

White Paper

Innovations in Long-Term Capital Management The Practitioner's Perspective

April 2016





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**World Economic Forum White Paper
Innovations in Long-Term Capital Management: The Practitioner's Perspective**

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Case Studies

A. APG: Responsible Investing in Real Estate

Organizational type	Collective defined contribution pension fund manager
Geographical location	Amsterdam, The Netherlands
Assets under management	€400 billion (\$455 billion)
Internal investment capability	650 employees
Liquidity profile	Net inflows
Investment objectives	Contribute to high-quality and affordable pensions for its clients' participants by realizing stable, long-term returns on investments (while taking measured and controlled risks)
Governance structure	Executive board: Chief Executive Officer (CEO), Chief Financial Risk Officer (CFRO), Chief Operations Officer (COO) and Chief Investment Officer (CIO) Supervisory board: Six independent directors

As trustees of other people's money, institutional investors must invest in a way that is aligned with their stakeholders' objectives. This case study examines how APG chose to pursue responsible investing objectives on behalf of its clients, specifically by integrating environmental, social and governance (ESG) factors into its organization and its investment processes, and by introducing a new real estate sustainability benchmark called the Global Real Estate Sustainability Benchmark (GRESB).¹

Background

The comprehensiveness of the Dutch pension system stands out among developed countries. Approximately 90% of the labour force is enrolled in a pension plan, and pension benefits aim to be about 70% of average lifetime earnings. Dutch workers save on average 16% of their disposable income (Eurostat, 2015), which is second only to Germany in the Eurozone. The Dutch pension industry is stringently regulated: funds are required to maintain a minimum asset-to-liability funding ratio of 105%, and pension liabilities are discounted at a rate that tracks the interbank swap curve (instead of a higher fixed-discount rate, which is the practice in some other markets).

APG, the largest pension fund manager in the Netherlands, was established in 2008 as a spin-off of Stichting Pensioenfond ABP, the Dutch pension fund for government and education-sector employees. This followed a law passed in 2007, which required pension funds to turn their asset management functions over to independent firms. Before this, ABP conducted asset management in-house; references in the text to APG before 2008 thus refer to equivalent functions conducted within ABP.

As of July 2015, APG Asset Management was managing €400 billion (\$455 billion) on behalf of over 4.5 million members at ABP and six other Dutch pension schemes. APG employs 650 investment professionals in four global offices, and invests 80% of its assets in-house. It manages portfolios of 15 asset classes across a full range of public- and private-market assets.

APG is governed by a two-tier board structure. A four-person executive board consisting of APG's CEO, CFRO, COO and CIO conducts management oversight of the organization. The executive

¹ GRESB was created in 2009. The organization of the same name was set up at the same time to exclusively develop and manage the benchmark.

board is, in turn, supervised by a supervisory board which, as of July 2015, was made up of six non-executive supervisory directors. The executive board is assisted by functional councils on finance and risk, human resources, information technology and strategic clients, as well as a risk committee that deals with matters involving risk management.

Principles of responsible investing

While all investors seek good financial returns, organizations do have different priorities. Some adopt a more laissez-faire approach to investing, buying assets wherever prospective financial returns appear to be optimal, regardless of sustainability and governance considerations. Others adopt an approach that they consider to be more “socially responsible” during portfolio construction and security selection, taking ESG factors into consideration: investors can choose to avoid investing in businesses associated with vice, might exclude countries that are on international blacklists, or might proactively invest in ways that promote positive social outcomes.

Typically, three reasons are cited for motivating firms to implement responsible investing policies. First, some investors believe that owning a share of a business puts the onus on them to influence and improve company behaviour and to hold the company accountable, an approach often called “active ownership”. Second, large investors know that their financial clout permits them to direct funds towards activities they believe to be beneficial. And third, responsible investing can be implemented as an active investment strategy aimed at generating improved risk-adjusted returns and making better-informed investment decisions.

The range and value of assets managed under formal, responsible investing mandates grew substantially in the 2000s. The Global Sustainable Investment Alliance, a collaboration of five regional sustainable investment organizations representing global investors, reported that assets managed under responsible investment mandates increased by 61% between 2012 and 2014 (Global Sustainable Investment Alliance, 2015) (Figure A1).

Figure A1: Global Assets under Responsible Investment Mandates

	2012	2014	Growth
Europe	\$8,758	\$13,608	55%
United States	\$3,740	\$6,572	76%
Canada	\$589	\$945	60%
Australia/NZ	\$134	\$180	34%
Asia	\$40	\$53	32%
Total	\$13,261	\$21,358	61%

Note: Asset values are expressed in billions.

Source: Global Sustainable Investment Alliance, 2015

As of July 2015, many large asset owners were devoting significant resources to integrating ESG factors into their investment processes, through maintaining exclusionary screening lists, engaging in shareholder action or pursuing thematic ESG investments. The responsible investing movement is particularly active in the Eurozone; there, asset managers have developed a strong tradition of responsible investing (US Environmental Protection Agency, 2009), the rate of growth in responsible-investing-mandated assets has been particularly marked, and regulations governing responsible requirements and ESG disclosure are generally more developed than elsewhere (European Commission, 2013).

Responsible investing at APG

This culture of responsible investing in the Eurozone puts APG’s approach in context. Both APG and its pension fund clients believe in the value of responsible investing and their duty to be aware of the real-world impact of their investment decisions, and that responsible investing is compatible

with their core goal of optimizing risk-adjusted returns. They also believe that responsible investing can enhance the APG portfolio's performance.

APG expresses its commitment to responsible investing by codifying such investing within one of its nine headline investment beliefs. According to belief 9, APG wishes to contribute to sustainable development, and the portfolio's risk-return profile can be improved by incorporating ESG considerations. Further details are specified within a more detailed list of eight pillars of responsible investing, which describe the approaches to such investing, expectations surrounding it, and the ultimate investment objectives. This type of clear mission statement is important for setting the tone and securing the buy-in of the strategic importance of responsible investing, both within the organization and among its stakeholders.

Arriving at this point has taken many years of concerted development. APG started exercising its voting rights at listed companies in 1999. In the early 2000s, APG researchers began in-depth analyses of ESG investing, conducting in-house studies and collaborating with academic institutions in the Netherlands. In 2007, a dedicated sustainability and governance position was created, and by July 2015 this function was being carried out by a team of nine members, in Amsterdam and Hong Kong. The team set guidelines for how APG should engage with investee companies, and developed internal processes to foster ESG integration at the company. The guidelines have helped to refine how APG articulates its ESG beliefs. Moreover, the sustainability and governance team collaborate closely with portfolio managers to integrate ESG factors into the investment processes across asset classes.

However, systems and mission statements alone are of little use if the rest of the organization doesn't buy into them. The organization's actual structures have to implement and manage the process of ensuring that the principles are fully embraced at all levels of the company. This began with the creation of a strong governance structure at the top of the house. A board-level steering group governs the implementation of the responsible investing policy. In addition, the managing director of sustainability and governance is part of the front-office management team reporting directly to the CIO.

Equally important is for individual staff members to share in the mission, and not view responsible investing as an arbitrary principle imposed by meddling bureaucrats. When they are selected, new employees are reminded that ESG factors are a fundamental part of the investment process. Once buy-in has been embedded throughout the organization, ESG principles can be organically incorporated into its investments.

Various tools have been created from APG's commitment to responsible investing. For instance, listed equity portfolios are analysed using APG's in-house ESG dashboard, which generates risk comparisons and estimates the extent to which an asset's value is affected by its ESG risk. Hedge-fund and private-equity managers are expected to adhere to industry-wide standards of ESG disclosure. As the latter part of this case study discusses in detail, APG has adopted the GRESB to analyse the sustainability of its real estate investments.

To demonstrate its accountability to its external stakeholders, APG publishes an annual report on responsible investing alongside its regular annual report. This report contains a range of ESG portfolio analytics, dialogues with investee companies, APG's voting record and a responsible investing outlook.

Responsible investing in real estate: the Global Real Estate Sustainability Benchmark

Approximately 10% of APG's portfolio is allocated to tactical and strategic real estate investments. This makes it one of the largest real estate investors in the world, with real estate assets under management (AUM) of about €40 billion. Naturally, APG measures the performance of its real estate investments by evaluating portfolio returns relative to their respective performance benchmarks. However, while this form of performance benchmarking is important for assessing overall financial risk and return, it says little about the portfolio's ESG characteristics.

In the mid-2000s, APG became acutely aware of the need for a systematic way of measuring the sustainability of its real estate investments. Therefore, to assess the ESG risk and performance characteristics of its real estate portfolio, APG has had to adopt a number of additional measures. At that time, individual asset managers tracked sustainability metrics, such as waste production and power utilization on an ad hoc and proprietary basis. This made it difficult to create valid comparisons between properties, measure the aggregate characteristics of a large portfolio with many holdings, and account for all the risk factors embedded within the portfolio. The problem became more complex as the portfolio grew in size. To address this, APG teamed up with Maastricht University (the Netherlands) and peer pension funds PGGM and USS to create a more focused, standardized approach to measuring sustainability performance. As a result, the GRESB was established in 2009, and APG has been making extensive use of it ever since. The GRESB organization, founded at the same time, applies the benchmark to assess the ESG performance of public and private real estate portfolios around the globe.

The organization initially developed the sustainability benchmark using an annual survey of data collected from property companies and real estate funds. The first survey consisted of 43 questions, with a focus on environmental performance such as energy consumption, water usage, waste management and carbon output. Other questions covered broader social and governance themes, such as employee treatment and training, corruption indicators, and engagement with tenants and suppliers. The survey now comprises 42 questions grouped into seven categories, with 14 additional questions for projects under new construction and major renovations (Figure A2).

Figure A2: GRESB Real Estate Survey Question Categories



Source: GRESB BV, 2014

The survey aims to assess the following dimensions of ESG practices:

- What sustainability-related strategies and objectives are in place at the organizational level, and what actions have been taken to implement these strategies and to achieve the objectives?
- What ESG policies are in place at both the organizational and portfolio level?
- Are key environmental performance indicators measured and monitored within the portfolio? What are the levels of consumption and emission?
- What frameworks, standards and certification/rating schemes are used within the portfolio?
- Are risk and opportunity assessments performed at the portfolio level? What are the actions taken? (GRESB BV, 2015)

Each year, GRESB collates the survey answers, validates the data and conducts random site visits. Survey results are then used to assign each participant a GRESB score from 0 to 100. This gives real estate companies and funds a simple indicator of the impact on sustainability and the risk of their portfolios, allowing like-for-like comparisons and easier communication of sustainability performance to third parties. The GRESB platform also allows investor members – pension funds, other asset owners and large asset managers – to monitor the annual survey results of their investments and explore sustainability reports for each holding.

As of July 2015, 707 listed real estate companies and private equity fund managers were participating in the GRESB survey, covering 61,000 buildings with an aggregate value in excess of \$2.3 trillion. While GRESB's coverage is clearly large, it is not universal. The survey covers substantially more assets in developed real estate markets, with particularly strong market coverage in Europe (Figure A3). As of July 2015, about two-thirds of APG's real estate portfolio was reporting against the GRESB survey, and all new investments are required to take part in it.

Figure A3: GRESB Real Estate Coverage

	Total	North America	Europe	Asia	Australia/NZ	South America	Africa	Globally diversified
Listed no of participants	170	41	69	41	12	1	3	3
Gross asset value USD million	1,339,733	521,529	377,088	290,919	84,048	1,185	9,151	55,813
Average size based on GAV in USD million	7,881	12,720	5,465	7,096	7,004	1,185	3,050	18,604
Market coverage* <small>Based on the regional FTSE EPRA/NAREIT</small>	56%	55%	74%	39%	67%			
Private no of participants	537	114	311	63	35	9	1	4
Development only participants	19	0	2	12	1	4	0	0
Gross asset value USD million	962,149	434,036	372,860	73,167	72,704	3,230	1,423	4,730
Average size based on GAV in USD million	1,792	3,807	1,199	1,161	2,077	359	1,423	1,182
Total no of participants	707	155	380	104	47	10	4	7
Development only participants	19	0	2	12	1	4	0	0
Gross asset value USD million	2,301,881	955,565	749,948	364,086	156,751	4,415	10,574	60,543
Average size <small>*based on GAV in USD million</small>	3,256	6,165	1,974	3,501	3,335	441	2,644	8,649

Source: GRESB BV, 2015

APG uses the GRESB in three important ways. First, during the due-diligence phase, it evaluates individual real estate holdings, allowing APG to identify which investments are underperforming in relation to sustainability. The organization can thus engage in dialogue with the asset managers of real estate funds to encourage them to improve their scores (APG, 2012). Second, the GRESB allows APG to make a quick comparison of its overall real estate portfolio's score against that of its benchmark, giving a snapshot of overall sustainability and setting a performance baseline for the future.

Third, APG uses the GRESB as a screening criterion for new real estate investments. External managers and property companies being considered for investment need to have GRESB scores that are better than the median company in their region- and sector-adjusted peer groups. Failing this, investee companies need to commit to improving their GRESB rank to above average within two years of APG's investment. In cases where an investment is underperforming, APG's first response is to engage and advise on how the sustainability performance can be improved. APG does, however, wield the stick besides the carrot to achieve its goals: it can stop investing in managers who fail to improve their ESG performance over time.

The dividends of responsible investing

APG's commitment to responsible investing has resulted in better internal processes for such investing. The organization has developed internal systems to monitor many aspects of sustainability performance, including its equity portfolio's carbon footprint, real estate energy consumption and the human capital policies of investee firms. This has helped with a more comprehensive understanding of the risk factors within the portfolio, allowing APG to identify key sources of sustainability and governance risk. Monitoring these metrics has also allowed APG to focus on improving the sustainability of its portfolio, as shown by indicators such as the improving

energy efficiency profile of its real estate portfolio (APG, 2013), and the growing number of high-sustainability investments. In 2014, APG had almost €31 billion (7.7% of AUM) in high-sustainability investments, which were assets ranking in the highest category of its sustainability benchmark or contributing to environmental and social solutions (APG, 2014).

APG's support for the GRESB has also had implications for the benchmark itself. While APG was instrumental in creating the benchmark, it has also promoted its wider adoption through industry networks and real estate associations, such as the European Association for Investors in Non-Listed Real Estate Vehicles (INREV) and the European Public Real Estate Association (EPRO). This has deepened the GRESB's coverage, making the benchmark more usable, and it has also allowed GRESB to grow as an organization and develop new products. In 2015, it launched GRESB Infrastructure, a sustainability benchmark for infrastructure assets and projects. APG and other large institutional investors were founding members of this most recent benchmark.

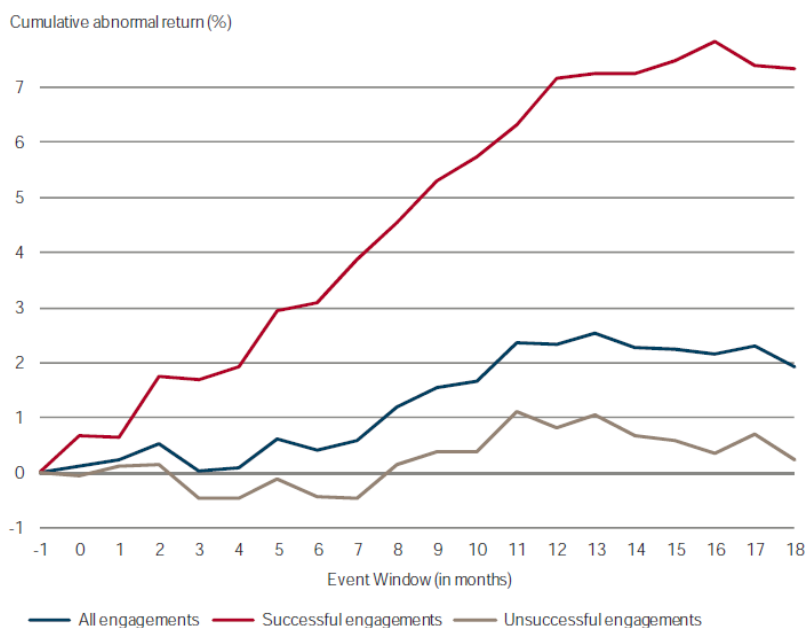
Furthermore, evidence suggests that APG's approach to responsible investing could contribute to better risk-adjusted returns. APG was part of a group of early investors who consistently invested in real estate assets with good sustainability characteristics. This would pay off if other investors started to realize the attractiveness of sustainable assets and followed suit, thus driving up demand and rewarding the strategy's early adopters. Evidence also exists of similar patterns even before this, in relation to governance. In the 1990s, researchers found that good governance led to good stock returns – that the better governed the firm, the more its stock appreciated (Gompers, Ishii & Metrick, 2003). Further analysis (Bebchuk, Cohen & Wang, 2013) found that the superior stock performance of these well-governed companies could be tied to market participants gradually learning about the benefits of good governance at companies. As the market became more aware of the importance of governance, they bid up the stock prices of well-governed firms.

A similar phenomenon may still occur in the real estate markets. Awareness of responsible investing is growing, and investors who wish to measure the ESG characteristics of their multi-asset portfolios are likely to use tools such as the GRESB. Over time, some of the sustainability metrics contained within the benchmark could prove to be catalysts for excess return. As a pioneering and proactive responsible investor, APG is undoubtedly capitalizing on its understanding of the importance of sustainability performance.

APG also tries to work with investee companies to improve their sustainability and governance performance when they have underperformed, rather than immediately divesting or blacklisting them. In economic parlance, and in relation to underperformance in ESG areas, APG has been more likely to adopt a strategy of "voice" – making its concerns heard and communicating with the firm – than one of "exit".

A body of research supports the use of "voice" as a method of enhancing returns. For instance, Dimson, Karakaş and Li (2015) analysed the proprietary database of a large institutional investor and found that engaging in active dialogue with an investee firm about ESG issues resulted in stronger stock performance, particularly when the engagement was successful (Figure A4). This is an intuitive result: markets should rightfully assign a higher value to companies when management makes a positive change and sustainability conditions improve.

Figure A4: Excess Return from Engagement with Investee Firms



Source: Dimson, Karakaş and Li, 2015

Of course, APG’s desire to be a responsible investor has been primarily motivated by its stakeholders’ preferences. While improved financial performance is clearly important, it is not the sole focus of its investment programme.

Closing thoughts

Responsible investing and stakeholder engagement are integral parts of many investors’ mandates. Stakeholders’ objectives will differ between organizations, but the example of APG offers a few broadly applicable approaches to responsible investing.

APG’s beliefs about responsible investing were articulated at the top of the house with clear, codified principles. The principle of responsible investing was clearly embedded in its governance structure, with a dedicated managing director of sustainability and governance on its front-office management team. To ensure that its ESG values were put into practice, the firm (1) hired employees who shared these values, (2) set up a new team dedicated to responsible investing, (3) put ESG-related investment policies in place, and (4) contributed to developing asset-class-specific benchmarks of ESG performance.

In effect, APG’s ability to implement ESG principles has been aided by two key attributes. First, APG’s clients are committed to responsible investing and have set a clear responsible investing mandate for the fund manager. This has made it easier to dedicate resources to responsible investing and to integrate it into the investment process. Having stakeholder support and a clear mandate has been a crucial enabler for the organization, with the process made easier by clear and consistent communication with the board, its pension fund clients and its pension members.

Second, the organization’s large scale has provided the required resources and clout to collaborate with other organizations, create a new benchmark and promote the benchmark to other investors. While many other organizations might find it difficult to replicate APG’s experience and success, the GRESB makes it possible for investors of all sizes to participate in the survey and use its sustainability benchmarking tool. As with many financial innovations, the marginal cost of using the GRESB has fallen rapidly as the innovation has become widely adopted.

As fiduciaries, investment organizations need to understand their stakeholders’ ultimate objectives. At APG, an important objective is comprehensive responsible investing; to meet this, it has developed innovative solutions.

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B. Caisse de Dépôt et Placement du Québec: A New Model for Infrastructure

Organizational type	Public and parapublic pension and insurance fund manager
Geographical location	Quebec, Canada
Assets under management	CAD 241 billion (Canadian dollar) (\$185 billion)
Internal investment capability	Over 800 employees
Liquidity profile	Net capital inflows
Investment objectives	Achieve optimal return on funds under management while contributing to Quebec's economic development
Governance structure	Executive committee: President and Chief Executive Officer (CEO) and 14 senior executives Board of directors: Chairman, President and CEO, depositor (client) representatives and independent board members

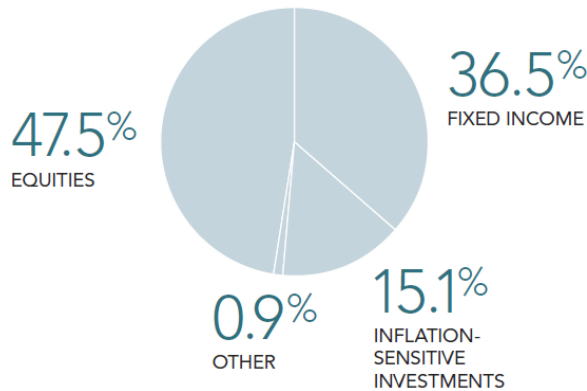
This case study examines CDPQ Infra, a new model for investing infrastructure put forward by Caisse de Dépôt et Placement du Québec (CDPQ). The model aims to be a highly integrated solution for carrying out public infrastructure projects, where CDPQ Infra assumes responsibility for the planning, financing, execution and operation of major infrastructure projects. It draws on CDPQ's institutional expertise in real assets, especially infrastructure, and its significant experience as a real estate developer, investor and manager via its real estate subsidiary, Ivanhoé Cambridge.

Background

CDPQ is an institutional investor managing funds for several pension funds, insurance plans and government-linked funds in the province of Quebec, Canada. Established in 1965 by an Act of the Quebec National Assembly, CDPQ manages the Quebec Pension Plan's funds. With a portfolio that has since grown to include 34 depositors (clients), its mission is to achieve an optimal return on the funds under management while contributing to Quebec's economic development.

The composition of CDPQ's overall portfolio is determined by its clients' cumulative asset mix. The fund manager holds a diversified portfolio of equities, fixed-income securities, inflation-sensitive investments (such as infrastructure, real estate and real return bonds) and other investments, such as overlay strategies (Figure B1). CDPQ is very active in the private markets and has made substantial investments in private equity, real estate and unlisted infrastructure.

Figure B5: Composition of CDPQ's Overall Portfolio

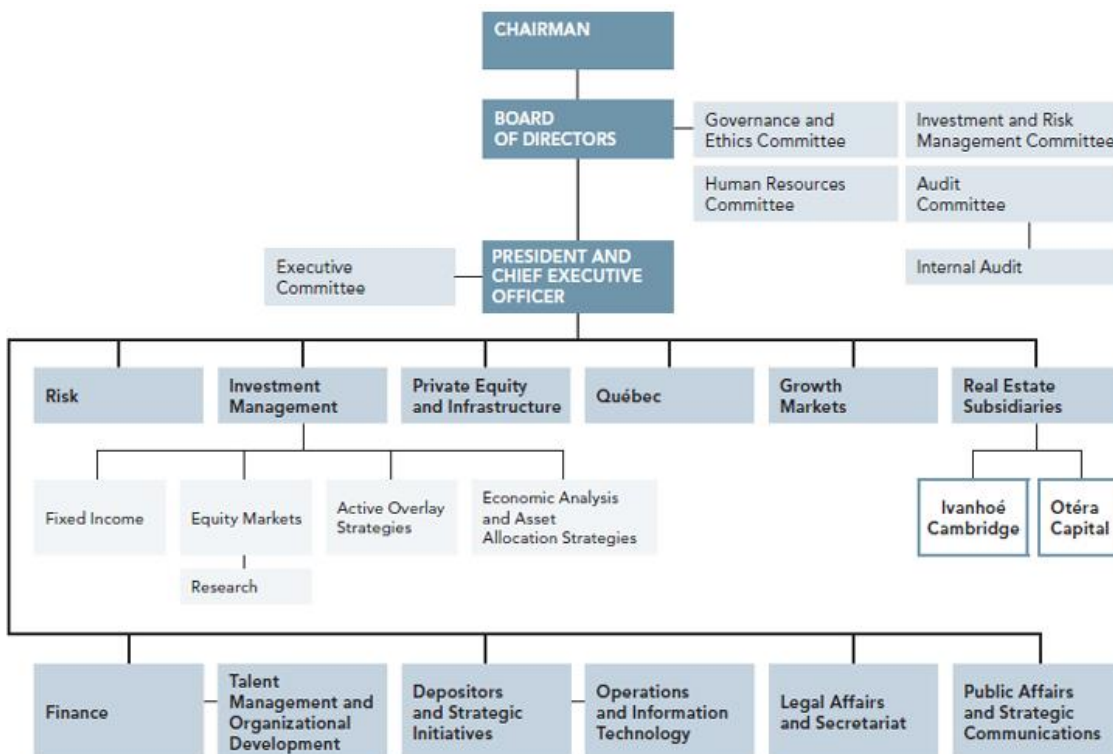


Source: CDPQ, 2014

As of June 2015, CDPQ was managing CAD 240.8 billion in total net AUM, making it the second-largest Canadian pension fund manager after the Canada Pension Plan Investment Board. It employs over 800 staff in nine offices worldwide.

CDPQ's organizational and governance structure (Figure B2) shows that the executive committee, made up of the president, CEO and 14 other senior executives, provides management oversight of the organization. Members of the board of directors, which oversees the executive committee, are appointed by the Quebec government upon consultation with the board. The board is composed of the board chairman, CDPQ's president and chief executive officer, depositor representatives and independent board members. CDPQ Infra, the focus of this case study, was established as a subsidiary of the fund manager in July 2015.

Figure B6: CDPQ's Organizational and Governance Structure



Source: CDPQ, 2014

Attracting private capital to infrastructure

Global underinvestment in infrastructure is both widespread and chronic. The global management consulting firm McKinsey & Company estimated that in the period 2007-2012, annual investment in infrastructure in developed countries was about 2.5% of GDP, when it should have been 3.5%. It also estimated that for the next 20 years, most developed countries will have to increase infrastructure spending by 0.6% to 1.0% of GDP per year just to support anticipated growth and maintain current levels of infrastructure service capacity (McKinsey Global Institute, 2013).

The core of the problem seems to be that governments are unable to channel sufficient funding to infrastructure investments. Many of the mechanisms used to finance infrastructure are archaic, inadequate and difficult to change. In the United States, for example, the Highway Trust Fund, a federal fund providing money for works on roads, tunnels and bridges, is funded mainly by an 18-cent-per-gallon petrol tax, which has not been nominally adjusted since 1993. Over time, as inflation and increasing fuel efficiency have eroded its spending power, the Highway Trust Fund has stayed solvent only through a series of stopgap transfers and accounting gimmicks (Peter G. Peterson Foundation, 2014). A longer-term fix of raising the petrol tax is considered to be too problematic politically. Similar problems have plagued comparable agencies in many other countries.

Many governments have also faced severe fiscal pressures while deleveraging for some years to bring down public debt levels. In the years since the global financial crisis, a combination of lacklustre long-term growth prospects and high levels of indebtedness has led to a squeeze on government spending, which in turn has forced governments to choose between infrastructure investment and other pressing priorities. Cutbacks in infrastructure spending have been particularly pronounced in regions where deleveraging has been most acute. In 2014, general government fixed investment in the Eurozone was about 15% below its pre-crisis peak, with especially steep drops in Italy, Ireland and Greece (Eurostat, 2015).

The role of public-private partnerships

To bridge the infrastructure gap, governments have tried to find ways of attracting private capital to invest in infrastructure. One popular approach has been to set up public-private partnerships (PPPs), which are contractual agreements between public-sector entities and private companies in which some portion of the potential and inherent risks and rewards within an infrastructure project is shared. PPPs aim to strike a balance between the public interest on the one hand, and the expertise, capital and profit motive of the private sector on the other.

PPPs are widely implemented in the United Kingdom, where more than 725 PPP projects have reached financial close since the early 1990s (HM Treasury, 2012). By contrast, in the United States, the PPP landscape is significantly less developed, as individual states differ widely in both their willingness and legislative ability to use PPPs for infrastructure development (Moody's, 2014).

A key feature of PPPs is that they can encompass a broad range of deal structures and asset types. They can be simple arrangements, where the private sector takes an active role only in the design, engineering and construction of the project (known as "design-build"). In more advanced markets, however, PPPs typically involve more integrated agreements, where the private sector agrees to design, build, finance, operate and maintain an infrastructure asset (known as "DBFOM") for a predetermined period of time. Public-sector agencies can choose to engage with the private sector on either end of the spectrum or anywhere in between. Traditionally, the public sector is almost always responsible for identifying an infrastructure need and proposing a solution, while the private sector is almost always contracted out to construct the project. Figure B3 shows a range of possible PPP arrangements.

Figure B7: Various Forms of PPP Arrangements

	Identify Infrastructure Needs	Propose Solution	Project Design	Project Financing	Construction	Operation & Maintenance	Ownership
Bid - Build	Public Sector				Private Sector	Public Sector	
Design - Build	Public Sector		Private Sector	Public Sector	Private Sector	Public Sector	
Design - Build - Finance	Public Sector	Private Sector			Public Sector		
Design - Build - Finance - Operate - Maintain	Public Sector	Private Sector				Public Sector	

Source: Brookings, 2014

While a PPP is an appealing model for infrastructure projects in principle, government agencies often struggle to attract and retain significant amounts of private capital. The World Economic Forum has written extensively on the subject, identifying many of the obstacles faced by private capital when considering PPPs (see, for example, the *Infrastructure Investment Policy Blueprint*, 2014). Based on the findings, it has made recommendations for governments seeking to attract private investors to infrastructure (World Economic Forum, 2014), including:

- **An infrastructure strategic vision** with a credible project pipeline, a viable role for investors and a clear communication strategy
- **Policy and regulatory enablers** for mitigating renegotiation risks and increasing the efficiency of key processes
- **Investor value propositions** at the individual project level that focus on maximizing value for governments and ensuring a competitive risk-adjusted return for investors

These recommendations are based on investors' main concerns when deciding whether to commit capital to a project. Often, because public projects are not specifically designed with these concerns in mind, the projects are ultimately inaccessible or unattractive to private investors. Indeed, investors have regularly cited regulatory concerns and political risk as the major impediment to their participating in public infrastructure projects (PwC, 2015).

On the other side of the equation, government agencies are sometimes reluctant to engage with the private sector for fear of misaligned interests. Private entities often have shorter time horizons than the public sector and answer to a different set of stakeholders. Governments partnering up with the private sector can also induce political pressure from different interest groups. While PPPs are not outright privatizations, many users and interest groups consider any type of partnership with the private sector as posing a potential threat to their welfare. In the United States, when the California Department of Transportation initiated a PPP project to improve the Presidio Parkway in San Francisco in 2010, the Professional Engineers in California Government (an association representing over 13,000 state-employed engineers and related professionals) took extensive legal action to oppose the deal. Their legal efforts ultimately failed, but they did cause significant delays to the project and damaged the already fragile relationships between the government and organized labour. Furthermore, users, particularly in toll- and tax-averse communities, often resist PPPs on principle. These political realities present obstacles for agencies that are considering to start their first PPP.

Nevertheless, private capital fundamentally has the potential to contribute to socially beneficial projects and add to much-needed infrastructure investment. As the US White House described it when launching the Build America Investment Initiative, encouraging public-private collaboration and expanding the market for PPPs are key ways to increase infrastructure investment and economic growth (The White House, 2014). The challenge lies in finding ways to build aligned, long-term partnerships that can harness the private sector's expertise to serve economic and social goals.

CDPQ Infra: integrated DBFOM investing

CDPQ's newest investment programme, CDPQ Infra, aims to offer a new model for carrying out public infrastructure projects. Established in July 2015, CDPQ Infra will be a wholly-owned subsidiary of CDPQ, and will work with the Quebec government to plan, finance, execute and operate greenfield infrastructure projects. Its involvement will be even more integrated than the DBFOM PPP model. CDPQ Infra will be involved in developing and proposing solutions to the Quebec government as soon as infrastructure needs have been identified and CDPQ has agreed to take on a project, after an independent review of its expected profitability. Such projects will also be removed from the government's balance sheet, thus minimizing the effect of new infrastructure projects on the public fiscal balance.

Important elements of the CDPQ Infra model are highlighted and contrasted with other models of infrastructure investment (Figure B4).

Figure B8: Key Elements of CDPQ Infra Model

THREE COMPLEMENTARY MODELS FOR CARRYING OUT PUBLIC INFRASTRUCTURE PROJECTS



A new way of sustainably investing in public transit

	TRADITIONAL MODEL	PPP MODEL	CDPQ INFRA MODEL
PLANNING AND FINANCING			
Responsibility for planning	Government	Government	CDPQ Infra + government
Sources of financing	New public debt	Private consortium Federal and provincial subsidies covering a portion of the costs (variable)	CDPQ Infra + partners Federal subsidy (depending on eligibility) Equity investment by the Québec government (based on agreed solution)
EXECUTION			
Responsibility for construction	Government	Private consortium	CDPQ Infra + partners
OPERATION			
Operation of projects	Government	Private consortium	CDPQ Infra + partners
Controlling shareholder	Government	Private consortium	CDPQ Infra
Assets on government balance sheet	Yes	Yes	No
Ownership of assets	Government	Private consortium (35 years) and then the government	CDPQ Infra + partners

Source: CDPQ Infra, 2015

Two features of CDPQ have played prominent roles in forming CDPQ Infra. The first is the fund manager's impressive experience in global infrastructure investment. Besides a solid, 15-year track record in infrastructure investment in Canada, Europe, the United States and Australia, it now has a team of seasoned investment professionals as well as investment experience in various infrastructure market segments. In 2005, CDPQ was a key investor in a greenfield project to construct and operate The Canada Line, a rail service connecting Vancouver and the city's airport. It subsequently made significant investments in the United Kingdom – in Heathrow Express and Gatwick Express (the trains linking these airports to central London), and in Keolis, a global public transport operator. The combination of expertise and experience acquired during this time has given CDPQ the confidence to expand its infrastructure investment model. The fund manager is also expanding its infrastructure portfolio, as reflected by its infrastructure holdings more than doubling in size between 2010 and 2015. As of July 2015, CDPQ's infrastructure portfolio was worth over CAD 12 billion, and plans are in place to continue growing the portfolio and thus opening up new sources of deal flow.

The second feature is the organization's long history of developing, managing and operating real assets via its real estate subsidiary, Ivanhoé Cambridge. Acquired by CDPQ in 1990 (when it was still named Ivanhoé), it is part of the fund manager's strategy to invest in more real estate and improve its position in the retail real estate sector (CDPQ, 1990). Over time, Ivanhoé merged with other industry players, forming Ivanhoé Cambridge in 2011, and was consolidated with CDPQ's other real estate subsidiary, Société immobilière Trans-Québec. It grew its portfolio from CAD 1 billion in 1990 to CAD 48 billion in 2015. The portfolio includes office, retail, logistics and multi-residential properties, and it employs 1,700 employees worldwide.

While Ivanhoé Cambridge is a subsidiary of CDPQ, it operates autonomously and is involved in the full real estate value chain, from development to investment to asset management. This makes CDPQ distinct from many other institutional fund managers, which have limited their involvement to the financial aspects of investing and played a secondary or more passive role in asset management. Over the years, Ivanhoé Cambridge has added value to CDPQ's real estate portfolio and allowed the organization to leverage off its success to replicate similar functions in other parts of the portfolio. This also means that CDPQ has valuable experience in setting up and managing a new subsidiary.

Building on the business model of Ivanhoé Cambridge, CDPQ Infra will pursue a fully vertically integrated investment process in the infrastructure space. The process begins with the Quebec government identifying infrastructure needs. CDPQ Infra will then take the lead in evaluating the project for feasibility and commercial viability, conducting studies, gathering data and drawing up specific plans for execution and operation. If CDPQ Infra believes the project is feasible and commercially viable, it will submit its proposal for consideration by the government. Rounds of dialogue between CDPQ Infra and the government will then follow, after which the government will either accept or reject the proposal. If the project is to proceed, CDPQ Infra will assume full responsibility for all aspects and stages, including planning, financing, execution and operations.

Central to CDPQ Infra's strategy will be its ability to unlock new deals by participating in the early stages of the planning process, and to add value by stimulating operational improvements. CDPQ Infra recognizes the critical importance of building strong internal investment and project management capabilities, with a skill set tailored to the project requirements. Skills will include experience in project finance, project management, engineering and operations management. A fully staffed CDPQ Infra team will increase the number of employees responsible for infrastructure at CDPQ to over 65.

Participating external partners will supplement in-house expertise. For every project, CDPQ Infra plans to work with well-aligned and complementary partners who will undertake the stages of construction, logistics and operations. CDPQ Infra will oversee and coordinate the projects, and choose partners through international public tenders. CDPQ is no stranger to large partnerships of this kind. In 2012, it partnered with Plenary Group, a PPP infrastructure developer and fund manager, to develop the 1.5 billion Australian dollar Victoria Comprehensive Cancer Centre in Melbourne, Australia, and its investment in Keolis in the same year was made in partnership with SNCF, the French national railway company.

Perks and projects

In June 2015, the Quebec National Assembly passed Bill 38, an Act that allowed CDPQ to establish CDPQ Infra. It was no surprise that the national assembly believed in the investment programme's merits. CDPQ Infra offers the government a way to engage with private capital and transfer construction projects off its balance sheet. It enables the government to benefit from CDPQ's extensive technical and financial knowledge, and it has allocated extra resources to the origination stages of infrastructure projects. Crucially, the government finds it desirable to partner up with an institution like CDPQ, whose long time horizon and track record of contributing to Quebec's development point to a closer alignment with the public interest.

For its part, CDPQ will benefit by gaining access to a pipeline of greenfield infrastructure deals. By involving itself from the earliest stages of project origination, CDPQ Infra will be able to carry out substantially deeper research and due diligence, and mould the design of the project to ensure mutually beneficial outcomes. By expanding its investment activities to include multiple sections of the infrastructure value chain, it gives itself a larger set of opportunities to add value. CDPQ Infra will be able to use its financial expertise not only to optimize its transactions, but also to add value during the planning, construction and operations stages.

As of July 2015, CDPQ Infra was evaluating two projects identified by the Government of Quebec. The first is a proposal for a light-rail system on the Champlain Bridge, which connects downtown Montreal with the South Shore. The bridge is undergoing an upgrade, and the proposed system will complement the new bridge and replace the present system of buses, thus increasing transport capacity and reducing users' commuting time.

The second project being evaluated is a proposal to build an electric transit system linking the West Island, Montréal-Trudeau International Airport and downtown Montreal. The aim is to give passenger trains dedicated lines on this route (thus increasing passenger capacity), instead of sharing capacity with freight trains along the Vaudreuil-Hudson train line.

These two deals have a combined cost of approximately CAD 5 billion. CDPQ Infra has stated that both projects are still in the preliminary stages and that, for the first 12 to 18 months, its focus will be on assessing the technical and commercial feasibility of implementing them. Nonetheless, the team's first yardstick will be to see if both projects can be successfully completed as commercially viable and operationally efficient ventures by 2020. As CDPQ Infra aims to be a long-term staple of the CDPQ portfolio, its activities should continue well beyond this.

Challenges

CDPQ Infra's investment model represents a bold advance for PPP models and is bound to encounter many challenges.

The team have already faced criticism about the nature of their potential projects. To many stakeholders, public infrastructure projects are synonymous with delays, cost overruns, mismanagement and unprofitability. These concerns are not all unfounded. For example, the development of CDPQ Infra's first project, the electric public transit on the new Champlain Bridge, has been stuck in limbo for some time; first proposed in the 1970s, it never gained momentum. Instead, and since 1978, public transport on the Champlain Bridge has been managed by a daily routine of traffic cones being laid out to demarcate a bus-only lane (Mader, 2015). These types of infrastructure projects, requiring large capital outlays and the consensus of many parties with entrenched positions, often get held up and drag on for extended periods without being built. In this case, some critics doubt that CDPQ Infra will be able to overcome these obstacles and complete the projects within the proposed time frame.

Furthermore, CDPQ's greatest strength as a partner to the Government of Quebec might also be the source of some of its challenges. As a partner with a track record in Quebec's economic development, CDPQ is in an excellent position to focus on the long-term benefits of its investments for the community. At the same time, the fund manager has a fiduciary duty to its depositors to make the best investment decisions it can. Balancing these roles can be difficult, particularly because financial projections on long-term assets will inherently carry large degrees of uncertainty. CDPQ Infra is adamant that it will only undertake commercially viable projects. To ensure this, it will need to be prepared to both address and resist external pressures. The airport and West Island electric transit system project will be an interesting test case: already, Quebec Premier Philippe Couillard has referred to its construction as a priority, and since 2010 a group called the Train de l'Ouest Coalition has been lobbying for construction to begin. As CDPQ has only committed itself to undertaking an evaluation of whether the project should go ahead, it will need to manage this kind of external pressure.

CDPQ seems to take many of these concerns in its stride; it acknowledges publicly that while many of the questions are legitimate, they are not going to stop it from exploiting the competitive advantages of its long-term horizon to explore a new way of delivering public infrastructure in Canada. Instead, the company intends to start its first two projects with caution, exercising the rigorous discipline and independence that it is known for (Sabia, 2015a).

Closing thoughts

Governments worldwide have been struggling to invest sufficiently in infrastructure for some time. The result has been a persistent shortfall in the supply of infrastructure projects, which will only be alleviated if countries increase their investments in infrastructure. Private capital has often been promoted as a potential source of much-needed investment, but in practice governments have not found it easy to establish and maintain partnerships with the private sector.

CDPQ Infra offers a new model for governments looking to engage with private capital. Its business model is highly integrated, involving CDPQ from the initial planning stages all the way to operations and maintenance. By partnering with CDPQ Infra, the Government of Quebec will be able to exploit CDPQ's institutional capabilities while working with a long-term partner that aims to contribute to Quebec's economic development. This partnership will also give CDPQ Infra access to a bigger deal flow, increase its opportunities for value added and develop its infrastructure programme so it can continue to be a top player in the sector.

In its early stages, the CDPQ Infra model will be limited to infrastructure projects in Quebec. This is by design: the organization is acting deliberately and cautiously as it expands its infrastructure investment strategy into uncharted territory. Its greenfield projects are also not intended to be the dominant focus of CDPQ's infrastructure portfolio, which will continue to be primarily focused on brownfield investments. Nonetheless, there is a definite sense that CDPQ Infra is not meant to be a small domestic project at the fund manager, but the natural evolution of the type of long-term, hands-on investing that CDPQ wishes to engage in.

CDPQ's ambition is to start a "virtuous cycle," with new infrastructure investments improving users' quality of life, generating an economic return and benefiting the retirement savings of Quebecers (Sabia, 2015b). To realize this ambition, it will need to rely on focused and well-resourced infrastructure investment capabilities. It will thus be able to adequately identify idiosyncratic risks, ensure that those most able to bear these risks can price them appropriately, and perform high-calibre asset management to ensure sustainable service delivery.

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The information presented in the case study is as of December 2015.

C. The University of California Endowment: Investing in Innovation

Organizational type	University endowment and defined benefit pension plan
Geographical location	California, USA
Assets under management	\$91 billion
Internal investment capability	60 employees
Liquidity profile	Endowment: annual spending rate of 4.35% to 4.75% Pension: annual net outflows with funded ratio of 85%
Investment objectives	Endowment: maximize the endowment's value while maintaining the liquidity needed to support spending in prolonged down markets Pension: maximize real, long-term total returns on all pension assets while assuming appropriate levels of risk
Governance structure	Office of the chief investment officer (CIO) centrally manages university funds, reporting to the university's president and the Board of Regents

This case study examines UC Ventures, a new venture capital (VC) investment strategy set up by the University of California (UC). UC Ventures aims to exploit its organizational comparative advantage by accessing the large pipeline of research, ideas and inventions originating from within the university network. This will create a scalable, long-term and aligned investment programme. Many of the pitfalls found in traditional VC investing, which is typically done through third-party fund managers, will likely be avoided.

Background

Established in 1868, UC is one of the largest public universities in the United States. As of July 2015, the UC system comprised 10 university campuses, five medical centres, three national laboratories, over 230,000 students and over 190,000 faculty and staff. All UC campuses are internationally recognized and have consistently ranked well on university league tables: Shanghai Jiao Tong's Academic Ranking of World Universities 2015 ranked UC Berkeley as the top public university in the world; UCLA, second; UC San Diego, third; and UC San Francisco, fifth.

The UC system is governed centrally by a committee known as the Regents of the University of California, and UC investment funds are managed by the Office of the CIO (OCIO) of the Regents. The OCIO reports to the university's president and the Board of Regents, a committee of 26 members with a fiduciary duty to oversee UC's pension and endowment funds. The board is made up of 18 regents, who are appointed by the Governor of California; one student, who is appointed by the regents; and seven ex officio members. In addition, two faculty members sit on the board as non-voting members.

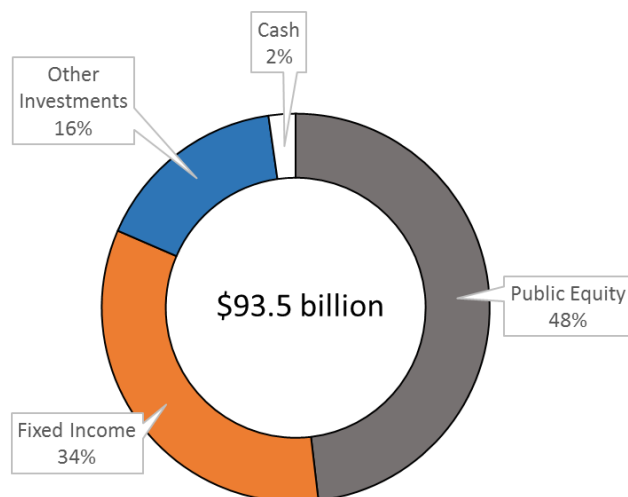
Investment funds fall into three categories: endowment, retirement and working capital. The funds are managed across five portfolios: endowment, pension, retirement savings programme, short-term investment pool and total-return investment pool. Each portfolio has a different asset allocation, with the mixes of equity, fixed-income and alternative assets determined in accordance with their risk profiles. These portfolios combine to form a diversified overall portfolio built up of various assets (Figure C1).

When it was created in September 2014, it was decided that UC Ventures would be funded out of endowment and pension assets. The endowment pool preserves and enhances the future stream of endowment payouts for the funds and activities supported by the UC network endowments.

Each year, the endowment has paid out between 4.35% and 4.75% of its five-year moving average market value. Pension assets are used to service the UC Retirement Plan, a defined benefit pension plan whose retirement benefits are a function of an employee's age, average salary and length of service. In fiscal 2014, the pension plan experienced net cash outflows of \$650 million and had an estimated funded ratio of 85% on a market-value basis.

In September 2015, the OCIO had approximately 60 staff and was managing a total AUM of about \$93.5 billion.

Figure C1: Overall Composition of the UC Portfolio



Source: Office of the Chief Investment Officer, 2015a

Venture capital and its discontents

Investing in VC has been a disappointing experience for large institutional investors for some time, and for three main reasons. First, large investors have found it difficult to invest in the asset class. Some institutions have tried setting up internal VC teams, only to find that they struggle with the aspects of VC investing that do not fit well in a large institutional setting. For example, VC is highly labour-intensive. Venture capitalists (VCs) are typically involved in a "high-touch" service provision relationship with investee firms, where VCs actively help entrepreneurs launch and build their companies. In fact, many VC firms view their role in business development – and not capital provision – as their primary source of competitive advantage. This means that the number of man-hours per dollar invested in VC tends to be high relative to other asset classes, making it less appealing to large funds whose central challenge is to efficiently deploy vast amounts of capital.

VC also relies heavily on direct contact with local networks of entrepreneurs. In the earliest stages of innovation, entrepreneurs are formulating ideas, starting implementation and building prototypes that can rapidly change. They are not engaged with formal marketplaces. Information transfer thus takes place mainly through informal channels such as interpersonal social networks. In these networks, trust is particularly important and needs to be built up over time through repeated and reciprocal interactions. These networks of entrepreneurs also tend to be densely clustered in specific geographical locations (most prominently Silicon Valley, but also runners-up like New York, Boston and Tel Aviv (Compass, 2015)). This means that access to the best networks is often restricted to a select group of investors who have built up strong reputations over time, in specific locations. Large institutional investors, many of whom have come relatively late to VC, often find it difficult to access these networks.

Large institutional investors have therefore relied primarily on third-party managers to invest in VC. However, it is difficult to get access to high-performing VC funds. Top VC firms often constrain the size of their businesses to focus on their core competencies, so many investors are not able to

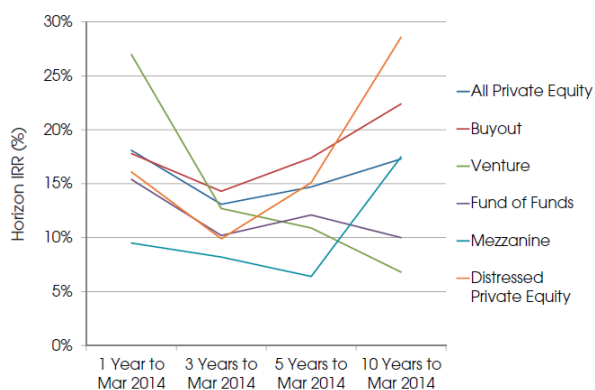
invest with them even if they wanted to. VC funds have constantly turned down investor capital: in April 2015, VC firm New Enterprise Associates raised over \$3 billion for the largest VC fund of all time (Primack, 2015a), and even then the fund was still "significantly oversubscribed" (De La Merced, 2015). This means that many institutional investors have had to either wait and hope for an opportunity to invest in a name-brand VC, or deploy capital with second- or third-tier VC funds. This has often led to middling performance or mediocre "beta returns", and involved high fees.

Second, it is difficult for large investors to invest in VC at a meaningful scale relative to their total asset base. Compared to other forms of private equity, VC firms tend to manage smaller amounts of capital, with average AUM ranging from \$200 million (National Venture Capital Association, 2014) to \$300 million (Lerner, Schoar & Wongsunwai, 2007). This corresponds with a typical fund structure where the VC firm (the general partner [GP]) makes initial investments of \$5 million-\$15 million in approximately 20 early-stage enterprises, leaving some capital for follow-up investments in the firms that succeed. The size of these VC funds makes it difficult for large institutional investors, who are the limited partners (LPs), to commit enough capital to make a VC programme worth the effort. After all, it is highly unlikely that \$50 million allocated to a top VC firm would meaningfully affect the total return of a portfolio worth tens or hundreds of billions of dollars, so large investors often forgo the opportunity.

Third, and most importantly, the VC asset class has simply not performed in line with expectations. Substantiating this claim is not easy because VC performance data relies heavily on self-reported and proprietary data sets, and no single one is a truly comprehensive measure of the asset class. Nevertheless, several sources have indicated that investors, and particularly LPs, have not had net positive experiences investing in VC. For example, in 2012 the Kauffman Foundation, a non-profit organization that encourages education and entrepreneurship, analysed the VC investments made by its \$2-billion endowment fund. It found that in a 20-year history of investing in 100 VC funds, only 48 funds outperformed the public markets after accounting for fees and carry. If it had factored in a required excess return of 3% per year (to account for illiquidity and other risks), the number of outperforming VC funds would have fallen to 20. Most of these funds had begun investing before 1995 (Mulcahy, Weeks & Bradley, 2012). Academic analysis of multiple commercial VC databases suggests a similar pattern: strong VC performance in the early 1990s, but weak performance – barely surpassing public market equivalents – in the 2000s (Harris, Jenkinson & Kaplan, 2013).

Furthermore, it appears that other forms of private equity have outperformed VC for over a decade, despite arguably lower risk profiles. Commercial data providers, such as Preqin, have found that VC's long-term investment performance has been the weakest of all the categories of private equity it monitors (Figure C2) (Preqin, 2014). Correspondingly, researchers Robinson and Sensoy found that buyout funds significantly outperformed VC funds in a proprietary database spanning almost 30 years of private equity investments (Robinson & Sensoy, 2011). This is counterintuitive. VCs have committed capital to early-stage firms that have no product, no proven commercial viability and sometimes no obvious market. While investors have meant to be compensated with higher returns for the high risk they bear, the fact that VC has instead underperformed the public markets and other forms of private equity has been a great disappointment to them.

Figure C2: Private Equity Horizon Internal Rates of Return (IRR)



Source: Preqin, 2014

These factors have caused large institutional investors to grow increasingly disillusioned with the VC asset class. While some examples, such as OMERS Ventures, have shown that it is not impossible to set up a successful in-house VC investing programme at a large institutional investor, these are the exception rather than the rule. Instead, many large asset owners have scaled back their VC investments, choosing to commit capital to other alternative asset classes such as real estate, private equity and infrastructure.

UC's history of investing in VC

At UC, the OCIO invested in VC over a long period of time. It made its first VC fund investment in the late 1970s, when it was the anchor investor at top Silicon Valley VC funds, such as Sequoia and Kleiner Perkins Caufield & Byers. With a well-known brand, a physical presence in California, the ability to write sizeable cheques and a track record of strong relationships with GPs, UC had long been well positioned to get above-average access to top-tier VC funds. This access yielded results: in the three-, five- and ten-year periods leading up to the end of 2014, the OCIO VC portfolio achieved annualized returns of between 11% and 17%, handily outperforming the Cambridge Associates US VC benchmark index on all three time frames.

However, while the programme did achieve strong absolute returns, its performance relative to public-market alternatives was insufficient to compensate the OCIO for the illiquidity risk associated with VC investing. The OCIO estimated that it required an annual outperformance of 3-5% to make up for the average VC fund commitment of 14 years. Evaluated in that context, the VC portfolio's long-term performance, which exceeded the public markets by 0.1% to 3% per year, did not present a compelling case in support of VC.

UC Ventures: a new approach

The shortcomings of traditional LP-style VC investing motivated UC to innovate.

The thinking was not that VC investing was a bad idea; VC was still regarded as the most direct method of investing in the technologies that would shape and define the future. It encourages innovation and launches businesses that can potentially disrupt and challenge pre-existing systems. It has allowed UC to directly participate in the innovation economy and to invest in ideas, inventions and companies yet to be conceived. Finding a way to invest in the unpredictable is a crucial part of investing in innovation; in 2005, nobody could have conceived that in a decade's time, iPhones would be ubiquitous, YouTube would become a household name, and Uber would represent a global behemoth. Technology now plays a crucial role in all major developments of the future, and the savvy long-term investor should want to be invested in tomorrow's technologies.

The challenge was to design an investment programme that would allow UC to participate in VC in an aligned, scalable and efficient manner. Thus, UC Ventures was created in September 2014 as an in-house VC investment vehicle aimed at investing in the UC network's innovation economy. At its core, UC Ventures seeks to capitalize on UC's unique ecosystem of research and new

technologies in order to gain access to commercially attractive long-term investment opportunities. It aims to tap directly into the university's large pipeline of new patents and inventions, avoiding circuitous arrangements where the OCIO might have to invest in third-party fund managers to access opportunities arising from within UC.

It is difficult to overstate the breadth of the UC innovation ecosystem. Almost 10% of all academic research funds provided by the US government has gone to UC. In 2014, UC spent \$5.7 billion on funded research projects, and UC researchers have created almost 1,800 new inventions – nearly five a day – to bring the total number of active inventions in UC's portfolio to almost 12,000 (University of California, 2014). In the same year, UC researchers launched 86 new start-up companies, bringing the total number of companies founded on UC patents to 843. Also in 2014, companies commercializing UC patents generated \$14 billion in revenue and employed 19,000 people. The experience of that year was not unusual: in each of the preceding five years, approximately 1,700 new inventions originated from UC. The UC network has also been one of the top earners of licensing income among US universities since 2003 (Association of University Technology Managers, 2013). UC has a dense ecosystem of research and innovation, and the OCIO sees much of this as having potential commercial value.

UC Ventures also ties in well with broader themes at the university, such as initiatives to enhance innovation and entrepreneurship, and to commercialize technology. The initiative aims to leverage the scale and diversity of the UC network to build a vibrant entrepreneurial culture. It looks to speed up the translation of ideas and inventions into societally beneficial products and services. A university-linked VC programme can help achieve those goals by directly funding nascent companies. Indeed, evidence shows that technology transfer is enhanced when universities support entrepreneurial efforts by nurturing and incubating start-up companies (Valdivia, 2013). In 2015, some institutions had already been doing this for a number of years, such as Stanford University through the Stanford-StartX fund vehicle.

The UC Ventures business model

In July 2015, UC Ventures was being established and was launched in December 2015. It plans to begin with AUM of \$250 million, seeded by the OCIO with money from pension and endowment assets. UC Ventures will be a team of independent investment professionals operating at arm's-length from the university, and will pursue investments in UC-affiliated companies within a clearly defined investment mandate. The team will be supported by operational staff managing the business's accounting, administration, finance and operations. UC Ventures will report to the OCIO, which will hold approval and veto rights over critical governance issues.

The team's overall objective is to generate net end-to-end pooled returns in excess of the Cambridge Associates US Venture Capital Index median for funds with similar vintages, measured over the long term. Interim results will be monitored using various medium-term performance metrics, such as the total value to paid-in ratio and the distributed to paid-in ratio. Ancillary impact indicators will also be used to measure the ecosystem-level impact of the investment programme; these include metrics such as the amount of third-party capital raised and the degree of syndicate partner involvement.

UC Ventures specifically seeks to leverage off its competitive situational advantage by investing in companies associated with UC – that is, companies that have licensed intellectual property from UC and that were founded by current UC students or staff, or UC alumni. Deals will be sourced through four key channels:

- **Technology transfer.** UC has an established technology transfer programme, which has governed how technologies developed in UC are disclosed, evaluated, patented and licensed. Through this process, approximately 70 new companies per year have been founded, based on technologies invented at UC. These companies are natural candidates for UC Ventures to invest in.

- **Incubators and accelerators.** The UC system has over 40 incubators and accelerators. They accelerate the growth of early-stage companies by providing business services, training and workspace, and are a source for UC Ventures to access potential investments.
- **Local funds.** Several small investment funds are affiliated with UC campuses, medical centres and labs. UC Ventures aims to cultivate strong local relationships with these funds and gain access to proprietary deal flow.
- **The UC community.** UC Ventures also expects that students, professors, researchers and alumni might bring deal flow to the team outside of the other three channels.

Once fully operational, the team at UC Ventures expect that these channels will give them access to over 200 investment opportunities every year. These opportunities will then be subject to rounds of reviews, due diligence and exploratory analyses until the pipeline is narrowed to about three to six seed-stage investments and three to five post-seed-stage investments. These investments are expected to translate into an annual capital deployment of \$30 million-50 million over the investment period.

Leveraging off UC Venture's endowments

Another important component of UC Venture's business model is its three-pronged investment strategy to access the full spectrum of start-ups and to leverage off UC Venture's position within the UC ecosystem.

First, UC Ventures will pursue a local fund investment strategy, where it plans to invest in local, profit-seeking investment funds that are affiliated with the UC network. Figure C3 shows the fund ecosystem across the UC campuses.

Figure C9: UC Fund Ecosystem



Source: Office of the Chief Investment Officer, 2015b

A fund needs to meet certain criteria to qualify as a potential investment for UC Ventures under the local fund investment strategy: it needs to invest the bulk of its capital in UC start-ups; it has to be professionally administered with a clear investment strategy; it has to raise its first \$1 million of outside capital on its own; and it should return part of its carry to its affiliated UC campus. Local funds that meet the criteria for consideration will be evaluated by UC Ventures' employees, who will be able to invest up to \$25 million when they find good local fund opportunities. UC Ventures will also request a seat on a fund's LP advisory board when an investment is made.

Underpinning this strategy is the belief that innovation is a localized phenomenon. Small VC funds working closely with campuses and entrepreneurs are particularly well placed to source investment opportunities. By investing with these funds, UC Ventures will be able to access contractual and proprietary deal flow.

Second, the UC Ventures team intends to syndicate all investments over \$1 million with a pre-approved list of leading VCs and angel investors. These potential syndicate partners are well-known VC investors, many of whom are based in California and have ongoing relationships with UC. By ensuring that all larger deals are done in syndicates with established investors, UC Ventures hopes to mitigate the potential conflicts of interest that might arise from investing in its own ecosystem. It also hopes to use this strategy to foster deeper relationships with the VC community, as it presents UC Ventures as a partner to regional VC funds, and not just a competitor for capital and deal flow. As the UC Ventures team deepen their expertise and develop a strong track record, this syndication requirement might be relaxed or completely done away with. The OCIO and UC Ventures intend to review the syndication strategy in five to six years.

Third, when faced with large investment opportunities in promising, later-stage portfolio companies, UC Ventures intends to scale up the investment into the UC portfolio by sharing its pro-rata investment rights with the OCIO. The OCIO will then evaluate the opportunity and participate in the investment if it is able to bring another credible institutional co-investor on board on the same terms. In part, this strategy is seen to be necessary because some later-stage investments will exceed UC Ventures' capacity; its mandate requires that not more than 10% of the UC Ventures fund be invested in any individual portfolio company. However, it also exists to leverage off the larger scale of the OCIO and make full use of the OCIO's broad network of potential co-investors, many of whom will be well placed to invest large sums. This strategy therefore enables continued participation by UC in high-conviction deals, giving promising entrepreneurs a clear line of sight of end-to-end capital requirements, and bringing in aligned third-party capital as the business grows.

The common thread running through these investment strategies is that they all leverage UC Ventures' position in California's VC ecosystem. By drawing heavily on the OCIO's relationships and balance sheet, the strategies aim to "crowd-in" investments by encouraging more concurrent investments from local funds, other investors and the OCIO for every dollar that UC Ventures deploys. By structurally including other established investors, such as regional VCs and local funds, UC Ventures also capitalizes on the domain expertise and specialized knowledge of experienced industry players, thus amplifying its impact and contribution.

With so many established players in California's VC ecosystem, UC Ventures needs to capitalize on its structural advantages if it wants to be a high-performing VC investor. Its current business plan reflects this understanding. UC Ventures hopes that by leveraging its endowments, its total impact will be greater than the sum of its parts.

Challenges

The key challenge for UC Ventures will be performance. As outlined in the background to this case study, industry-wide VC performance has been relatively lacklustre for over a decade. This trend may well continue for some years. Furthermore, as of July 2015, risky assets were being richly valued, and many investors are concerned that the technology sector – and in particular technology VC – is in a bubble (Primack, 2015b). As UC Ventures begins deploying capital in an expensive market, it needs to be particularly judicious about the investments it makes so it does not end up with a portfolio of overvalued and poorly performing assets.

Being a public university system, UC also faces various structural challenges. In an analysis of university-based spin-offs between the early 1980s and early 2000s, Lerner found that internal university venture initiatives often struggled with the following issues:

- **Political interference.** Programmes that commercialized federally funded research risked receiving politicized complaints from competitors.
- **Obstructive regulations, such as restrictions on researchers' involvement with start-up companies.** Poorly designed regulations, which made it difficult for publicly funded researchers to work with spin-off companies, stifled commercialization efforts.

- **A failure to recruit and retain the best talent.** Internal university VC programmes needed to offer compelling value propositions to attract experienced managers from the VC industry. Well-designed systems had to offer meaningful autonomy and reward aligned and successful risk-taking. (Lerner, 2004)

All this suggests that good governance is crucial to the programme's success. The onus is on the OCIO to ensure that UC Ventures remains autonomous and insulated from undue external influence. It needs to design aligned systems to attract high-performing VC managers who have investment experience and industry connections. Regarding the regents and other stakeholders, the OCIO has to manage expectations and communicate the typical performance characteristics of VC investments: short-term performance volatility, initial underperformance due to the J-curve effect, and bankruptcies or failures among portfolio companies. These traits are expected of the VC asset class, but can bring with them reputation risk and short-term pressure from stakeholders.

As a public institution, UC is also subject to a high degree of public scrutiny. Maintaining clear lines of communication, ensuring good, clear governance and maintaining stakeholder buy-in to the long-term time horizon of the UC Ventures programme are therefore crucial.

Closing thoughts

UC Ventures, a new \$250 million VC fund set up by the OCIO of the Regents of the University of California, hopes to overcome some of the traditional shortcomings of LP-style VC investing by understanding and exploiting its comparative and relatively distinctive advantage. It will invest specifically in UC-affiliated investment opportunities, capitalizing on its access to the extensive pipeline of research and innovation within the UC network. By internalizing the investment strategy, focusing the team on the main objective of long-term value creation, and exploiting its immediate and established network, the OCIO hopes to create a VC programme with a longer horizon and more closely aligned with its endowment portfolio's objectives. It also aims for UC Ventures to be more scalable than traditional VC vehicles. The current allocation of \$250 million is already larger than most VC fund commitments, and members of the OCIO want the UC Ventures portfolio to grow as the programme achieves good results.

UC Ventures' business plan shows that it is conscious of the competitive landscape it is moving into. Its investment strategies heavily leverage UC's position within California's innovation ecosystem, capitalizing on relationships with local investors and the OCIO's balance sheet. At the core of this is a desire to precisely identify UC Ventures' competitive edge and make full use of its endowments.

Investing in innovation is difficult, which also suggests that the investment returns can be very high. By recognizing its unique competitive advantages and explicitly leveraging them, the OCIO at UC has created UC Ventures as an efficient and innovative way to generate a scalable and high-quality pipeline of venture capital opportunities.

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D. ATP: Rethinking Asset Allocation

Organizational type	Defined contribution pension plan
Geographical location	Capital Region (Hovedstaden), Denmark
Assets under management	DKK 710 billion (Danish krone) (€95 billion)
Internal investment capability	50 investment professionals
Liquidity profile	Net capital outflows with funded status of 115%
Investment objectives	Create good, stable pensions Generate 9% return on free capital via the investment portfolio
Governance structure	Executive board: five senior ATP officers Supervisory board: six employer representatives, six wage-earner representatives and an independent chairman Board of representatives: 15 employer representatives, 15 wage-earner representatives and an independent chairman

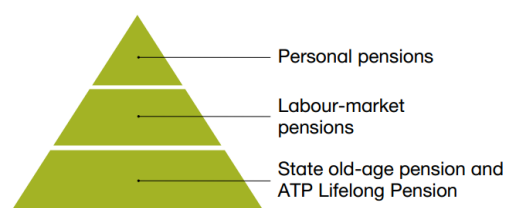
Asset allocation forms a core part of any multi-asset portfolio, and has significant implications for the portfolio's long-term risk-return characteristics. Some investment organizations make the bulk of their asset allocation decisions at board level, while others give management significant discretion over asset allocation. This case study examines the asset allocation framework at ATP, a Danish pension fund.

Since 2006, ATP has had a flexible, risk-based asset allocation model, enabling its investment team to successfully navigate the post-crisis economy. It is currently upgrading this model by incorporating more granular methods for decomposing the underlying risks of the assets it holds. It is also extending its risk-factor framework to include alternative risk premia and illiquid alternative assets.

Background

ATP is a statutory, defined contribution pension fund, established in 1964 to act as a funded supplement to Denmark's tax-funded old-age pension system. With 4.9 million members, it is Denmark's biggest pension scheme. ATP is an integral part of the first pillar of the Danish pension system (Figure D1), which aims to provide universal minimum coverage for all its citizens. An ATP pension provides 90% of Danish old-age pensioners with supplementary income; for half of them, ATP is the sole source of pension income other than their state old-age pension. ATP's main objective is therefore to create good, stable pensions that provide basic retirement income for the Danish public.

Figure D1: Danish Pension System

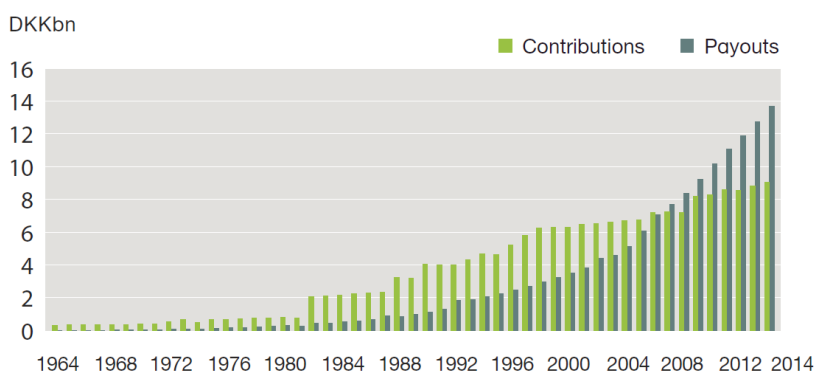


Source: ATP, 2014

ATP contributions are paid by 92% of the Danish working-age population. Members pay contributions starting at the age of 16 and continue until retirement, as long as they are employed or receiving welfare benefits. The amount that individuals contribute is independent of their income, but varies according to how much they have worked during their working life. At retirement, the amount of pension paid out depends on the total amount that the member has contributed to ATP.

As of September 2015, net AUM at ATP totalled DKK 710 billion (€95 billion) (ATP, 2015). Of this, DKK 611 billion (€82 billion) was used to hedge ATP's pension guarantees, while DKK 100 billion (€13 billion) acted as free reserves, giving ATP a funded status of 115%. ATP is a mature pension fund, where payouts have exceeded contributions since the mid-2000s (Figure D2). Continuing the current trend, the gap between payouts and contributions is expected to grow as the fund matures. This makes liquidity management and hedging particularly important, and this priority is reflected in its portfolio structure.

Figure D2: Pension Payout Profile at ATP



Source: ATP, 2014

As of July 2015, the ATP Group employed almost 2,000 full-time staff (ATP, 2014), with most employees carrying out pension-related and administrative activities. ATP's core internal investment team consists of about 50 employees who are responsible for internally managing more than 85% of AUM.

The ATP Group is managed by an executive board consisting of the CEO, CIO, CFO and COO of pensions and investments; the CRO; and the COO of processing business and human resources. The executive board reports to ATP's supervisory board, a committee made up of a chairman and 12 other board members equally representing the social partners (associations representing Danish employers and employees). In turn, the supervisory board is overseen by a board of representatives, a 31-member board made up of a chairman and 15 representatives each from employer and employee associations.

Investment model

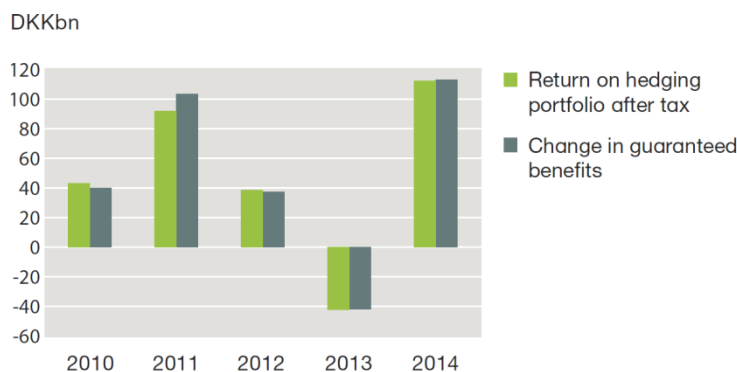
ATP has two sources of value creation: a hedging portfolio and an investment portfolio. When a member makes a contribution, 80% is allocated to the hedging portfolio, whose purpose is to produce pension guarantees, and 20% is earmarked for the investment portfolio, which is a return-seeking portfolio whose objective is to maintain and enhance the purchasing power of the pension guarantees.

ATP assigns a guaranteed rate of return (based on the prevailing 15-year interest rate of safe government bonds) to contributions made to the hedging portfolio. These assets are invested in a liability-mimicking portfolio made up of interest-rate-sensitive instruments whose value changes in tandem with the benefits ATP has guaranteed for its members. As of July 2015, all of ATP's liabilities were fully hedged, and ATP had a funded status of around 115%.

The hedging was done because ATP's guaranteed benefits between years zero and forty² have been valued using a market-based yield curve. Therefore, the benefits' value changes when interest rates change. Left unhedged, the value of guaranteed benefits would increase if interest rates declined, forcing ATP to draw down on its reserves to deliver on its commitments (and vice versa). The hedging portfolio neutralizes this and ensures that changes in interest rates do not affect ATP's ability to pay out its guaranteed benefits. It does this by hedging the interest rate risk on ATP's pension liabilities via a portfolio of bonds and interest rate swaps with maturities of up to 40 years. As of July 2015, assets in this portfolio included Danish government bonds, German government bonds, and interest rate swaps denominated in euros and Danish krone.

Thus far, the hedging portfolio has successfully safeguarded ATP's reserves by ensuring that the value of hedging assets and guaranteed benefits moves in lockstep over time (Figure D3).

Figure D3: Hedging Portfolio vs. Guaranteed Benefits



Source: ATP, 2014

For maturities beyond 40 years, ATP's liabilities are discounted at a fixed 3% rate. To hedge this segment of the yield curve, ATP utilizes long-term returns from its investment portfolio. For example, returns on real estate investments with very long leases could be used to hedge these long-term liabilities. If the rate of return on these assets is higher than 3%, the surplus accrues to ATP's free reserves. If the rate of return is lower than 3%, free reserves are reduced.

The remaining 20% of member contributions is invested in ATP's investment portfolio, which aims to generate a return sufficient for preserving pensions' long-term purchasing power – that is, outperform the rate of change of the retail price index over time. ATP seeks to soundly diversify the investment portfolio by using a broad range of assets. The belief underpinning the portfolio's construction is that good diversification can enhance a portfolio's risk-return characteristics while giving up little in return. As economist Harry Markowitz said, diversification is the only free lunch in finance. For this to be true, however, the diversification has to be real and effective.

Effective diversification is ATP's first line of defence against investment risks. In addition, the pension fund has enhanced its risk management in two ways: first, by holding outright hedges against tail risk events; and second, by dynamically adjusting the amount of the investment risk taken based on the size of its reserves. The result is a resilient investment portfolio expected to generate good risk-adjusted returns and to deliver stable performance across a range of growth and inflation scenarios.

Excess returns from the investment portfolio accrue to ATP's free reserves, which are also referred to as the "bonus potential". These excess returns directly translate into better pensions for ATP members; if the value of the bonus potential exceeds 10% of the value of guaranteed benefits, ATP's supervisory board could decide to increase pension payouts for pensioners, as it did both in

² ATP changed its pension product in January 2015; all future contributions were assigned rolling 15-year rather than lifelong guarantees, which was the case before 2015. This means that while a significant part of ATP's pension liabilities were still long-dated, over time all of ATP's pension liabilities will be rolling guarantees of not more than 15 years.

2013 and 2014. In 2014, ATP's bonus potential amounted to 17.9% of guaranteed benefits, and the board decided to increase pension payouts for all current pensioners by 1.5%.

2006-2015: asset allocation and risk classes

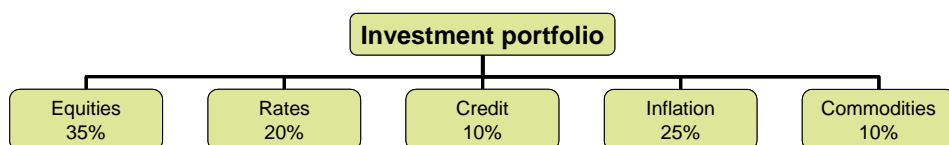
To achieve effective diversification, ATP allocates to risk classes rather than asset classes, a practice it began in 2006. This is driven by the belief that different asset classes often share common underlying risk drivers, even when their “asset class labels” do not look the same. As ATP cares about its portfolio's risk profile and not the nominal amounts allocated to each asset type, it seeks to allocate risk – and not capital – in a highly diversified way.

Assets are categorized into five risk classes with distinct risk profiles:

- **Interest rates:** interest rate-sensitive issuances, such as government bonds and mortgage debt
- **Credit:** instruments which reflect the ability of issuers to repay their debt, such as loans to credit institutions and high-yield bonds
- **Equities:** instruments which reflect corporate earnings, such as listed and unlisted global equities
- **Inflation:** assets whose values move with the general price level, such as infrastructure, inflation-linked bonds and inflation-hedging strategies
- **Commodities:** assets related to the price of oil, such as oil-indexed bonds and oil-related financial contracts

ATP's supervisory board sets a long-term reference target for allocating investment risks between the five risk classes (Figure D4).

Figure D4: Long-Term Target Risk Allocations



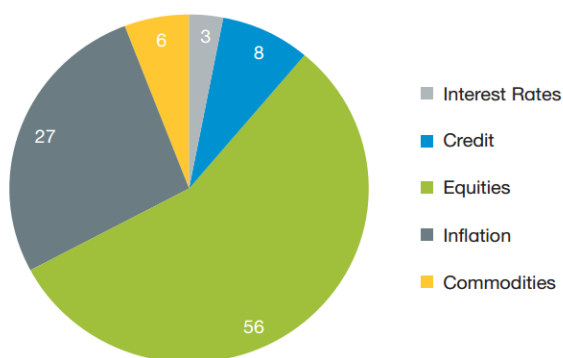
Source: ATP, 2014

The goal of this type of risk allocation is to create a portfolio that offers better diversification than a traditional one, where 60% of capital is invested in equities and 40% in bonds. While a 60/40 portfolio has a relatively balanced capital allocation to two asset classes, equities are far riskier than bonds and contribute substantially more risk than the 60% capital allocation: in a 60/40 portfolio, equity risk typically makes up over 90% of the total risk. ATP's risk allocation model aims to overcome this by viewing the investment universe in terms of risk and constructing a portfolio that has a diversified exposure to various risks.

The risk allocation set out in Figure D4 is a long-term target. In fact, in the shorter term, ATP management is not structurally encouraged to hold an investment portfolio whose risk composition matches the board's target. Instead, the supervisory board asks that ATP meet its long-term investment objective by beating an absolute return target. (In fiscal 2015, this was a 9% target return on free capital before taxes and expenses). ATP's management is then given the flexibility to alter short-term risk allocations to meet this objective.

Figure D5, which sets out the average risk allocation in ATP's investment portfolio in the first half of fiscal year (FY) 2015, shows this flexibility in practice. Here, the investment portfolio's risk allocation to interest rates (3%) is substantially lower than the long-term target (20%). This is a response to central banks' highly expansionary monetary policy, which has driven government bond yields to near-zero levels. Consequently, ATP believes that current and potential returns from bonds, as well as diversification benefits, are limited. This has led to the near-zero allocation to interest rate risk.

Figure D5: First Half of FY 2015 Risk Allocations (in %)



Source: ATP, 2015

On the other hand, ATP has maintained a higher level of risk in equities (56%) than the long-term target (35%). This reflects the belief that equities remain relatively appealing in the prevailing market, and that the other risk classes provide effective diversification against major risks.

Attributes supporting this approach

Organizational buy-in and support of the asset allocation team at management level is crucial to ATP's ability to act as a flexible, risk-aware investor. Underpinning this is the core investment belief that asset allocation plays a central role in determining the bulk of the fund's return. The organization explicitly acknowledges and supports this belief through appropriate resourcing and incentive structures. For example, ATP's benchmarking system does not encourage the organization to stay at a "neutral" risk allocation, and the board gives management the discretion to make relatively large asset allocation decisions.

This investment model also puts risk awareness at the front and centre of investment decisions. By framing those decisions in terms of risk rather than assets, investment staff are consistently made to evaluate underlying risk drivers. Over time, this has led to a more comprehensive understanding of the portfolio's risks, more sophisticated methods of accessing desirable risk exposures, and the development of more advanced risk management systems and frameworks.

For an organization like ATP, the flexibility to make risk allocations in a dynamic way is crucial for the investment team, as it enables a relatively small team to make decisions that materially impact on the total portfolio's return profile. While this arrangement puts a greater burden of responsibility on the investment team and their asset allocation decisions, it successfully leverages the capabilities of the 50 investment staff to actively manage the DKK 102 billion (€14 billion) investment portfolio.

Enhancing the risk class allocation approach

ATP's investment portfolio performed well in the 2007-2013 economic cycle; it benefited particularly from a dramatic fall in interest rates, which led to the strong performance of fixed-income securities. This resulted in the portfolio generating a Sharpe Ratio of approximately 1.0, substantially exceeding the expected Sharpe Ratios of traditional benchmark portfolios, which typically range from 0.3 to 0.4 over the six-year cycle (Faber, 2015).

Mindful that past performance does not guarantee future results, ATP launched an exercise in 2015 to update its approach to portfolio construction. Both external and internal factors provided the motivation for the exercise. Externally, the low-interest-rate environment, changing diversification patterns and weaker liquidity in specific segments of the financial markets prompted the ATP investment team to take a deeper look at how to best ensure that their portfolio could be effectively diversified over the next economic cycle. Internally, the overhaul of ATP's pension

product and the revamp of its liability discounting curve led the team to review the portfolio's construction.

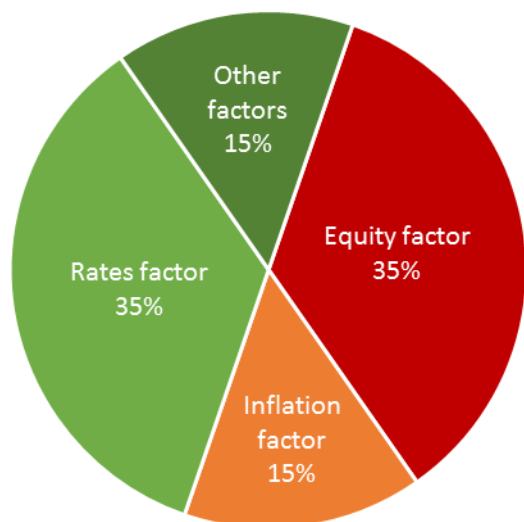
2015 onwards: asset allocation and portfolio-wide risk-factor investing

As a result of the portfolio review, it was decided that from 2015 onwards, ATP's investment approach would be based on a risk-factor allocation framework in which investments will be mapped to four risk factors, as opposed to the previous five risk classes. The organization believes that the new framework will create a more systematic approach to investments across all asset classes, teams and subsidiaries, as investments can be broken down into more granular risk factors and be more easily compared. The new framework also aims to strengthen overall risk management, with a special focus on illiquid investments.

The four risk factors under the new approach are equity, rates, inflation, and a category called "other factors". While comparable to the previous investment model, certainly in name, the new model contains important differences. Importantly, and under the previous approach, assets were bucketed into risk classes whose risk characteristics most closely corresponded to the assets' underlying drivers. In the new model, each asset will be decomposed into factor exposures corresponding to the four risk factors. This increased granularity aims to more accurately reflect all the risks in a given asset. For example, a corporate bond would formerly have fit into the "rates" risk class but, under the new approach, it will be decomposed into some amount of rates risk and some of equity risk.

As before, the goal of decomposing the constituent risks of every asset is to allow ATP to build a well-diversified long-term portfolio, whose beta return streams are balanced and stable over a range of economic scenarios. Figure D6 shows the indicative weightings of the four new risk factors in ATP's long-term target portfolio.

Figure D6: Indicative Long-Term Weightings of Risk Factors



Source: Internal ATP documents, 2015

Empowered by the detail and flexibility offered by its new risk factor model, ATP expects to be able to build a better portfolio, with more geographical diversification and a greater range of assets. Already, to build a better "balanced beta" portfolio, the organization is planning to increase its exposure to global stocks, credit spreads, interest rates and new commodity markets.

Of the four risk factors, the fundamental ones – equity, rates and inflation – are intuitive and represent risks associated with their corresponding economic factors. The other factors category is more complex. It is not a residual catch-all category, but rather a combination of two types of risk

factors that have distinct features from the fundamental factors, namely alternative risk premia strategies and illiquid alternative investments. Both types of investments entail higher levels of analytical and operational complexity, and ATP believes that some alternative risk premia and illiquid factors share certain common risk drivers.

ATP's history of internally implementing alternative risk premia strategies began in 2006, through its alpha and hedge fund unit, ATP Alpha. In late 2012, however, ATP shut down this unit and integrated the alpha platform into its main investment portfolio. This merged the once-separate alpha and beta investment functions and housed all investments on one common platform, as one portfolio. The integration process naturally evolved through the integration of alternative risk premia strategies to be a broader component of ATP's overall risk allocation framework.

Looking ahead, ATP plans for the other factors category to house a diversified portfolio of alternative risk premia strategies across multiple large asset classes. As of July 2015, ATP had six forms of low-risk and high-carry strategies in its alternative risk premia portfolio, and it intends to grow the portfolio over time to some 20 strategies across all large asset classes. The alternative risk premia portfolio aims to generate higher returns and diversify the total portfolio, meaningfully improving the portfolio's risk-adjusted performance.

For illiquid alternative investments, ATP will apply a three-step approach to decomposing risks. First, the risks of an illiquid investment will be mapped to the three fundamental factors. A private equity investment, for instance, would have considerable exposure to the equity factor. Risks that cannot be allocated to the fundamental factors are then allocated to the other factors category. Second, illiquid investments will be evaluated relative to the marginal cost of illiquidity within the ATP portfolio. This means that the costs associated with ATP's inability to quickly liquidate the asset (or to do so only at distressed prices) are assessed relative to the total portfolio's liquidity requirements for rebalancing, collateral management and pursuing new opportunities. Third, the residual risks of illiquid investments – bucketed within “other factors” – will be analysed according to 13 different criteria, covering potential exit, duration, geography and various economic factors. These include both quantitative and qualitative factors, and are aimed at giving a more meaningful representation of the risks in private assets, which are usually difficult to analyse precisely.

Challenges

As of July 2015, ATP was in the midst of implementing its new risk-factor allocation framework. To successfully implement its new model, the organization will need to tackle four main challenges. First, it needs to identify multiple systematic risk factors across a large range of asset classes. In some cases, academic research will lay the groundwork for these choices; an example is economists Eugene Fama and Kenneth French identifying value and size as sources of excess return in the equity market (Fama & French, 1992). Subsequent research expanded on this analytic framework (Carhart, 1997). However, a lack of quantitative data in other markets means that this kind of analysis is limited to the most liquid markets, such as developed market equities and bonds. To extend the framework into other risk classes, ATP will need to conduct substantial proprietary research and rely more heavily on theoretical assumptions.

Second, implementing the model will call for the technical know-how to design strategies that can harvest risk premia in an efficient manner. This involves designing systematic (or semi-systematic) investment strategies in various markets, and consistently monitoring risk factor performance to ensure that investment theses are playing out as expected. In some markets, it will mean investing in derivatives markets or long/short positions, which often require new risk management and monitoring systems.

Third, the current investment model overhaul is extensive in scope and encompasses the entire portfolio, affecting investment teams across asset classes and subsidiaries. It will require an overhaul of the operational and risk management set-up at ATP, the addition of new staff to the internal investment team and a deepening of in-house analytical capabilities. The dedicated

portfolio construction team that drove the initial portfolio review will remain as a permanent fixture to oversee and monitor the framework's development.

The fourth main challenge is that implementation requires a strong governance framework and a long investment time horizon. Risk premia are cyclical and express themselves over multi-year time horizons. Even the equity risk premium – the well-documented tendency for risky equities to outperform safe bonds – has gone through long periods where the premium was zero or negative, most recently in the decade after 1999 (The Economist, 2010). An investor seeking to invest in long-term systematic risk premia has to be prepared to deal with extended periods of volatility and underperformance. This challenge is even more pronounced when the risk factors in question are less well documented and have little recorded history to serve as a guide. The onus will be on ATP's senior management to maintain a long-term view and garner the support and buy-in of the board through periods of underperformance.

Closing thoughts

The precise role of asset allocation in a fund's return is something of an intellectual curiosity among academics. In 1986, a seminal paper on the subject implied that asset allocation explained over 90% of a fund's performance (Brinson, Hood & Beebower, 1986). Years of debate followed, aptly summed up in the title of a 2000 article, "Does Asset Allocation Policy Explain 40, 90, or 100 Percent of Performance?" (Ibbotson & Kaplan, 2000). Much of this debate has centred on definitions of the underlying mathematical methods and interpretations of what the typical investor considers as "fund performance".

The specific effect of asset allocation is, however, a moot point. Asset allocation policy affects the vast proportion of a fund's assets and could result in significant shifts in a fund's risk profile and return potential. For instance, increasing a portfolio's equity risk content by 10 or 20 percentage points could dramatically increase its long-term expected return, typically at the expense of greater drawdown risk. Having an integrated, dynamic asset allocation framework thus allows a company to control and understand its risk profile, and to make effective investment decisions with a relatively small team of investment professionals.

ATP has had a risk-based asset allocation framework in place since 2006. This has been implemented at every level of the organization: a clear commitment to effective asset allocation at the top of the house, a governance framework that has encouraged good risk-based capital allocation, an empowered internal investment team and a clear investment framework. Its strong performance in the previous market cycle shows that it is reaping the rewards of this approach.

To make its investment framework more resilient, ATP has been extending its asset allocation framework to give a better understanding of its portfolio's risk factors. Its new model will incorporate more granular risk factors and decompose the risk profile of assets in a more precise way. It will integrate alternative risk premia investing into a diversified portfolio that aims to grow substantially over time. It will also add a significant new dimension to how it analyses and manages the risks of its illiquid alternative investments, by systematizing a new risk decomposition framework for illiquid assets.

ATP believes that a broader, risk-factor-based understanding of its portfolio can offer more nuanced insight into the ultimate sources of risk and return. It believes that integrating these factors into its asset allocation framework is an important part of its investment model maintaining its competitive edge. Implementing this new framework will involve a number of challenges. Identifying systematic risk factors is difficult, particularly where data is sparse. Building up internal capabilities will take time. Although risk-factor investing can entail long periods of underperformance, ATP appears to be fully committed to preparing its asset allocation framework for the future.

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E. Canada Pension Plan Investment Board: Thematic Investing

Organizational type	Target benefit pension fund manager
Geographical location	Toronto, Canada
Assets under management	CAD 269 billion (\$207 billion)
Internal investment capability	1,100 employees
Liquidity profile	Net capital inflows expected until 2023 Expects to remain financially solvent for the long term
Investment objectives	Maximize returns on Canada Pension Plan (CPP) fund investments without undue risk of loss
Governance structure	Senior management team: president, CEO and 10 senior managing directors Board of directors: 12 independent board members, appointed by the federal finance minister Investment planning committee: for oversight and management of investment departments

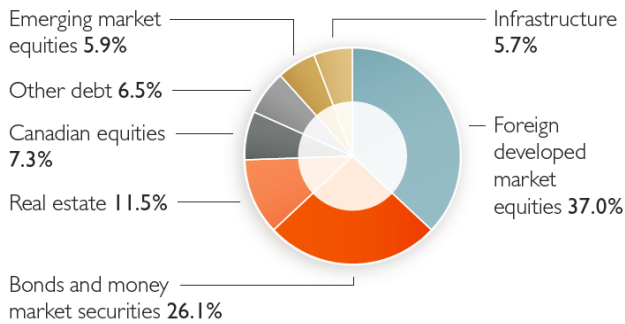
In fiscal 2015, the Canada Pension Plan Investment Board (CPPIB) implemented a new investment strategy called thematic investing. The strategy seeks to profit from large structural changes and trends in the economy by taking long-term investment positions in asset classes, industries and companies that are expected to gain and lose as the economy evolves over time. The strategy team aim to find assets whose long-term growth potential has been underestimated by the market, and to use CPPIB's longer time horizon to aid its entry into and exit from these investments. This case study explores the increasingly popular concept and practice of thematic investing, focusing specifically on CPPIB's chosen method of implementation. It discusses the ways in which CPPIB's investment team have tried to define the pension fund manager's thematic strategy, particularly in terms of leveraging its scale and time horizon.

Background

CPPIB is an asset manager that invests the funds not needed by the CPP to pay current benefits on behalf of 18 million contributors and beneficiaries. CPP is a compulsory, earnings-related pension programme operating across Canada, with the exception of Quebec (where pensions are provided by the Quebec Pension Plan).

Created under the Canada Pension Plan Investment Board Act of 1997, CPPIB was established to provide independent and professional investment management for CPP funds. CPPIB's main investment objective is to maximize returns on CPP fund investments without undue risk of loss. It holds a diversified portfolio of global assets (Figure E1) which are managed within a well-defined risk-return accountability framework.

Figure E10: CPPIB's Asset Mix as of 31 March 2015



Source: CPPIB, 2015

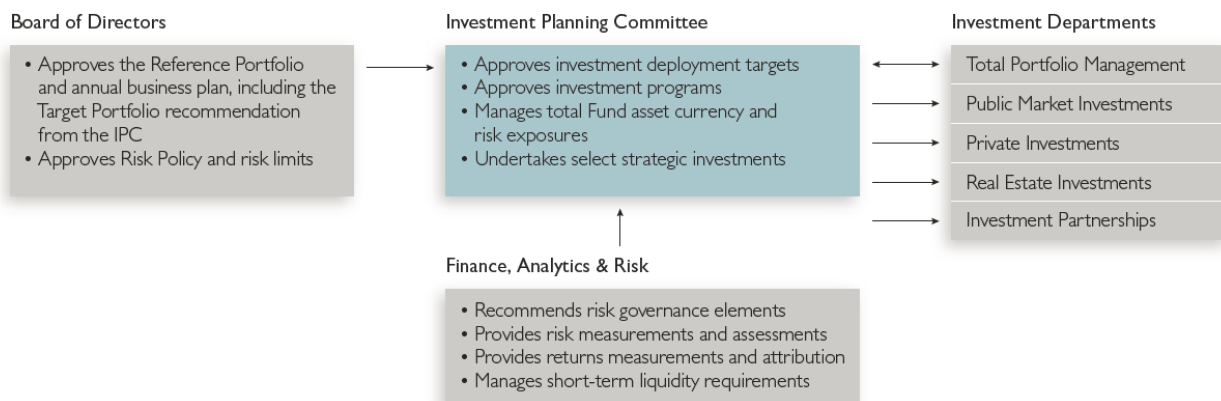
As of July 2015, the CPP was in its accumulation phase and now expects to be sustainable over the long term. The CPP expects to receive more contributions than it pays out until 2023, which will allow it to channel excess cash to CPPIB. Paid-out benefits after 2023 are expected to exceed contributions, and investment income generated by CPPIB should cover 20-25% of the benefits that the CPP pays out. The proportion of the pension programme's benefits funded from CPPIB investment income is projected to gradually increase over time, but the CPP is expected to remain financially solvent and to be able to meet its obligations until 2090 and beyond (Office of the Chief Actuary, 2013).

With over 1,100 staff in seven offices worldwide as of June 2015, CPPIB was managing a total AUM of CAD 268.6 billion (\$206.5 billion) (CPPIB, 2015), making it the largest pension fund in Canada.

Management oversight at CPPIB is provided by the senior management team, which consists of the president, the CEO and 10 other senior managing directors. CPPIB reports to its board of directors, whose 12 members are appointed by the federal finance minister.

Figure E2 gives an overview of how the investment departments at CPPIB are governed. Overall management accountability for the oversight and management of the investment portfolio is provided by management's investment planning committee (IPC), which is chaired by the chief investment strategist. The president, CEO and eight other senior CPPIB executives are also members of the IPC. The thematic investing strategy, which is the focus of this case study, falls under the Investment Partnerships investment department, which reports to the IPC.

Figure E11: CPPIB's Governance Structure



Source: CPPIB, 2015

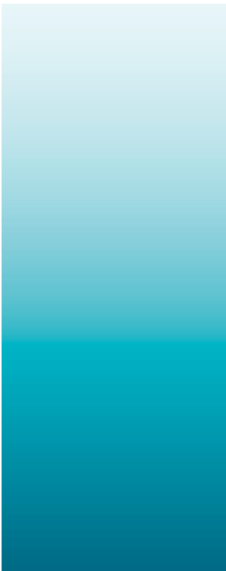
Themes and trends

Investing is fundamentally the repeated process of making and capitalizing on predictions about the future, and can be done in a number of ways. Some investors make long-term predictions about the equilibrium rate of return on risky assets and profit from bearing the associated risks; this is typically referred to as *risk premium investing*. Some investors make predictions about the future value of financial instruments based on macroeconomic variables; this is typically referred to as *global macro investing*. Many active managers attempt to profit by being better at predicting the true value of a security and selling it for more than it is worth, without bearing more risk; this is referred to as “pure alpha”. This case study examines an investment process where investors make proprietary predictions about themes and trends in an economy, and invest in those that will be important in the foreseeable future. This approach is becoming commonly known as *thematic investing*.

The central feature of thematic investing is that it seeks to profit from trends by identifying (and having greater exposure to) future winners, and avoiding (or having less exposure to) future losers. This makes it an investment style that is decisively forward-looking. This trait is intensified as there is no default neutral portfolio for thematic investments: while active managers who manage against a market capitalization-weighted index typically treat the index as their default neutral position, thematic investors do not have that option. This puts the onus on the thematic investor to have an explicit view of the future and hold a corresponding portfolio of assets.

Thematic investing is sufficiently loosely defined for it to encompass a wide range of strategies. Global consultancy firm McKinsey & Company illustrates this diversity by categorizing thematic investing programmes according to the institutional level of commitment to the strategy (Figure E3). In this framework, a highly committed investor would be one whose thematic investing programme avoids asset class silos when trying to gain exposure to a theme.

Figure E12: Various Approaches to Thematic Investing



Approach	Example
<p>Develop thematic views within existing structure</p> <p>Develop and implement thematic investments within the risk limits and structure of the current portfolio</p>	<p>Use current risk limits in an international equity portfolio to increase exposure to specific solar-module producers in response to a renewable-energy theme</p>
<p>Put in place a thematic overlay</p> <p>From the center, establish a thematic-overlay portfolio or shift asset allocations and increase their duration based on house views on sector/geography</p>	<p>Gain long-term exposure to wheat price by investing in wheat futures as part of a thematic-overlay portfolio</p>
<p>Create a single-asset-class thematic mandate</p> <p>Allocate capital to portfolios or mandates with investment strategies that rely on developing forward-looking thematic views</p>	<p>Create and capitalize an equity portfolio with a clear purpose of gaining long-term exposure to renewable energy</p>
<p>Create a multiasset-class thematic mandate</p> <p>Create a thematic fund to generate the most attractive long-term risk-adjusted returns by investing in various asset classes</p>	<p>Create a portfolio—governed by a multiasset-class committee—looking into technology investments through a combination of venture-capital funds, direct private-equity investments, and public-equity positions</p>

Source: Berube, Ghai, Tetrault, 2014

Thematic investment programmes also reflect the nature of the investing institution, as well as its client base and time horizon. On one end of the spectrum are retail-focused institutions, which typically use themes as a way for clients to express views and preferences within listed equities. For example, Motif Investing, an online brokerage company backed by Goldman Sachs and

JPMorgan Chase (Alden, 2014), has become prominent as it allows retail investors to buy baskets of stocks centred on specific themes, such as “cloud computing” or “for-profit colleges”. Investors carry out their own research on particular themes and transact via Motif’s low-cost platform.

Some asset managers use themes to guide their active management and distinguish their product offerings. Newton Investment Management, a London-based asset manager that serves institutional and retail clients, touts its global thematic investment approach as its key competitive advantage. It provides regular updates on its investment themes (“Debt Burden”, “Financialization” and “Smart Revolution”) to keep investors abreast of its longer-term macroeconomic views (Newton Investment Management, 2014). Asset managers also use the thematic investing label to signal that they are focused on longer-term trends and less concerned with traditional market benchmarks (AMP Capital, 2014).

Large institutional investors, such as pension funds and sovereign wealth funds, use thematic investing to find new sources of long-term profits. Thematic investing teams in large multi-asset funds are often given mandates that transcend asset class boundaries. This allows them to seek investment opportunities that pre-existing teams – who would be more focused on specific asset classes – might miss. Thematic investing teams complement the rest of the organization by allocating resources towards long-term trends that affect all teams. They also capitalize on the structural endowments of their funds, such as their long time horizons, large scale and ability to invest in many markets. CPPIB is this kind of institutional investor.

Thematic Investing at CPPIB

CPPIB’s thematic investing strategy, launched in 2014, aims to use top-down analysis to find scalable, long-term thematic investment solutions for the CPPIB portfolio. Its overarching thematic focus is on major structural changes in the economy because these changes are likely to drive broad trends that develop over long time horizons – years or decades – and significantly affect security prices. This definition of thematic investing gives CPPIB an unequivocal focus on the long term. Moreover, the approach makes a clear distinction between shorter-term macroeconomic views (which other investors sometimes refer to as “themes”) and the long-term secular changes that are the focus of CPPIB’s thematic strategy.

The CPPIB thematic investing team’s investment process begins with in-depth, top-down analysis to identify important structural growth drivers in the economy. Once a major driver is identified, the team will look for associated investment themes, and determine how they are reflected in investable opportunities. These could take the form of investments in industries, sectors or companies that are expected to do well as a theme develops over time. The team have the freedom to invest across asset classes, but aim first to try expressing their views by investing in the public markets, where positions are more scalable. If it makes more sense to invest in a theme using non-public instruments, the team can make use of CPPIB’s extensive institutional experience in the private markets.

The investment team adopt a flexible approach in selecting assets and sizing their bets. While the team are comfortable making broad, diversified investments in industries or indices, they also recognizes that some investments will entail concentrated bets on specific companies or in specific securities. The team’s risk budget, in the context of CPPIB’s total portfolio, ultimately depends on the amount of concentration risk that the thematic strategy can manage. There is no *ex ante* target operating model.

Underpinning this strategy are two key investment beliefs. First, the investment team believe that important long-term structural growth drivers exist in the economy, that they have significant impact over time, and that most investors underappreciate their significance. Many market participants simply do not think about important growth drivers that span multi-decade, even multigenerational time horizons. Rather, they tend to get caught up in near-term market gyrations, chasing quarterly and yearly results. Also, carrying out sound, long-term research is very difficult. Without dedicated resources and a concerted institutional effort to focus on the very long term, most investors can

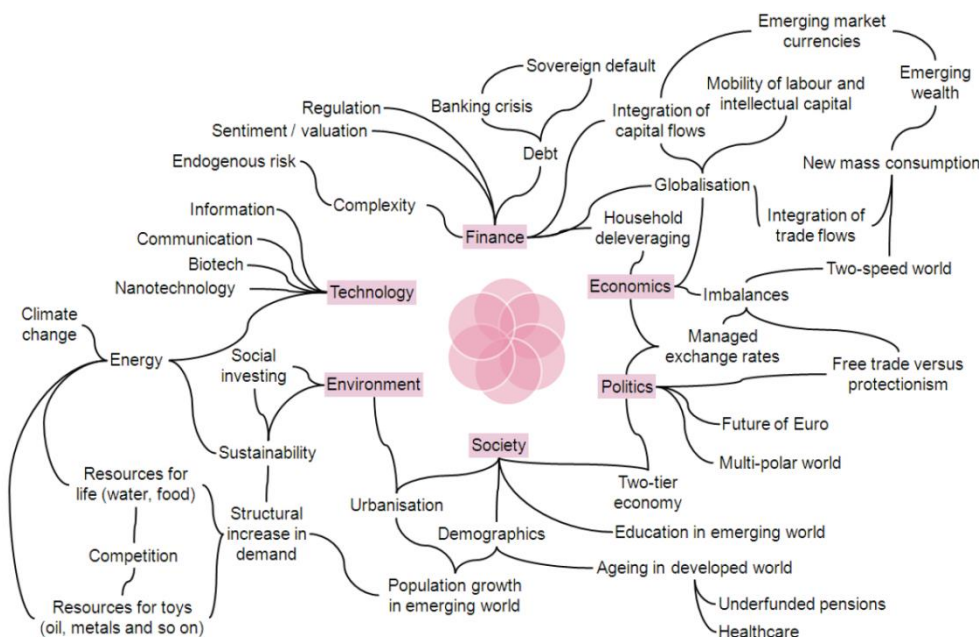
offer little additional insight beyond generic consensus estimates. The CPPIB team believe that by conducting intensive long-term research, they can identify segments of the economy where growth potential has been overlooked or underappreciated.

The second investment belief is that markets are prone to over- and under-reactions, which in turn cause prices to systematically overshoot and undershoot growth expectations. Such is the classic story of the boom-bust cycle: when things are good, markets are prone to excessive optimism and flock to the new asset of choice, overconfident in the asset's potential. Enthusiasm for the asset grows, prices rise rapidly and an asset bubble forms, inflating until it eventually pops. As prices collapse and market participants capitulate and sell out, investors abandon the asset, underestimating its true growth potential. In this scenario, the CPPIB thematic investing team believe that by understanding the underlying long-term forces and the market's potential for overreaction, they are well positioned to buy into trends when the market is in a panic, and to sell out of trends when the market is ebullient.

Generating and implementing ideas

Central to thematic investing is the process of generating ideas. Most investors start with broad categories when they organize their investment universe, and then focus on specific trends to look for investment opportunities. Global consulting firm Towers Watson gives an example of this process in a mind map (Figure E4) produced by its Thinking Ahead Group (Towers Watson, 2012). It categorizes the world in terms of six broad, interlinked subjects, and then looks for potential themes related to each category. CPPIB's process is similar, in that it first identifies broad structural growth drivers and then looks for the investable themes affected by them.

Figure E13: Mind Map of Thematic Ideas



Source: Towers Watson, 2012

On the whole, investors do not disagree on the broad structural forces at play. However, they distinguish themselves as they delve deeper into specific themes and identify the implications for their investment strategy. For example, like many other institutions (AllianceBernstein, 2009; Bank of America Merrill Lynch, 2014; Canadian Investor Relations Institute, 2015), the team at CPPIB believe that over time, demographic changes will have important effects on the economy. To invest in this concept, the team have carried out in-depth research on the relationships between consumer consumption patterns and demographics in various countries, and constructed their investment thesis using their proprietary life-cycle model of consumption. The team then take long positions in companies expected to do well once current-day millennials enter the latter stages of

their working lives. This approach capitalizes on CPPIB's long investment time horizon as the investment slowly proves itself over time.

Investable themes can be updated and reused over time. As generations change and demographic patterns evolve, the CPPIB team believe that the fundamental structural drivers of long-term consumption growth will remain the same. They therefore plan to update and reuse the life-cycle consumption model to generate new investment ideas over long periods of time.

Identifying high-quality investment themes involves significant in-depth analysis. The team aim to focus their efforts by limiting the portfolio to a relatively small number of high conviction ideas; they estimate that their research will narrow the investment universe down to approximately three or four major structural growth drivers, each of which might lead to three to five investable themes. In its optimally steady state, the thematic portfolio should ultimately have between ten and fifteen investable themes.

Attributes that support the strategy

As with all investment strategies, effective implementation requires technical expertise and market acumen. It also requires a team with the right skill set and attitude. A combination of long-term strategists, fundamental researchers and quantitative analysts make up the CPPIB thematic investing team. Crucially, team members and stakeholders have to appreciate the long-term nature of their investments and be prepared to experience performance volatility in the shorter term. With an investment time horizon spanning many years, the thematic portfolio is bound to experience significant divergences from its funding assets over time – particularly if those assets are public market securities whose values fluctuate daily.

Organizational buy-in and support are equally important. In this respect, CPPIB has many features of good governance. It is institutionally committed to long-term investing, citing its long time horizon and certainty of assets as key built-in advantages. CPPIB's leadership takes active steps to promote long-termism, such as by spearheading the 2013 Focusing Capital on the Long Term initiative, an effort to advance practical actions to focus businesses and markets on the long term. The president and CEO of CPPIB has spoken often about the importance of looking beyond short-term results and maintaining a long view, even when CPPIB has achieved exceptionally strong short-term performance (Wiseman, 2015). For such a strategy, it is critical that this culture be embedded across the organization and that there is commitment and buy-in to the long term.

Furthermore, CPPIB's method of constructing and managing its overall portfolio – the "total portfolio approach" – complements thematic investing. This approach looks at the underlying risk-return drivers of any given investment regardless of its asset class label. A separate team within CPPIB is responsible for matching the risk characteristics of any new investment to its funding assets, which gives other teams more flexibility to explore markets and instruments that fall outside traditional asset class boundaries. This provides the thematic investing team the requisite flexibility to look for opportunities across the capital structure.

Strengths and pitfalls

It is not surprising that thematic investing is growing in appeal. For one thing, themes matter, and investors who can successfully predict themes and trends are well placed to make early investments in sectors that could grow to be disruptive and important. Beyond that, themes allow investors to invest in narratives they believe in. Investors like these narratives not only because they make it easier to communicate the motivations behind an investment, but also because they help investors build conviction and hold on to their positions during inevitable periods of underperformance. The more inexplicable an investment strategy, the more likely an investor is to cut and run at the first sign of turmoil. By attaching a convincing narrative to an investment position, an investor is more likely to take a longer-term view.

But the attractiveness of narratives works both ways. Neurological research shows that humans are biologically hardwired to respond to them. When presented with a compelling story, the human brain provides rewards in elevated levels of oxytocin, a hormone associated with intimacy (Barraza, Alexander, Beavin, Terris & Zak, 2015). The downside of this is that it can lead to narrative bias, where investors pay less attention to the information that may contradict their chosen narrative. As long-term positions with complex underlying drivers, thematic investments rely heavily on good narratives to generate strong investment theses. The challenge underlying thematic investing is therefore to balance the appeal of a good narrative with the discipline to monitor the validity of long-term investment ideas.

Evaluating thematic investments is made more complex by the difficulty of quantitatively isolating the thematic risk factor. The long time periods of thematic investments present a challenge for the availability of data. Because investment themes are intrinsically forward-looking, historical data is likely to be less relevant even if it is available. Furthermore, themes are thought to cut across traditional risk factors and have broad cross-sectional effects that change dynamically over time (Steward, 2010). This interferes with traditional time series analysis, which is data-driven and relies on stable relationships between variables. Thematic investing relies much more on theoretical beliefs and qualitative assessments of the world. Some investors have difficulty with the lack of precision in these techniques.

Implementing a long-horizon investment strategy in a world full of real-time information will pose challenges for even the most astute long-term investor. Stakeholders and the media often focus on short-term results, and the resultant pressure could shorten an institution's effective time horizon, even when the institution sets out with the long term in mind. CPPIB's long-term thematic investments are bound to diverge significantly from their funding assets over time, and the organization's ability to manage performance expectations and withstand external pressure will be crucial in determining the strategy's success or failure.

CPPIB is no stranger to pro-cyclical pressure due to short-term results. In 2009, it weathered severe criticism from politicians and the financial media about its compensation policies in light of poor short-term performance during the global financial crisis (Mazurkewich, 2009). This occurred despite CPPIB behaving in accordance with its pre-established guidelines on long-term compensation, which awarded an incentive component based on a rolling average of the fund's performance. In 2014, the Canadian press intimated that CPPIB's model of active management was inferior to passive investing, in light of short-term underperformance relative to passive bonds and equity (Kiladze, 2014). These examples show how easy it is to lose sight of the long term during periods of short-term underperformance. They are indicative of the pressures that CPPIB will continue to face, particularly as it embarks on investment strategies that can take time to pay off. To maintain a long view and resist procyclical pressures, stakeholder commitment and buy-in will be crucial.

Finally, successful thematic investing is difficult because – as the old Danish proverb supposedly goes – it is difficult to make predictions, especially about the future. There are many famous predictions that have turned out to be inaccurate, from *The New York Times'* 1939 prediction that the television would never be a serious competitor to radio, to Microsoft Chief Executive Officer Steve Ballmer's claim in 2007 that the iPhone would flop. Of course, the future is uncertain: there are too many moving parts and too much randomness for forecasters to make consistent and precise predictions. In this context, CPPIB's team emphasize that their strategy is less about consistently outguessing the market, and more about identifying mispriced long-term growth drivers that are underappreciated by the marketplace.

Closing thoughts

Many investors are finding value in looking through a thematic lens. They find themes to be useful tools for generating ideas and focusing them on the longer term. CPPIB's thematic investing strategy aims to make these concepts concrete through the actions of a large institutional investor. The strategy focuses on identifying major structural growth drivers in the economy, and looks for

scalable investment solutions that span very long time horizons. This is no small task. From a technical standpoint, making good long-term forecasts and searching for high-quality investment themes is a challenging and resource-intensive process. From a governance standpoint, much of the strategy's success depends on CPPIB's ability to consistently behave like a long-term investor – despite external pressures around short-term performance – and the rigour and commercial experience of CPPIB's internal team to have controls in place. With such controls, they can discern between the observational equivalence of performance as a short-term cost of long-term success, versus performance as an indicator of investment error.

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F. New Zealand Superannuation Fund: Manager Flexibility

Organizational type	Sovereign wealth fund
Geographical location	Auckland, New Zealand
Assets under management	NZD 29.5 billion (New Zealand dollar) (\$19.4 billion)
Internal investment capability	100 employees
Liquidity profile	Government contributions to the fund were stopped in 2009, and are forecast to restart in 2020-2021 Withdrawals from the fund are expected to begin in/around 2029-2030
Investment objectives	Maximize the fund's return over the long term, without undue risk, to reduce New Zealanders' future tax burden
Governance structure	Leadership team: Chief Executive Officer (CEO), Chief Investment Officer (CIO) and five senior general managers Board: seven members chosen by the minister of finance from an independently nominated pool of candidates

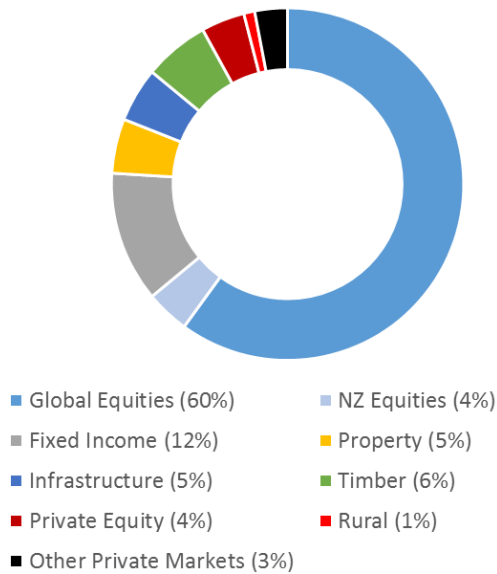
This case study shows how the Guardians of the New Zealand Superannuation Fund (NZSF) select and use external managers when they make investments. The case study examines the concept of flexibility, which in this context refers to the ability of an internal team to flexibly alter risk allocations when investing through an external manager. It gives examples of how the NZSF has managed to achieve this.

Background

All citizens and permanent residents of New Zealand aged 65 and over are eligible to receive flat-rate superannuation (pension) payments from the government. These payments are funded by present-day taxpayers. As New Zealand's population ages and the ratio of pensioners to workers increases, the tax burden required to support superannuation payments is expected to increase significantly. To solve this problem, the New Zealand legislature passed the New Zealand Superannuation and Retirement Income Act in 2001, creating the New Zealand Superannuation Fund. The NZSF is a pool of assets on the government's balance sheet that is used to pre-fund the future cost of New Zealand's superannuation system. The fund is managed by a Crown entity known as the Guardians of New Zealand Superannuation (the Guardians).

The Guardians' investment objective has been to maximize the fund's return over the long term, without undue risk, in order to reduce New Zealanders' future tax burden. They have largely done this by investing in a diversified portfolio of public and private assets (Figure F1), overlaid with dynamic asset allocation positions they refer to as "strategic tilting".

Figure F14: NZSF Fund Exposures



Source: NZSF, 2015

While the NZSF portfolio has a range of assets, only 30% of it is invested actively. The Guardians aim to be judicious in choosing active investments. If a prospective investment does not offer a sufficiently compelling value-adding opportunity over the passive assets in NZSF’s reference portfolio (a simple, liquid portfolio of 80% public equities and 20% bonds), it will not be selected.

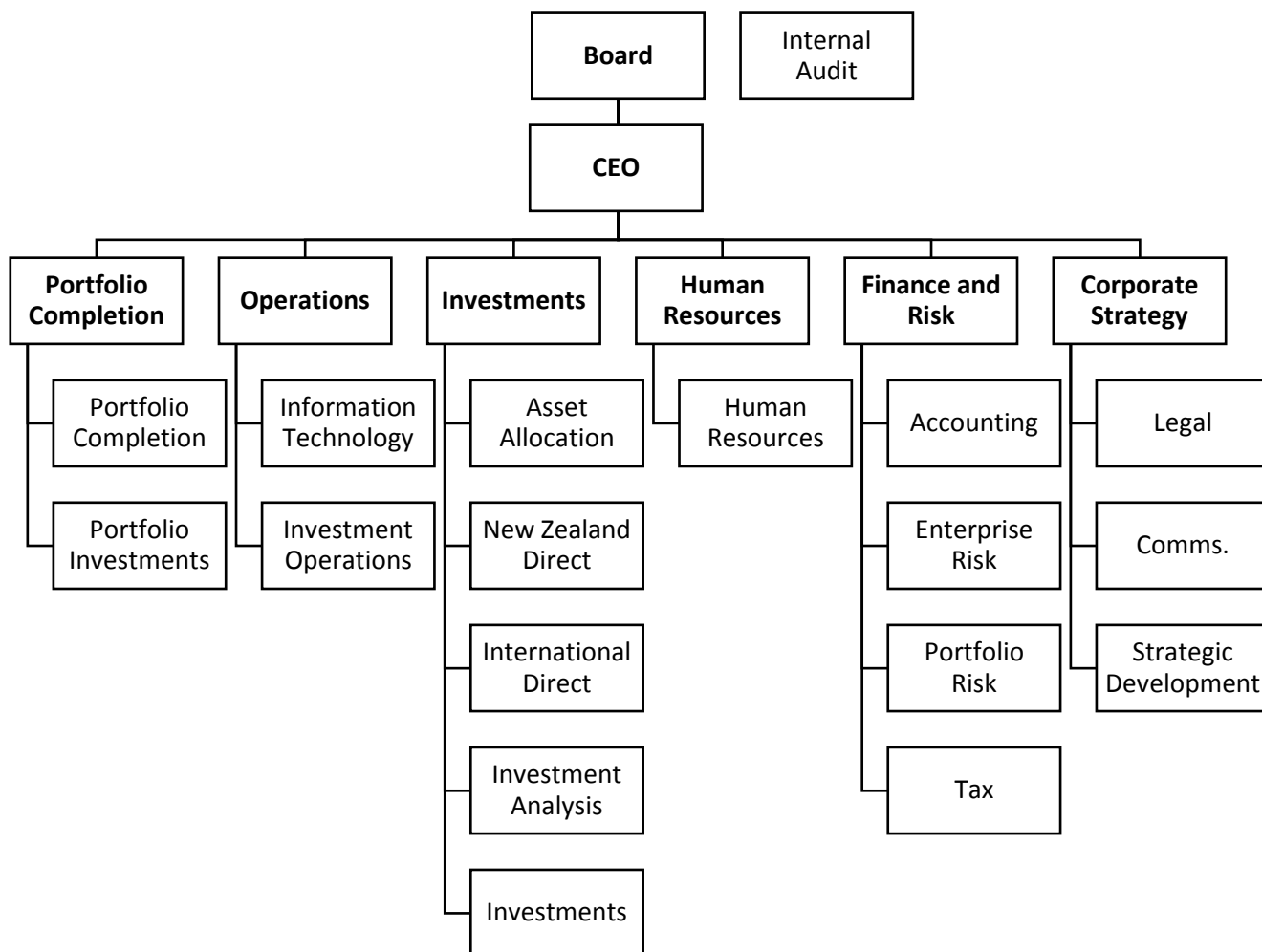
As of July 2015, NSZF had a total net AUM of NZD 29.5 billion (\$19.4 billion), with approximately 100 staff in its office in Auckland, New Zealand.

As a legally separate entity from the New Zealand government, the Guardians operate at “double arm’s-length”. The first arm’s-length refers to the fact that while the minister of finance selects NZSF board members from a pool of candidates, the government does not decide which candidates get nominated to that pool. These are identified by an independent nominating committee.

The second arm’s-length refers to the Guardians’ independent status in making investment decisions at the NZSF. After the minister of finance sets expectations for the fund’s risk and return, the board and management of the Guardians can perform investment management activities autonomously.

Figure F2 shows the organizational structure of the Guardians. The leadership team is made up of the CEO, CIO and the general managers of the five other departments. Board oversight is provided by seven board members, each serving terms of up to five years.

Figure F15: NZSF Governance Structure



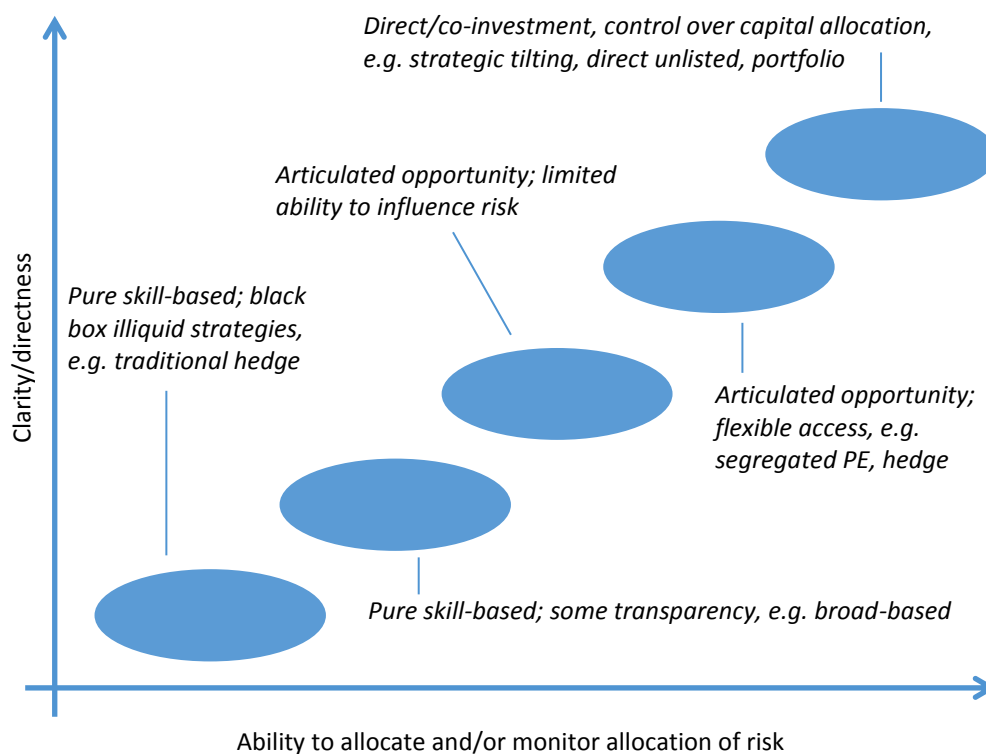
Source: NZSF, 2015

Investment access points

NZSF looks for two things when choosing which investments to undertake. The first is the attractiveness of the investment opportunity, which has been conceived in terms of expected return adjusted for return and risk. The second criterion is how consistent the investment is with the fund’s investment style: specifically, how well an investment fits in with the Guardians’ beliefs and investment preferences, the fund’s endowments and themes, and its focus on responsible investments. If an investment opportunity scores highly on both criteria, the investment team will seek out an access point to the investment. This could be a passive investment, an internally managed direct investment or an externally managed investment made via a third-party fund manager.

The Guardians prefer to invest as directly as possible, based on the belief that their ability to realize the expected risk-adjusted return of a particular investment is highest when (1) the team can see and articulate the opportunity; (2) the underlying drivers are consistent with NZSF’s endowments and beliefs; and (3) the team have the ability to change the risk allocation according to attractiveness over time. If they directly access a particular opportunity, they are more likely to have control over these three factors. Figure F3 shows that the more clearly and directly they can access an investment, the more willing the Guardians are to allocate risk to it.

Figure F16: Greater Clarity Leads to an Increased Ability to Allocate Risk



Source: Internal NZSF documents, 2015

This preference for direct investing does not mean that the Guardians shun external managers. They certainly do consider investing through external intermediaries – for example, when they do not have the internal capability to manage a particular investment or the capacity to assign the responsibility for a particular investment to internal investment teams, or when they simply are not physically close enough to an investment to invest with confidence. When investing with third parties, they codify the specific traits that they find desirable for direct investing, and try to replicate these. NZSF typically uses external managers for investments in private equity, real estate, early-stage "expansion capital" investments, rural investments and listed equities.

Selection criteria for external managers

Manager selection is an important part of the investment process. A key criterion for the selection is the level of conviction. The investment team define this as their confidence in a manager's competence to act on an investment opportunity, and in the general quality and "fit" of the institution. Conviction is established by evaluating managers according to these criteria:

- **Viability:** the manager's credibility and stability as an organization, such that it can deliver on its strategy over time
- **Structure and focus:** legal structures and terms which ensure that the manager's interests are aligned with those of the NZSF
- **Trust:** the team's confidence that the manager will do what it says and always act in NZSF's interests
- **Risk awareness and management:** the robustness of the manager's systems and processes for identifying, assessing, managing and reporting investment and non-investment risks
- **People capabilities:** the necessary competencies and depth to execute the investment strategy
- **Process capabilities:** the necessary tools, systems, networks and processes to execute the investment strategy

- **Opportunity consistency:** the manager's ability to demonstrate that it understands NZSF's investment objective and how its strategy will deliver, and the ability to consistently execute the strategy
- **Performance:** the manager's demonstrated performance in executing the investment strategy

In addition to these capabilities, the investment team seek to invest in a way that maximizes the alignment between the manager and the overall fund. This means that they need to negotiate an acceptable level of fees, reporting requirements and structures that protect NZSF against changes in strategy, ownership and key personnel. When these structures are not in place, the team are unlikely to pursue an investment opportunity and will rather default to the passive reference portfolio.

Flexibility

Another important consideration when allocating capital to a manager is flexibility. As mentioned, the Guardians believe that an important part of realizing good returns is the ability to dynamically alter risk allocations as the attractiveness of an investment opportunity changes over time. Starting in 2012, the Guardians began attempting to replicate this trait by embedding flexibility into the access structures which they had with specific investment managers. In practice, this involves the following types of agreements with managers:

- Clear visibility of the underlying drivers of an investment opportunity and an understanding of how the manager has been allocating risk in response to changes
- The flexibility to influence the risk allocation; for instance, the ability of the Guardians to reduce or increase their exposure to the opportunity under predetermined circumstances
- The flexibility to "pivot" how risk is allocated within the opportunity; for example, an investment agreement that split the opportunity into various "sleeves" and allowed the Guardians to transfer risk between the sleeves, depending on how their view of the opportunity was changing

Flexibility also extends to ancillary aspects of the investment agreement with an intermediary. In particular, the Guardians have focused on achieving flexible agreements in the following areas:

- **Fee structures:** Specifically, the team push for management fees to be charged on invested capital instead of committed capital, and for performance fees to be based on appropriate hurdles representing actual outperformance vs. relevant listed alternatives.
- **Reporting requirements:** These can concern, for example, changes in opportunity drivers and how environmental, social and governance risks and opportunities are identified, evaluated and managed.
- **Knowledge transfer requirements:** The Guardians often embed expectations for the manager to assist them in understanding and executing on opportunities. This could include secondments, regular meetings of senior staff from the Guardians and the asset manager, and other collaborations. It helps the team to manage that particular investment opportunity and to frame it in relation to other opportunities being considered.

A case in point: flexibility in practice

In an example of a highly flexible agreement between NZSF and a private equity fund manager, the mandate involved allocating the bulk of NZSF's investment among four "sleeves", representing four different aspects of the same underlying opportunity in the oil and gas industry: upstream, midstream, downstream and distribution. Given a prearranged amount of prior notice, the NZSF team were able to vary their allocations between the sleeves as their view on the opportunity – assisted by the asset manager – changed. With notice, the team also had the flexibility to cease further allocations of risk capital to the manager. Furthermore, the team achieved broader flexibility with the manager concerning fees on committed capital, and the manager agreed to receive two secondments of staff from the Guardians per year.

In turn, the Guardians committed a significantly larger amount of capital to the manager than to its typical private equity investments. The Guardians also dedicated significantly more resources to assessing the opportunity and managing the relationship, with the implicit understanding that the relationship was likely to be maintained over a long time horizon.

Managing the relationships

The NZSF does concede that many managers instinctively push back against the suggested changes, as they are in the interest of the Limited Partner (LP) rather than the General Partner (GP). Indeed, some fund managers have been entirely unable or unwilling to offer flexible terms. In a world awash with liquidity, the search for yield has led many investors to increase their allocations to the alternative asset classes, and many managers do not feel compelled to alter the terms of their agreements when investor capital is easy to come by.

Nevertheless, some managers have responded positively to the promise of significantly larger mandates and longer-term partnerships with NZSF. Furthermore, the flexibility framework gives the Guardians a much clearer idea of the specific terms and characteristics they find desirable in an external manager. This allows them to more effectively negotiate with managers and customize their investment management agreements.

Ultimately, the Guardians believe in pursuing fewer, deeper relationships with their external managers. The organization believes that focusing its resources on a smaller number of managers with larger mandates will allow it to gain a more thorough understanding of the manager and the underlying investment opportunity. This gives it more confidence in the position and translates into improved risk management. Setting up large, flexible mandates with long-term aligned managers is a natural expression of this belief.

Closing thoughts

It is common for investors to speak of the importance of aligned intermediaries and the benefits of deep, strategic partnerships with third parties. However, too often these concepts are not specifically defined. At the NZSF, the Guardians have outlined a clear set of characteristics they use to determine their ability and willingness to allocate large amounts of capital to an external fund manager. They find these traits desirable because they are well aligned with the organization's fundamental investment beliefs. And while it is likely that the Guardians will only be able to find a limited number of external managers who are fully willing to take their suggestions on board, they benefit from having a specific and clearly articulated set of ideas, principles and aspirations surrounding manager selection.

Reference

NZSF, 2015, *NZ Super Fund 2014-15 Annual Report*.

G. PensionDanmark: Direct Infrastructure Investing

Organizational type	Defined contribution pension plan
Geographical location	Capital (Hovedstaden) Region, Denmark
Assets under management	DKK 171 billion (Danish krone) (€23 billion)
Internal investment capability	25 investment professionals
Liquidity profile	Positive inflows expected until 2050 No guaranteed minimum yields on pension products
Investment objectives	Ensure the highest possible buying power of members' pension savings by taking a prudential level of risk
Governance structure	Executive team Board: representatives from labour and employers

As part of a portfolio overhaul in 2010, PensionDanmark allocated 20% of its investment portfolio to “stable alternatives” of real estate and direct infrastructure investments. This case study examines PensionDanmark’s experiences in setting up a direct infrastructure investing programme, particularly in light of its medium scale and its portfolio's objectives.

Background

Denmark has one of the most comprehensive pension systems. Global consulting firm Mercer ranks the Danish system as the best in the world, describing it as a “first class and robust retirement income system that delivers good benefits, is sustainable and has a high level of integrity” (Mercer, 2014). A pensioner in Denmark has two key sources of retirement benefits: first, a basic public pension scheme with supplementary means-tested benefits; and second, occupational pension schemes whose benefits are related to the amount pensioners earn over their working lifetime.

PensionDanmark is the largest of the occupational pension schemes in Denmark, and the fourth-largest pension provider overall. It offers defined contribution pensions, insurance and healthcare products to more than 660,000 members working in 27,500 companies. As of the end of 2015, the fund was in the accumulation phase and is expected to experience net positive capital inflows until the 2050s. Its defined contribution scheme has no guaranteed minimum yields, which gives it more investment flexibility.

As of July 2015, PensionDanmark was managing a total AUM of DKK 171 billion (€23 billion), with 25 investment professionals in its internal asset management division.

PensionDanmark is co-owned by labour unions and employer organizations in Denmark. It reports to a board made up of representatives from labour unions and employer organizations, as well as an independent member with accounting and financial knowledge.

Investing in unlisted infrastructure

In theory, institutional investors and infrastructure investing are an excellent fit. Capital is clearly needed in the infrastructure market, which has been significantly underfunded for some time. The average annual global spending over the next ten years on transport, power, water and communications infrastructure is expected to be \$2.7 trillion, while it should be closer to \$3.7 trillion (World Economic Forum, 2014). Many governments have cut back their infrastructure spending since the global financial crisis, and have been in search of alternative sources of capital to fund infrastructure projects.

One natural alternative source of capital is the large pool of private capital held by institutional investors, such as pension funds and sovereign wealth funds (The Economist, 2014). In principle, this supply of capital should be easy to access. After all, infrastructure investments have many characteristics that make them attractive to large institutional investors: they are long-lived, which makes them well suited for institutional investors' long-term liability profiles; some have generated contractually fixed and inflation-linked cash flows; and infrastructure asset values are also meant to be relatively uncorrelated to the business cycle, which offers diversification. From this perspective, it is not surprising that investors looking for new opportunities prioritize different kinds of infrastructure investing (personal interviews conducted at the Sovereign Investor Institute Global West Roundtable 2015).

In practice, however, infrastructure assets still make up a minor part of most institutional investors' portfolios. By some estimates, less than 1% of pension assets worldwide are invested in infrastructure projects (Tsafos, 2014). One explanation for this is that investing in infrastructure can be very challenging; while investors can buy publicly listed infrastructure companies, these securities often show equity risk characteristics that make them undesirable. Also, unlisted infrastructure projects often have poor risk transparency and underdeveloped project pipelines.

Finding access routes to unlisted infrastructure can also be difficult. The most common route, through third-party infrastructure fund managers, offers investment vehicles that are structured like private-equity leveraged buyout funds (Blanc-Brude, 2014). Heavy fee structures often detract from investments' net end-to-end returns, and many institutions find it difficult to maintain an alignment of interests over the long time horizon involved. Many institutional investors are also uncomfortable with the level of leverage utilized and their lack of direct control.

Some institutional investors, notably pension funds in Canada and Europe and sovereign funds in Asia, choose to invest directly in unlisted infrastructure by building up internal investment teams that can directly invest in infrastructure projects. Setting up an internal direct investing strategy is resource-intensive: the human capital and back-office requirements to sustain an internal team can be substantial. It also often requires that the institution attract new expertise and develop mechanisms to maintain a long-term alignment of interests, such as new performance management systems. Thus, only generally larger organizations are able to set up an internal strategy.

Infrastructure investing at PensionDanmark

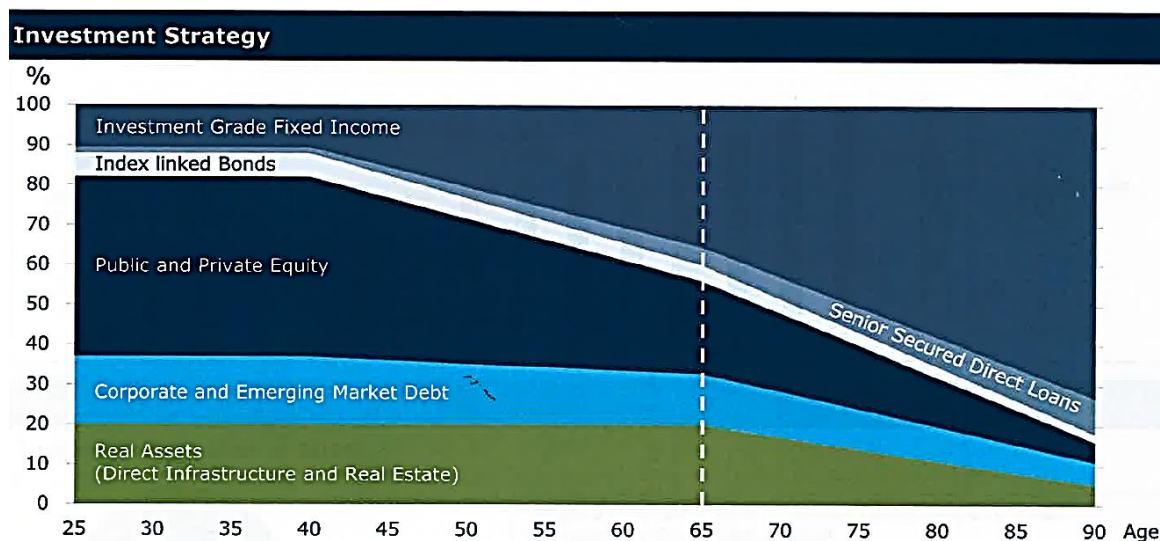
PensionDanmark's experience in setting up a direct infrastructure strategy is instructive in a number of ways. As a mid-sized pension fund attempting to break into the infrastructure market, it focuses on markets where it faces less competition from significantly larger and more established investors. In addition, it makes deals with partners to ensure that the risk profile of its investments matches its objectives. It also works closely with a newly-formed asset manager, Copenhagen Infrastructure Partners, which acts as an aligned intermediary and boosts PensionDanmark's infrastructure investment capacity.

The pension provider began making direct infrastructure investments in 2010 as part of a desire to add new sources of return to its portfolio, which had previously been dominated by bonds and equities. In the low-interest-rate environment that took hold following the global financial crisis, PensionDanmark's board believed that bonds looked set to generate low returns with little yield cushion to protect against falling bond prices. In response, management sought out alternative investments that could act as safe assets, to reduce the portfolio's reliance on fixed-income securities.

Following a portfolio review, PensionDanmark decided to allocate 10% of total AUM to infrastructure investments. This was to be part of a portfolio of real assets, which would be equally divided between direct infrastructure and real estate. The real asset portfolio, aiming to provide a long-term and non-cyclical foundation for the investment portfolios of PensionDanmark's members,

would make up 20% of the portfolios of members between the ages of 25 and 65 (before the percentage declines after retirement) (Figure G1).

Figure G17: PensionDanmark's Investment Strategy



Source: Internal PensionDanmark documents, 2015

Conscious of the potential pitfalls of indirect investments, PensionDanmark decided that its infrastructure portfolio should consist primarily of direct investments. The organization believes it is important to have direct control over its assets, particularly in light of the global financial crisis, because highly leveraged funds found themselves forced to sell just when prices were at their lowest at the depths of the crisis. Being a long-term, highly solvent investor, PensionDanmark would have preferred to hold on to its positions, and to buy more, just as others were motivated to sell.

Internal team: philosophy and parameters

To set up its infrastructure programme, PensionDanmark's team for alternative investments first established their scope, philosophy and vision. They determined that the strategy would focus on making direct equity investments in unlisted infrastructure projects, although direct credit investments would be allowed. The strategy's main objective would be to look for opportunistic investments in new segments of the infrastructure market.

By law, PensionDanmark can take a maximum 50% equity stake in a direct investment. This means that direct infrastructure investments have to be carried out in partnerships. The team would look for partners that were experienced industrial firms with deep technical expertise, and who shared a similar risk appetite. Furthermore, because partners would be in charge of managing the asset, it was especially important that interests remain well aligned over the investment's lifespan. To this end, the team aimed for deal structures where their partners held significant financial stakes in the projects they were jointly invested in, so that partners would have "skin in the game" and be invested in the projects' success or failure.

The team then established a number of criteria for choosing investments. First, they sought assets that were characterized by low demand and price risks. This could occur when demand for the asset's output was lowly correlated with the business cycle, or when the asset could sell its output for prices that were contractually determined or linked to inflation. Power distribution networks or regulated utilities with fixed price agreements were good examples of this kind of investment.

Second, the team looked for investments that they believed had low regulatory or political risk. Here, they limited themselves to investing in the European and North American markets, where the regulatory framework for private infrastructure investments is stronger and better understood.

Nevertheless, while this mitigated the problem of regulatory risk, it did not eliminate it. For example, even though Spain was an established European market, it enacted various retroactive subsidy reductions and tax hikes on the solar power sector between 2008 and 2013 (Couture & Bechberger, 2013). This led to an unexpected fall in profitability in the sector, and various investors, including PensionDanmark, suffered losses. This experience reinforced the centrality of understanding and being able to price regulatory and political risks.

These investment criteria mean that investments typically focus on lower-risk situations. Nevertheless, the agility of PensionDanmark's team, derived from their investment universe and internal mandate structure, allows them to pursue various methods of achieving their investment objectives. For example, their mandate allows them to invest in smaller, less developed segments of the infrastructure market, such as new renewable technologies. The team are allowed to invest in greenfield infrastructure projects where the asset is still being constructed, and are encouraged to consistently look for fresh opportunities in new locations around the world.

Ultimately, the binding constraint on the infrastructure team's mandate is an expectation of underlying asset quality. Once they determine that the investment opportunity is of sufficiently high quality, there is a certain amount of freedom for access and deal structuring. PensionDanmark's appreciation of the idiosyncratic nature of the risks in infrastructure investment means that the team are not restricted from exploring new ideas and unique deal structures, as long as they contribute to the infrastructure portfolio's overall objectives.

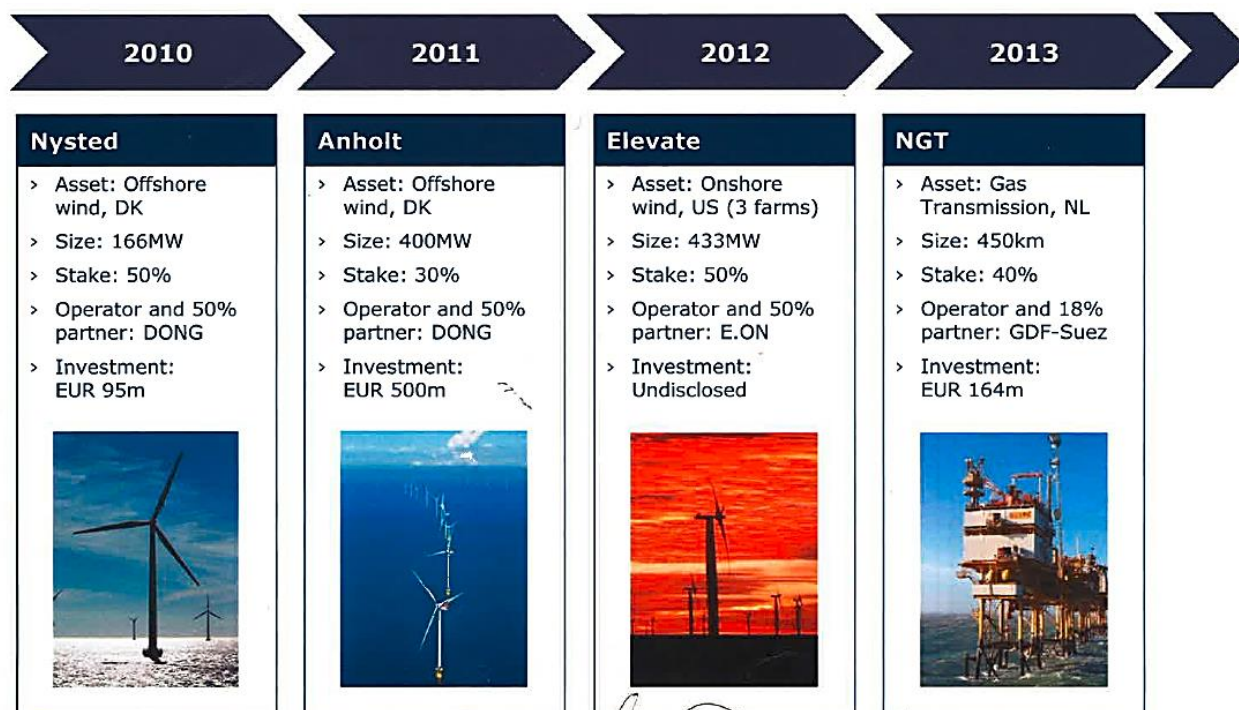
Internal team: implementation

Since 2010, PensionDanmark has gradually built up its internal infrastructure investing capabilities. As of July 2015, it had seven investment professionals in its alternative investments team. To support the team's investment activities, the pension provider has added new expertise to its legal and tax departments, and expanded internal back-office systems to include the new assets.

As part of the investment process, the alternative investments team are in charge of sourcing, evaluating and transacting on deals. Together with this, the investment committee – comprised of PensionDanmark's CEO, CIO, chief financial officer and the head of alternatives – is involved in the entire process of an investment decision, and have veto rights over major decisions. During the deal-making process, the investment committee holds meetings when necessary to facilitate an efficient, real-time investment process.

Figure G2 shows a number of the direct investments that the PensionDanmark team have made since inception. Investments have focused on the energy generation and transmission sector, with an emphasis on renewable and alternative energy in Europe, where pre-existing relationships with local providers have facilitated this. PensionDanmark's medium scale also means that many investments have been in deals that were below the radar for significantly larger funds. In line with its mandate, each investment has been made with the participation of an established industrial partner, such as DONG Energy, E.ON and GDF-Suez.

Figure G18: Direct Infrastructure Investments by Internal PensionDanmark Team



Source: Internal PensionDanmark documents, 2015

The evolving nature of its deals demonstrates PensionDanmark's flexible investment approach and commitment to adapt to changing circumstances. For example, in 2010, the team began with a straightforward investment in Nysted, a brownfield Danish offshore wind farm. In 2011, they moved on to a significantly larger investment in the Anholt offshore wind farm, where five times as much capital was deployed as before. In the years that followed, the team made investments in a wind farm in the United States. As wind farm prices rose, the team expanded their sights to gas transmission infrastructure in the Netherlands. The team believe that their competitive advantage results from the ability to expand swiftly into different markets to stay ahead of the price curve.

The principles of flexibility and control have enabled the tailored structuring of deal terms; the 2011 investment in the Anholt wind farm reflects this approach. Conceived in 2008 as part of the Danish government's 2008-2011 energy policy, Anholt is the largest offshore wind farm in Denmark and the third largest in the world. DONG Energy, Denmark's largest energy firm, was awarded the licence to construct and operate the wind farm. In March 2011, PensionDanmark bought a 30% equity stake in Anholt for \$680 million, its largest investment in renewable energy to date. While this investment was made before construction began, PensionDanmark assumed no construction risk through its chosen contract structure. The contract also dictated that once Anholt was operational, the power generated was to be sold for a fixed feed-in tariff guaranteed by the Danish government for 12 years. Furthermore, the turbine manufacturer Siemens agreed to guarantee the wind turbines' output for five years, mitigating operational risk at the outset. These features have enabled the investment team to customize the risk profile of their investment in Anholt. Effectively, the team traded some of the deal's upside potential in exchange for a safer, more stable return profile. This has enabled them to invest in an early-stage infrastructure project while receiving a return stream that fits the team's risk profile.

The team's other investments show similar features. In 2012, they invested in three US onshore wind farms operated by E.ON, where 90% of the power generated was to be sold under 15-year fixed-price power purchase agreements, and in which PensionDanmark was protected against unforeseen operating and maintenance costs. In 2013, the team bought a stake in a Dutch offshore gas pipeline, which provides a monopoly service for multiple gas fields and has a very low exposure to gas price fluctuations. In each case, the investment team's control and investment-

structuring flexibility enabled them to customize their investments to achieve particular risk profiles, appropriate for their fund's investment objectives and risk budget.

Investing via an aligned intermediary

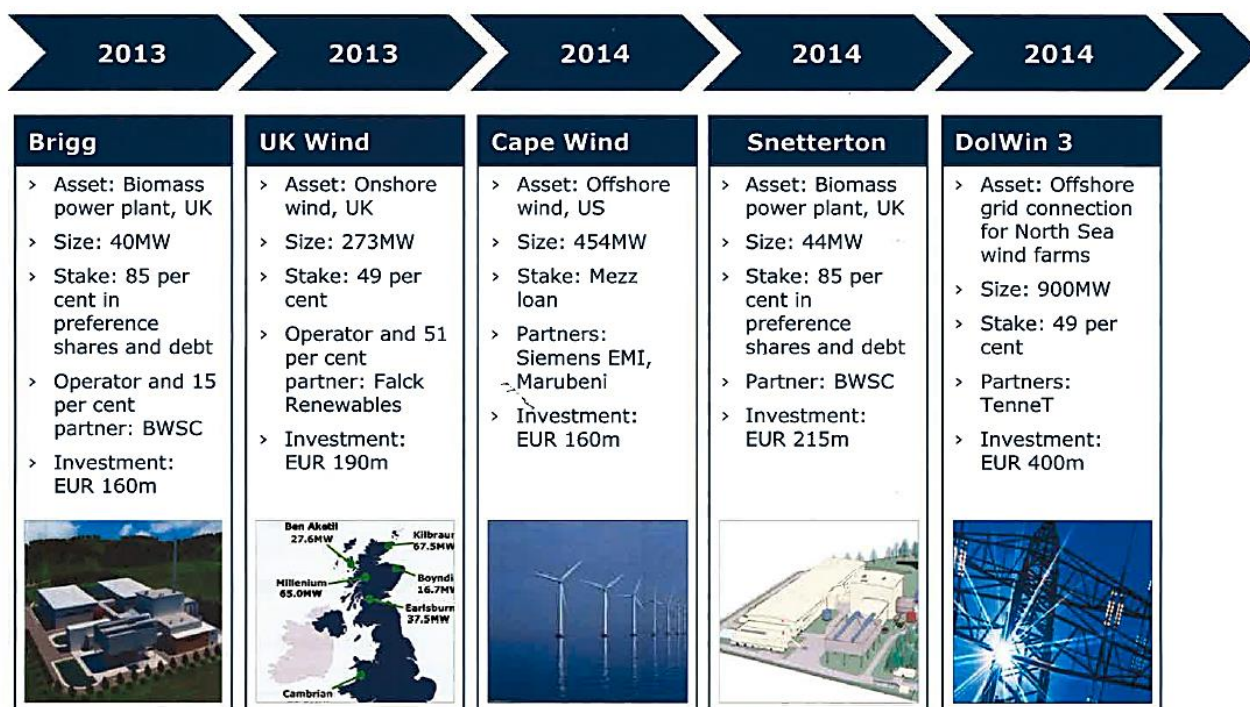
While PensionDanmark has developed its in-house investment capabilities, it has also explored complementary methods of deploying capital in direct infrastructure deals. Traditional private-equity-style external fund managers, who operate at arm's-length and charge high fees, are regarded as undesirable because of the principal-agent problems that often arise. Not all intermediaries are shunned, however, if better ways of aligning objectives and interests can be found.

Looking for such an intermediary underpinned PensionDanmark's decision to provide seed capital for Copenhagen Infrastructure Partners (CIP), an infrastructure fund management company founded by five former employees of DONG Energy. All five partners had good track records in the infrastructure and energy sectors, and PensionDanmark believed that it could bring valuable expertise to the company, while sharing in its long-term objectives.

In 2012, PensionDanmark became the sole investor in CIP's first fund, committing €800 million to the newly established fund manager for a 20-year investment time horizon. Being the seed investor gave the pension provider privileged access to CIP's ideas, investment processes and future investment funds. The partnership structure also meant that CIP charged significantly lower management fees, reducing costs by as much as 70-80%. Within PensionDanmark, CIP was thought of more as an extension of the internal investment team than as a standard external asset manager.

Figure G3 shows the direct infrastructure investments made through CIP. Like those undertaken by the internal PensionDanmark team, CIP's investments have mainly been in renewable energy. Like PensionDanmark, CIP's strategy has been to look for deals in newer markets that receive less coverage, to avoid the bidding wars that come with the more hotly contested infrastructure projects. It looks for value in market segments, such as biomass power production in the UK, where it made brownfield and greenfield investments in 2013 and 2014.

Figure G19: Direct Infrastructure Investments by CIP



Source: Internal PensionDanmark documents, 2015

Working closely with an aligned counterparty like CIP allows PensionDanmark to benefit from a third-party manager's expertise while avoiding many of the manager's typical pitfalls. The relationship is mutually beneficial. On the one hand, CIP has found a long-term, committed partner to back its inaugural fund; on the other, PensionDanmark is able to approximately double the amount of capital it has deployed into direct infrastructure by investing with CIP. The relationship looks set to continue and strengthen: in 2015, PensionDanmark committed another €500 million to CIP's second fund.

Closing thoughts

The infrastructure investments narrative typically refers to stable, long-term cash flows and non-cyclical asset values. While this is certainly valid, investors have found that their ability to make these features materialize depends heavily on the underlying asset, how it is structured and the method of investing in the project. Many investors therefore find it preferable to invest directly in infrastructure or to be highly selective when investing through intermediaries.

PensionDanmark presents an interesting example of how a medium-sized fund has chosen to set up an infrastructure investing programme. After overhauling its portfolio in 2010, the company set up a direct infrastructure strategy as part of its desire to invest in real assets. It implemented this in two ways. First, it established an in-house direct investing team, which focused on looking for low-risk infrastructure investments in Europe and North America. In the years that followed, the team made various investments in both brownfield and greenfield energy-related infrastructure deals. They customized individual deals to fit their risk profile, and explored markets and deal sizes that other infrastructure investors (particularly much larger funds) were competing over less fiercely.

Second, PensionDanmark made approximately half of its direct infrastructure investments via CIP, a five-member team of ex-DONG Energy employees for which PensionDanmark provided seed capital in 2012. By establishing this unique relationship with an aligned intermediary, the pension provider gained privileged access to CIP's expertise and investment capacity, giving it a complementary way to grow its infrastructure portfolio and transfer intellectual property into its internal team. CIP acts as an extension of PensionDanmark's internal team, and is a valuable addition to the internal strategy team.

By gradually building up its internal team with a clear vision and mandate, exploring unique markets and deals and leveraging its relationship with an aligned intermediary, PensionDanmark has come ever closer to realizing its objective of deploying 10% of AUM into direct infrastructure investments.

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Acknowledgements

Global Agenda Council on the Future of Investing

Alison Tarditi, Chief Investment Officer, Commonwealth Superannuation Corporation (Chair)

Josh Lerner, Jacob H. Schiff Professor of Investment Banking, Unit Head, Entrepreneurial Management, Harvard Business School (Vice Chair)

Jagdeep Singh Bachher, Chief Investment Officer of the Regents, University of California

Gert Dijkstra, Chief Strategy & Communication, APG Asset Management

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Sara Hamilton, Founder and Chief Executive Officer, Family Office Exchange

Brett House, Chief Economist, Alignvest Investment Management

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Mahmood Al Kooheji, Chief Executive Officer, Bahrain Mumtalakat Holding Company

Winston Ma Wenyan, Managing Director, China Investment Corporation (CIC)

Hiromichi Mizuno, Executive Managing Director and Chief Investment Officer, Government Pension Investment Fund (GPIF)

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