REAL ESTATE DEBT

BNPP AM's Commercial Real Estate Debt team was created to enable institutional investors to generate attractive risk adjusted returns via investment in loans secured against underlying commercial real estate. Loans of this nature typically have a defensive credit profile generating stable and secure cashflows while offering an illiquidity premium to equivalently rated corporate debt.

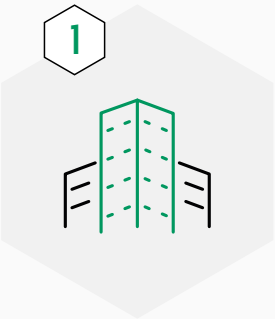
The highly structured and covenanted nature of transactions also affords lower default rates and higher recovery rates offering further downside protection to investors.

The Commercial Real Estate Debt team is currently comprised of four individuals with complementary experience across asset management and banking leveraging a **45-strong proprietary origination channel** offered by the BNP Paribas Group.

In addition, our relationship with the Real Estate Financing team also allows us to be flexible in the nature of the loans that are brought to BNPP AM clients.

> *We are able to offer long-dated, fixed rate tranches where the market standard would typically be floating rate, across a number of geographies.*

Physical assets include:



Office
Office campus, tower, CBD, single/multilet

Retail
Shopping centre, high street, out-of-town retail, outlet centre

Logistics
Light industrial, logistics platform

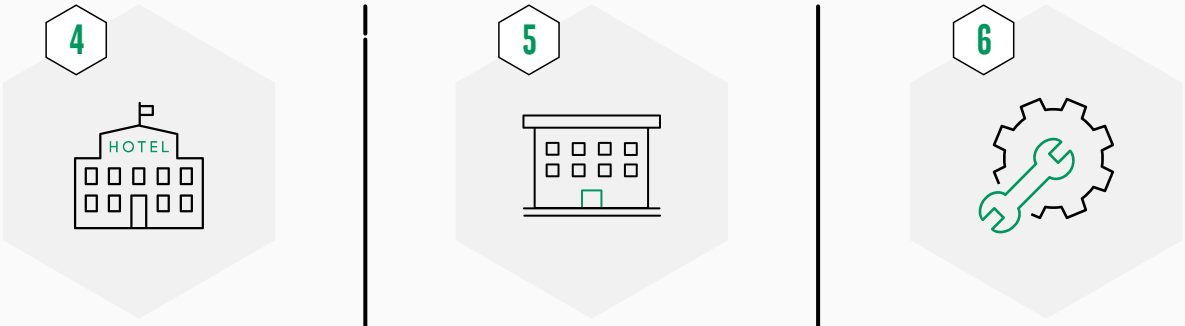
The team's origination capabilities are two-fold:

- **Proprietary extensive sourcing capability** established thanks to a working practice with main commercial real estate players such as financial and industrial sponsors, financial advisors and banks' origination and syndication teams
- **Privileged access** to BNP Paribas Group's origination capabilities. It is a unique opportunity to benefit from a leading bank active in the European Real Estate market offering access to a privileged pipeline

BNP Paribas Group participated in €11.1bn of mortgage financing facilities in 2017 across Europe

Commercial Real Estate Debt is similarly an ideal source of potential CDI assets as the asset class benefits from the following characteristics:

- Highly secure, covenanted, contractual long-term cashflows (WAL of 5.5 years)
- Prepayment protection and modified spens protection
- Lower default rates and higher recovery rates than equivalently rated investment grade credit
- Floating rate and fixed rate tranches available, particularly as assets can be structured via the BNP Paribas Group



Hotels
High end, mid scale, budget hotels, hostels

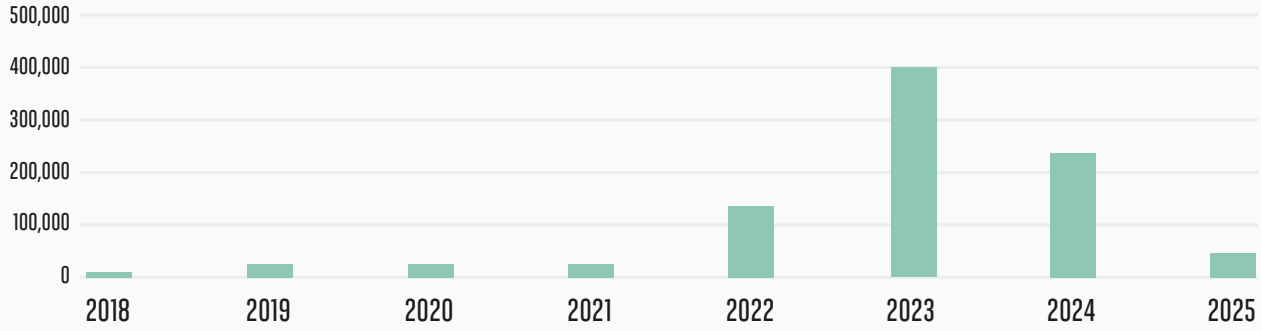
Operating assets
Student housing, nursing homes

Non standard
Datacentre, parking, leisure

CASHFLOW EXAMPLE 2: REAL ESTATE DEBT (CONTINUED)

THE RESULTANT CASHFLOW PROFILE:

Cashflow per GBP 1 Mln



• Commercial real estate debt

BNPP AM, August 2018

Features

- Commercial Real Estate Debt to finance several real estate projects diversified across different sectors and geographies
- Participation in limited number of projects in various countries with risk profile of investments Core+/Value add
- Coupon is defined as spread over Libor therefore bond participation in yield rise
- Low default probability, high recovery rate resulting in stable cashflows (Core+)

Methodology

- Spread and Weighted Average Life based on fund manager targets. Cashflows based on characteristics of actual and potential future projects
- Typical ramp-up period of 2-3 years with largest capital calls in the first two years
- Expected return based on our long term views on yield curves and funds outperformance target. Expected risk based on propriety factor model and Sharpe ratio assumption (link with return target)
- SCR based on unrated qualified infrastructure investments with spread duration of approx. 6 years and Loan-to-Value a maximum of 75%

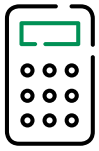
Metrics

Spread over Libor	2.4
Effective duration (interest rate sensitivity)	0.25
Weighted Average Life (WAL)	5.5
Expected return (ER)	4.1
Expected risk (standard deviation)	5.8
ER / Stdev	70.8
SCR (solvency capital ratio)	8.0
ER / SCR	51.5

No assurance can be given that any forecast, target or opinion will materialise.

BNPP AM, November 2018

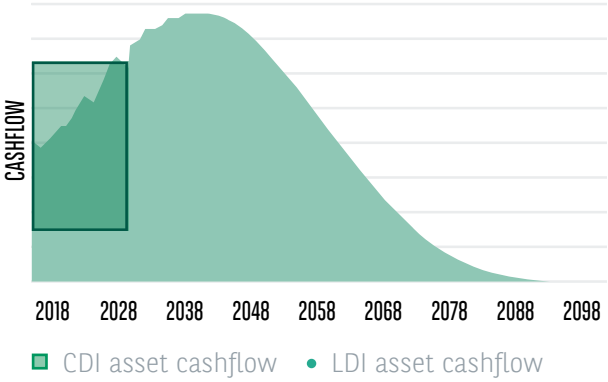
4 OUR APPROACH TO CASHFLOW DRIVEN INVESTING



The first step in constructing a bespoke CDI portfolio is to understand the long-term objectives of the scheme in question in terms of return expectation and risk tolerance. On that basis BNPP AM undertakes a modelling exercise to optimise a CDI portfolio versus the expected cashflows as a benchmark.

The second step is to optimise the CDI allocation with the non-CDI asset allocation (notably those that are impacted by the CDI allocation).

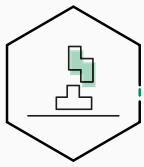
CDI portfolio versus the expected cashflows



BNPP AM, November 2018

BNPP AM's CDI solution can be summarised as a three step process intended to design a portfolio to meet client requirements, undertake dynamic implementation and provide ongoing governance and reporting to trustees and scheme sponsors.

THE CDI PORTFOLIO SOLUTION PROCESS - OVERVIEW:



1

CDI portfolio design, asset allocation and flightpath

2

Dynamic implementation

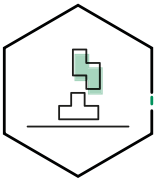
3

Governance and reporting

No assurance can be given that any forecast, target or opinion will materialise.

THE CDI PORTFOLIO SOLUTION PROCESS - IN DETAIL

1



CDI portfolio design, asset allocation and flightpath

The first step in the process is to establish the client's risk budget and model an optimised CDI allocation with respect to the cashflow requirements. This includes an assessment of the liquid components of the portfolio, the interaction with illiquids and the long-term flightpath (or design thereof).

This can be done in conjunction with third party investment consultants or on a holistic basis by BNPP AM. In designing a dynamic implementation flightpath, it is possible to structure a portfolio with long-term objectives in mind, such as buy-out or the transfer of a sustainable portfolio to a captive insurance solution.

2

Undertaking dynamic implementation

The second step in the process is to assess the feasibility of supply with respect to the target allocation and design a dynamic implementation approach that oversees the transition to CDI assets over the planned period.

This approach takes into account relative value, liquidity and diversification.

3

Ongoing governance and reporting

Holistic CDI approaches monitor and report on the interaction of CDI assets with more liquid components and monitor relative value triggers with respect to underlying asset classes.

The pensions solutions team conduct active reconciliation of the long-term investment strategy versus flightpath, objectives and risk budget.

Modelling team and tools:

- Establish the client's risk budget
- Set up a CDI modelling approach
- Tailor current model(s)
- Prepare the modelling team

Structuring the CDI solution:

- Model the optimised asset allocation (taking into account the existing investment risk management policies)
- Model the optimised CDI portfolio

Establishing LT investment strategy:

- Establish the long-term investment objectives
- Include the inflow schedule
- Set up the dynamic evolution of the CDI allocation

Real CDI asset supply:

- Access supply and demand data
- Perform feasibility study
- Highlight origination and absorption bottlenecks
- Assess need for listed and / or synthetic CDI assets

Transition approach:

- Design transition plans for institutional investors

Integration into flightpath:

- Design dynamic implementation approach

Dynamic execution:

- Execute the transition to real / synthetic CDI assets over the planned period

Ongoing CDI asset monitoring:

- Performance and risk monitoring

CDI asset transition triggers:

- Relative value trigger monitoring

Reconciliation:

- Active and regular reconciliation of LT investment strategy, objectives and risk budget

Reporting:

- Ongoing reporting for operations team

CASE STUDY 1: A TRADITIONAL REAL CDI ASSET SOLUTION

Typically, mature UK pension schemes invest in real CDI asset solutions in a progressive way, focusing first on the earlier liability cash flows (up to 10 or 15 years) and extending the level of matching over time to later ones.

Pension schemes often liquidate growth asset allocations first (and in particular listed equities) to fund their CDI investments. Allocations to liquid matching (LDI) assets are usually maintained, especially for long maturities, as these are more difficult to find in the universe of real CDI assets. The graph on page 15 attempts to illustrate this concept by showing the end-game for such a strategy. The assets are then split between CDI (covering the first 15 years) and LDI assets as well as cash for collateral and benefit payment purposes (covering the rest of the cashflows).

Alongside the matching of cashflows by a holistic approach, the risk / return profile of a real CDI asset solution is, in most cases, tightly controlled and aims to fund the deficit over a number of years, complementing the sponsor contribution schedule and any remaining investments in growths assets.

In that context, our case study relies on **a set of pre-defined objectives / assumptions** that best illustrate a progressive and risk-controlled real CDI asset strategy that mostly focuses on matching the liabilities with shorter maturities.

- Creates an illiquid asset portfolio that "matches" 60% of the liability cash flows for the first ten years
- Maintains a strict risk budget with steady incremental upside and low volatility:
  - Target net excess return on GBP cash is 2.5%;
  - With a volatility of c. 5.0%

For real CDI asset solutions, **portfolio construction guidelines** are in general relatively well established and encompass the following:

- Benchmarking the CDI portfolio against the liabilities of a typical UK pension scheme (in our case study, we have made the additional assumption that the income produced by the CDI asset portfolio represents about 15% of the liability cashflow);
- Identifying the most appropriate CDI asset classes to achieve the required liability cash flow matching (see table on right for the risk / return assumption for each asset class); and
- Maintaining an attractive risk / return trade off at portfolio level

In practice, we tend to only retain **specific real CDI asset classes** that best match the pension scheme's requirements and investment guidelines as described above. For this case study, we have selected five of them:

- GBP Commercial Real Estate Debt
- GBP ABS
- GBP Infrastructure Debt
- Euro Mortgages
- Euro Leveraged Loans

Illustrative metrics for the selected real CDI asset classes summarised:

	GBP-hedged return	Volatility	Maturities estimated
GBP Infrastructure Debt	3.8%	5.1%	9.0%
GBP Comm Real Estate Debt	4.1%	5.8%	15.0%
GBP ABS	3.3%	3.8%	5.0%
Euro Mortgages	3.3%	5.4%	4.0%
Euro Leveraged Loans	5.0%	9.7%	5.0%
Cash	1.6%	1.2%	–

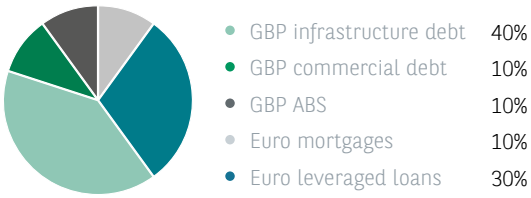
BNPP AM, November 2018

No assurance can be given that any forecast, target or opinion will materialise.

The resultant real CDI asset portfolio is diversified and offers the modelled expected return and cashflow matching features. It is also worth noting that this optimal portfolio includes some currency exposure (to Euro) for Mortgages and Leveraged Loans and is hedged to Sterling.

The real CDI asset portfolio metrics are summarised. It is important to point out that the Sharp ratio is relatively low in a passive implementation modelling exercise. We would expect it to improve in an actual implementation context, which would be dynamic and would include added value from BNPP AM's fundamental views.

Real CDI asset portfolio:



BNPP AM, August 2018

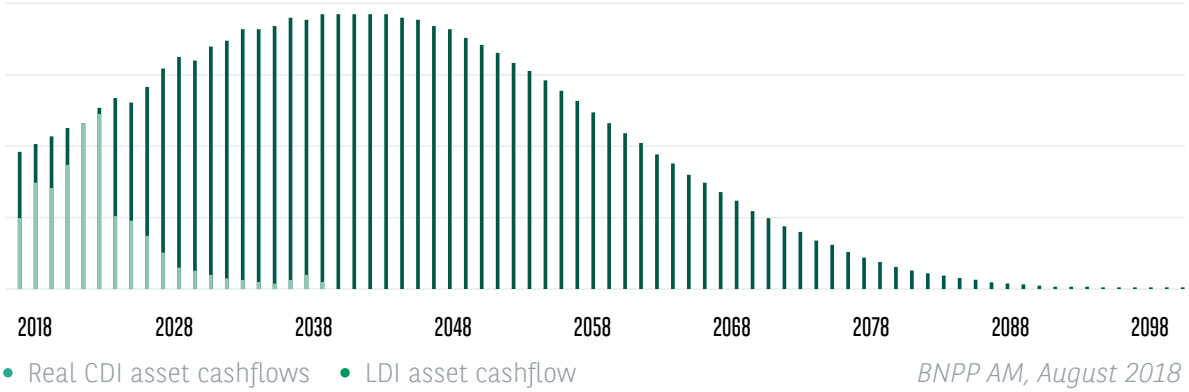
Portfolio metrics:

Return	4.1%
Excess over cash	2.5%
Risk	5.1%
Sharp	0.6
Coverage CDI first 10 years Liabilities	61.0%
Weighted average life CDI assets	6.0%

The resultant CDI portfolio cashflow matching properties are illustrated here. It is possible to customise to a high degree the shape of the real CDI asset cashflows and in doing so change the risk / return profile of the real CDI asset portfolio.

The resultant CDI modelled portfolio meets the intended outcome of delivering both enhanced risk-adjusted returns relative to a pure LDI approach and better cashflow matching through the use of secure, contractual cashflows.

The resultant CDI portfolio cashflow matching properties:



BNPP AM, August 2018

As funding levels improve and volatility in capital markets increases, pension schemes targeting self-sufficiency are thus able to implement a CDI portfolio strategy that can:

- Improve the funding level of the scheme (through the enhanced discount rate levels associated with such portfolios);
- Significantly lower the funding volatility; and
- Reduce the ongoing reliance on the scheme sponsor.

No assurance can be given that any forecast, target or opinion will materialise.

5 OUR SPECIALIST PENSIONS SOLUTIONS CAPABILITY

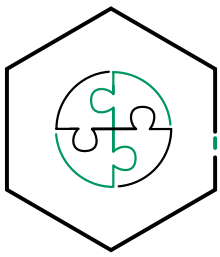
The day-to-day management of our CDI approach is the responsibility of our **Multi-Asset, Quantitative and Solutions (MAQS)** team, a dedicated multi-asset investment team that combines the best of both BNPP AM's fundamental and quantitative expertise.

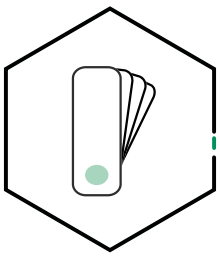
Up to 20 Solutions modelling, structuring and portfolio management professionals can help tailor CDI portfolio (either real or synthetic) to the objectives, needs and preferences of institutional investors.

The MAQS team manages approximately **130bn euros** of assets[1], comprising **140 experts**[1] and an experienced leadership team split across four pillars: **Multi-Asset, Structured Management, Quantitative & Index, Solutions & Advisory**.

Whilst the underlying investment teams are responsible for the selection of assets the MAQS team are responsible for asset allocation, ensuring compliance with client guidelines and managing / matching cashflows against client liabilities.

20
MODELLING SOLUTIONS[1]





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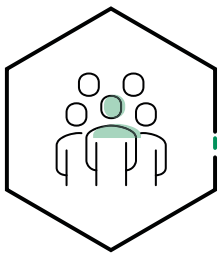
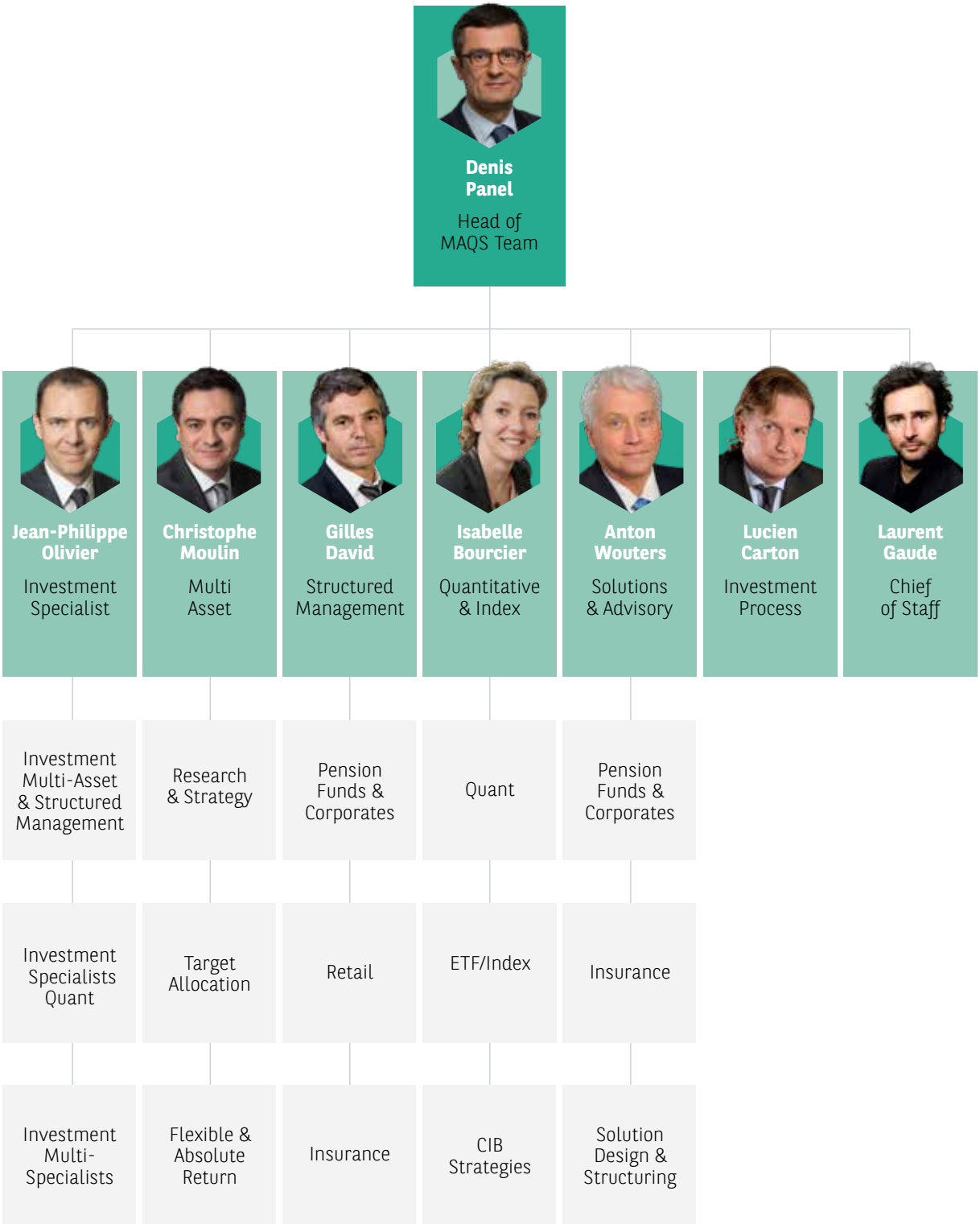
MAQS EXPERTS[1]



130bn euros
OF ASSETS[1]
(UNDER MAQS MANAGEMENT)

[1] BNPP AM, 30 June 2019

THE MULTI ASSET, QUANTITATIVE AND SOLUTIONS TEAM



BNPP AM, December 2018

SYNTHETIC REPLICATION OF PRIVATE CREDIT EXPOSURE

While we believe at BNPP AM we have a competitive advantage, with unrivalled access to the origination capabilities of a Tier One global bank, one of the challenges of implementing large CDI portfolios is the material time that it can take to source high quality assets.

As credit terms, covenants and spreads are cyclical in nature, single asset class commitments can suffer as individual managers feel compelled to find assets irrespective of the assessment of the underlying environment. **Active asset allocation** can allow a multi-asset private credit manager to allocate cashflows to where value exists at any point in time. However, even with this approach there is likely to be a lag between receipt of cashflow and ultimately the identification of a suitable asset.

The simplest (and most common) way to solve such an issue is to 'park' assets in cash or liquid investment grade credit prior to identification of suitable assets. Whilst providing the requisite liquidity, such an approach may not be optimal as there is an associated opportunity cost and cashflow risk.

BNPP AM, together with the BNP Paribas Group, has designed a **synthetic replication approach** that can offer clients the desired liquidity and a spread to more traditional liquid investment grade credit. Alternatives do exist and, depending on the underlying sleeves to be incorporated into the mandate, a synthetic portfolio can be built on a temporary basis using listed and synthetic assets.

Listed infrastructure (or utility) bonds can be used to provide a yield pick up to long-dated investment grade credit whilst offering a high degree of correlation to underlying infrastructure debt transactions. This is particularly pertinent as often they are used as the benchmark by which infrastructure debt managers provide marked to model valuations of their own assets.

One step further would be to incorporate into the replication portfolio the use of over-the-counter real estate, **equity** and **credit derivatives** (like equity default swaps and credit-default swaps) as shown in the illustrative table opposite.

A
SYNTHETIC REPLICATION APPROACH
GIVING CLIENTS THE DESIRED LIQUIDITY

MAKING USE OF OVER-THE-COUNTER REAL ESTATE, EQUITY AND CREDIT DERIVATIVES
(like equity default swaps and credit-default swaps)

	Underlying proxy types	Listed alternatives	Reverse convertible	Equity default swaps	Credit default swaps
ABS	**Debt / derivatives:** ■ Credit card ■ Leasing ■ Auto / Equipment Hire ■ Consumer Loans	✓			
(Leveraged) Loans	Corporate debt	✓			✓
Real assets	**Corporate debt / derivatives:** ■ Forestry ■ Timber	✓	✓	✓	✓
Infrastructure debt	**Debt / derivatives:** ■ Agricultural Operations ■ Heavy Construction ■ Engineering and R&D ■ Pipelines ■ Oil Field Machinery	✓	✓	✓	✓
Commercial real estate debt	**Debt / derivatives:** ■ REITS ■ Home Builders ■ Estate Management ■ Operations	✓	✓	✓	✓

BNPP AM, November 2018

CASE STUDY 2: SYNTHETIC CDI SOLUTION

An alternative to real CDI assets can be found in synthetic and listed CDI assets. These can prove very useful in the event that sourcing real CDI assets proves challenging, expensive or both due to lack of market supply and / or large investment sizes.

The **objectives and constraints** of a synthetic and listed CDI solution are usually to:

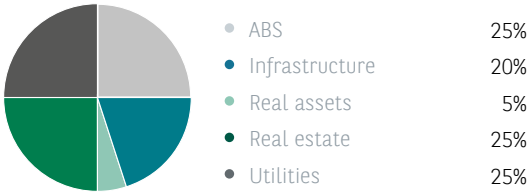
- Replicate the exposures and cashflow matching features of a real CDI asset portfolio;
- Offer a (temporary) implementation alternative to real CDI asset investors as these are not always available at acceptable conditions; and
- Maintain a high level of liquidity to ease transition to real CDI assets when available.

For synthetic and listed CDI asset solutions, **portfolio construction guidelines** are similar to those of a real CDI asset portfolio:

- Replicate the CDI portfolio solution;
- Identify the most appropriate synthetic and listed CDI asset classes to achieve the require replication;
- Maintain the appropriate level of liquidity in relation to a potential transition to real CDI assets; and
- Maintain an attractive risk / return trade off at portfolio level

The resultant synthetic and listed CDI asset portfolio is also diversified and offers valuable expected return and cashflow matching features.

Synthetic CDI Asset Portfolio (Illustration):



BNPP AM, November 2018

The synthetic CDI asset portfolio metrics are summarised here. The objective being to maintain similar metrics for comparison with the real CDI asset solution.

Portfolio metrics:

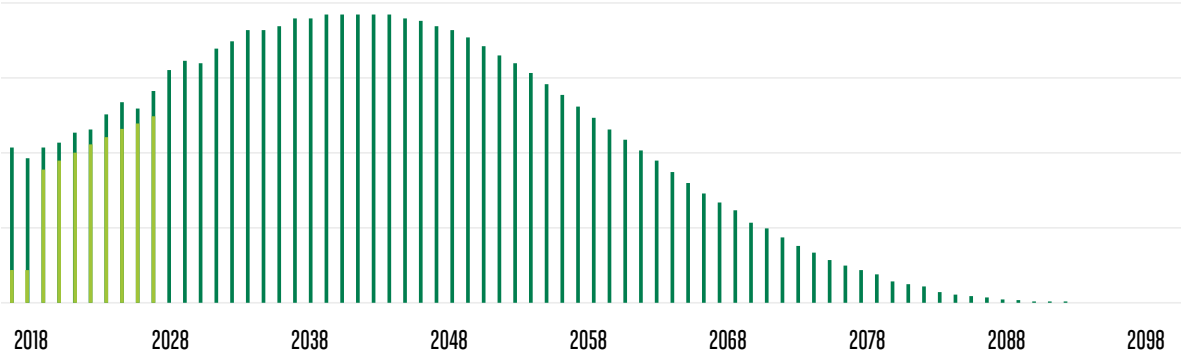
Long term return	3.35%
Excess over cash	1.7%
Risk	5.1%
Sharp	0.6
Coverage CDI first 10 years Liabilities	60.0%
Weighted average life CDI assets	5.5%

BNP Paribas AM, November 2018

No assurance can be given that any forecast, target or opinion will materialise.

As can be seen here, the synthetic CDI portfolio can be structured to maintain some cashflow matching properties. Although this may not be extended easily beyond 10 years at this stage, further extensions can be considered ongoing.

Synthetic CDI asset portfolio cashflow matching properties:



• Synthetic CDI asset cashflows • LDI asset cashflow

For illustrative purposes only. BNPP AM, November 2018

Having the **flexibility** to use synthetic replication provides pension schemes with optionality in the speed and rate of deployment into real CDI asset classes.

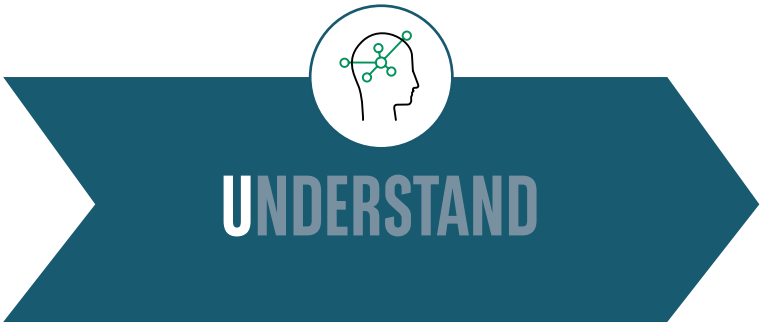
This patient capital approach reduces opportunity cost for clients and ensures that illiquid assets are only deployed when their relative value suggests that it will enhance the CDI portfolio:

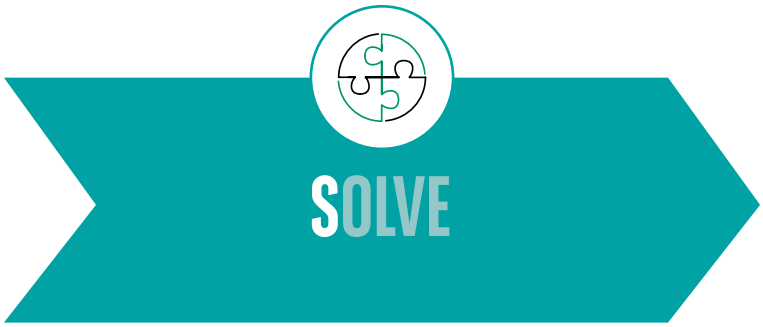
- A **strong monitoring** framework is therefore necessary to continuously govern the relative value between synthetic and real CDI assets and optimise the implementation of the CDI solution.

The limitations of such an approach reside in:

- The limited supply of synthetic alternatives beyond 10 years and in the mark-to-market risks of potentially volatile listed securities and derivative instruments. However, as can be seen in the graph above, a high matching level can still be achieved with a smaller cashflow
- There is potential reduced yield generated from synthetic and listed CDI asset portfolios

6 WHY BNPP ASSET MANAGEMENT FOR CASHFLOW DRIVEN INVESTING





1 Access to specialist private credit and real assets teams

BNPP AM's CDI capability offers institutional investors access to a broad range of private credit and real assets capabilities encompassing infrastructure debt, commercial real estate debt, loans, SME lending and structured securities. Leveraging over **50 investment professionals** located in the UK, Europe and the US.

2 Bespoke dynamic implementation

BNPP AM is able to create bespoke solutions for institutional clients. This can include segregated multi-asset private credit mandates, holistic CDI approaches where BNPP AM match and govern the CDI portfolio or sustainable CDI run-off solutions embedded within a captive insurance company wrapper. The design, dynamic implementation, governance and reporting is overseen by a **dedicated team of 130 multi-asset**, quantitative and solutions investment professionals.

3 Supported by an A-rated bank infrastructure

BNPP AM's CDI approach is supported by the infrastructure and resources afforded to the company by our parent BNP Paribas, including solutions in capital markets, securities services, advisory, finance and treasury. This allows the underlying teams to leverage proprietary origination, structuring and distribution capabilities from the wider BNP Paribas Group including **62 Commercial Real Estate Debt and Infrastructure Debt professionals**.

4 Co-investment creates an alignment of interest

In many instances BNP Paribas Group will retain a proportion of the underlying loans within their balance sheet creating a clear and transparent **alignment of interest** between third-party investors and the Group.

5 Synthetic private credit replication

BNPP AM is able to leverage the capabilities of the BNP Paribas Group to offer institutional clients **synthetic 'liquid' replication** of illiquid private credit. This offers a spread to liquid investment grade corporate bonds whilst allowing for the patient deployment of underlying capital.

6 Bespoke lending solutions for BNPP AM

BNP Paribas Group and BNPP AM have partnered to offer **customised solutions to institutional investors seeking long-dated private assets**. For example, whilst the Commercial Real Estate Debt sector is characterised by floating rate tranches, BNPP AM can offer CDI clients longer-dated fixed rate tranches in partnership with BNP Paribas Group. For mandates with broad discretion this enables ongoing innovation in accessing underlying assets.

7 Impact investing with ESG embedded within the credit process

BNP Paribas Group has been financing the real economy for **150 years** with market leading positions in real estate and infra structure financing. The bank's UK growth plan is predicated on expanding its UK client base and increasing **sustainable lending** e.g. to UK housing associations.

From SME lending to infrastructure debt BNPP AM's CDI strategy offers investors a stake in the real economy investing in a range of asset classes that play a vital role in promoting economic growth. In addition to social impact **ESG** is also embedded across the underlying asset classes providing further coherence and consistency with our **Group-wide sustainability policies**.

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Sourcing CDI assets: Sourcing of CDI assets may prove difficult, especially since many asset managers are chasing the same type of assets. The available assets may not meet the client's objectives or may not be attractively priced. The ramp up period can be long for large CDI investments and necessitate the use of synthetic CDI portfolios.

Liquidity risk: There is a risk that CDI assets may become illiquid if the economic or market situation deteriorates. Consequently, it may not be possible to sell or buy CDI assets at all or quickly enough before their expiry.

Mark-to-market risk: Given the illiquid nature of CDI assets, their mark-to-market may be adversely affected by changing market conditions.

CDI portfolio risk: Because of the inherent complexity of such a strategy and the lack of liquidity of some CDI assets, a CDI portfolio may not always deliver the expected cash flows.

Basis risk: By nature, there is a difference between pension liability cash flows and CDI assets. It is important to keep this aspect in mind when structuring a CDI portfolio in order to minimize basis risk .

Governance risks: Given the multiple CDI asset classes and the potentially long ramp up period, the required level of governance is quite high and can involve performance, risk, trigger and exposure monitoring as well as the use of synthetic CDI assets. Assessment of relative value between synthetic proxies and real assets may also need some governance. Not providing the appropriate level of control and governance could negatively impact the long-term performance of the CDI strategy.

All information referred to in the present document is available on www.bnpparibas-am.com.

As at December 2018.

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