

A long-term perspective

Navigating your investment journey

Pension Fund Indicators 2017



Pension Fund Indicators 2017

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Foreword



Malcolm Gordon
Head of UK Institutional
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Our aim with Pension Fund Indicators is to deliver an objective and educational source of investment data with practical explanations, covering the range of investment opportunities available to pension funds.

Last year when we went to press we did so following the historic EU Referendum vote, with the UK electorate voting to leave the European Union (EU). The longer term implications and the reality of the 'Leave' vote will take years to play out. For the moment the UK remains in the EU, and the process of leaving could take two years or more.

Fast forward 12 months and at the time of going to press, we do so with the backdrop of European elections. The French presidential elections in April saw a clear victory of centrist and pro-European Emmanuel Macron. This was followed by a surprise general election in the UK in June, announced by Prime Minister Theresa May in a bid to achieve a strong mandate as Brexit negotiations begin. While opinion polls initially painted a positive picture for the ruling Conservative party, the results were not as had been expected. The victory of Donald Trump in the US presidential elections last November also leads us into an era of greater policy uncertainty than has been the case in the past two to three decades. Indeed this uncertainty is undoubtedly going to impact market sentiment and therefore volatility for the foreseeable future.

This year our guest author, Mark Fawcett, CIO of NEST, emphasises the importance of planning ahead and preparing portfolios for the evident investment risks and opportunities that climate change and the transition to low carbon represent. NEST partnered with UBS Asset Management to develop a scalable, cost-effective solution addressing the climate change issue. We launched the UBS Life Climate Aware World Equity Fund earlier this year, which provides clients with a passive-like, low cost solution designed to capitalise on the long-term transition to a low greenhouse gases (GHGs) emissions economy.

We continue in this publication, our focus on Environmental, Social and Governance issues, including a contribution from Michael Baldinger, Head of Sustainable Investing and Impact Investing at UBS Asset Management. Michael joined in November 2016, and is responsible for delivering a world-class Sustainable and Impact Investing business across asset classes. He focusses on why sustainable investing is a game changer for all investors, with two recent collaborations that have led to innovative sustainable solutions.

Each year we review and update every chapter to ensure it remains topical and a useful source of information. We hope that this publication provides you with some informative facts and valuable insights, which help you to choose a path through the challenges that lie ahead.

A handwritten signature in black ink that reads "Malcolm Gordon". The signature is fluid and cursive, with a long horizontal stroke at the end.

Malcolm Gordon

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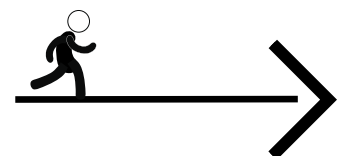
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Current
thinking
in UK
pensions

Introduction

2016 continued to be a defining year for the UK pensions industry. A couple of years on since the "Freedom and Choice" reform came into effect, overall changes have been positive and we continue to see much more joined-up product development and a much needed greater focus on clients from asset managers.

The proposal to pool assets of the 89 Local Government Pension Scheme funds in England and Wales in October 2015 to form a group of far larger, pooled investments of around GBP 25 billion each continues to progress. The LGPS funds are seeking to capture the positives of pooling assets – including the associated management fee savings and improved governance. The sheer scale of the plan to consolidate these assets into a small number of investment pools means it will be a milestone event, and the deadline of April 2018 by which these pools should be operational is also rapidly approaching.

We discuss later in this chapter that all types of pension schemes are faced with a range of significant challenges. Achieving a balance between meeting liabilities, achieving growth, and achieving a stable cash flow presents substantial investment challenges. However, our interaction with clients suggests that the governance challenges this presents are equally pressing. We've assessed the investment options schemes have for addressing these issues and consider how robust governance arrangements can help schemes achieve their long-term objectives.

In this year's edition we are pleased that Mark Fawcett, CIO of NEST has contributed as guest author, highlighting the importance for pension trustees to evaluate whether climate aware investment approaches are within the bounds of their fiduciary duty to members, and how they partnered with UBS Asset Management to create a solution for their members. The UBS Life Climate Aware World Equity Fund launched earlier this year and is a passive-like, low cost solution aiming to provide investors with an innovative, rules-based equity fund, designed to capitalise on the long-term transition to a low greenhouse gases (GHGs) emissions economy and invest more in companies at the heart of this transition.

By combining environmental data from several sources, UBS Asset Management developed a portfolio optimisation model which reduces exposure to climate risk whilst maintaining a low tracking error. Rather than simply reducing exposure to companies with higher CO₂ emissions, the investment team examined the trajectory of emissions reduction over time, as well as corporate management's commitment to emissions reduction, to orient the portfolio toward companies that are better prepared for a low carbon future and the two degree reduction scenario. Moreover, the strategy reduces the exposure to, rather than exclude companies with higher carbon risk in order to pursue strategic engagement with these companies.

Following on from this, Michael Baldinger, Head of Sustainable and Impact Investing, UBS Asset Management, addresses how the perception of investors towards sustainability has changed over time and the importance of global standards for responsible investments.

2017 and beyond

At the end of 2016, the new year looked like one full of potentially market-disrupting political risk. With the surprises of the UK's Brexit vote and the election of Donald Trump, we looked with apprehension at the number of European elections due to take place in 2017 that threatened to bring new, untested governments to power in four of the five largest eurozone economies. The UK election resulted in a hung parliament, with no party winning an outright majority in an outcome that will likely create uncertainty about the path ahead for Brexit negotiations. Geopolitical risk remains high on the agenda, albeit pressures within the Eurozone have eased somewhat, at least short-term. Longer-term, uncertainties remain, particularly given the prospect of an Italian election by early 2018.

In Europe, the victory of centrist Emmanuel Macron in the French presidential election has removed immediate existential risks to the Eurozone while increasing the prospects of a stronger EU 'core' alongside Germany. And while the UK election did not quite go as planned for Prime Minister May and the Conservative Party, the new government seems more likely to go the route of a 'soft Brexit' which emphasizes trading ties and does less damage to the UK economy.

What does appear certain is the high level of economic, policy and geopolitical uncertainty. For markets this may well mean more frequent and more severe bouts of risk aversion than has ever been the case for most of the post-financial crisis period. But for high conviction asset managers it also means the strongest potential opportunity set for a decade. We will continue to monitor as events unfold.

The pressure on the UK pension industry to adapt to regulatory change has shown no signs of slowing down this year. Providers must continue to stretch and develop their propositions in line with constant change. The industry is also coping with significant ongoing regulatory change as well, not least of which the preparation for MIFID II provisions which will take effect from 3 January 2018. This Directive amongst others, will introduce changes that will have a large impact on the EU's financial markets. This is covered further below.

Riding the regulatory wave

Pre 2008, when the housing market was buoyant, and stock prices were high, the regulators hailed the concept of principle based regulation. This was an era where regulators had taken the view that markets should be able to regulate

themselves, and it seemed that the evidence was in their favour, until the global financial crisis of 2008.

Following on from the crisis, regulators across the globe released wave after wave of regulatory rules and requirements in order to ensure stability and structure to the financial system and bolster consumer confidence.

From 2012 onwards, there was the introduction of the European Markets Infrastructure Regulation (EMIR) which was aimed at regulating the derivatives industry. The Alternatives Investment Funds Managers directive (AIFMD), which was introduced to regulate alternative managers following the Madoff scandal. Then followed UCITS V which was the regulator's response to the unintended consequences of introducing AIFMD which made some features of alternative funds more protective than UCITS. The introduction of the Benchmark Regulation followed the LIBOR scandals of 2014, which was then followed by Solvency II which was put in place to regulate the insurance sector in relation to capital requirements.

Surely one would assume the industry would have time to come to grips with all of the changes and a chance to reflect on whether any of these new regulations provided the outcome they were intended for. Sadly, this was not to be the case as we saw the introduction of the Securities Financing Transaction Regulation (SFTFTR) which was the regulator's attempt to control shadow banking like activities (i.e. stocklending), Packaged Retail Investment Insurance Products regulation (PRIIPs) which is about transparency in insurance related product information to investors, and also what is now one of the biggest changes in the industry in Europe, MiFID II.

What does the introduction of these regulations mean for you as an investor? Are you directly impacted and if so, what should you do? The simple answer is you are impacted, and should be actively engaging in industry discussions and communication with your asset managers in order to assess the true impact on your investment.

For instance, EMIR, is still currently being implemented and while this is ongoing, the cost of trading OTC instruments is proving more and more expensive. The trade-off in having a more aligned hedge compared to the cost involved is now becoming more of a factor than ever before for asset managers and clients to consider. However, on a positive perspective, when trading in OTC derivatives which are margined, the counterparty risk exposure to a portfolio will be minimised dramatically, thus reducing the overall risk.

A further positive aspect is that investors are also able to take advantage of the transparency provided from managers under MiFID II in relation to cost and charges. This new transparency will potentially provide a useful tool to be able to critique and compare the total costs of the service compared to other managers.

There are also regulations such as SFTR which actually impact clients directly rather than asset managers. Clients will therefore need to understand whether their managers are trading such assets which bring them in scope, and if they are, what is being done about ensuring they meet their regulatory obligations.

So what are the next steps for you? How do you deal with all of these regulatory obligations and decipher which ones apply to you, which ones apply to your asset managers, and which ones apply to the market place? The answer is simple, engagement. Engagement with your asset managers in order to understand how to navigate the regulatory landscape is essential in order for you to comply and take full advantage of regulatory changes currently occurring in the industry. UBS Asset Management has a vast array of regulatory expertise and industry knowledge which enables us to stay ahead of regulatory obligations and understand how best we can we comply with our obligations, as well as ensuring we can provide solutions and services to our clients to help them comply with theirs.

Cash flow conundrum

When examining the current state of the UK pension fund market, it is clear many schemes are faced with a number of significant challenges. The two most prevalent are the ability to meet future liabilities in an environment of ever-declining bond yields, and the need to achieve capital growth in order to recover almost universal scheme deficits. As schemes put measures in place to meet these challenges a third issue has arisen – achieving adequate cash flow to meet near term commitments in an era of falling pension contributions and declining yields on bonds and cash.

While the first two challenges have received significant levels of attention, we believe less thought has been given to tackling the looming problem of a changing cash flow position. In particular, the issue caused by pension funds benefit payments exceeding contributions resulting in a negative cash flow position. The challenge afflicts both corporate schemes and Local Government Pension Schemes (LGPS). In the case of corporate schemes, contributions have fallen on account of scheme closures to new members or future accrual, while LGPS have been impacted primarily by falling numbers of contributing employees.

Industry research suggests that pension schemes are, to date, adopting a piecemeal approach in addressing the challenges posed by turning cash flow negative. Their methods include stripping income, selling down assets or holding cash balances. While each of these has its own merits, they all have the potential to lead to sub-optimal investment outcomes if undertaken in an unstructured fashion.

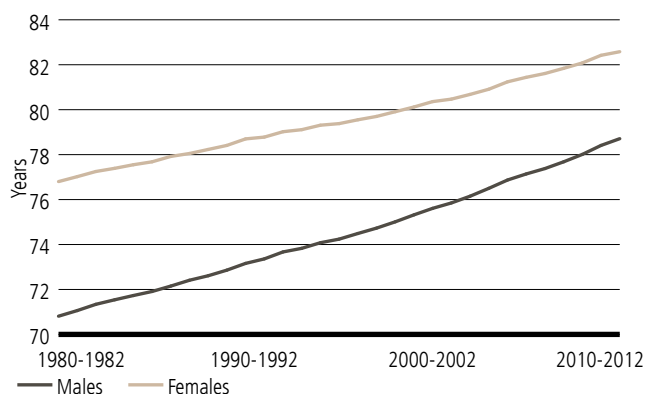
Achieving a balance between meeting liabilities, achieving growth, and achieving a stable cash flow presents substantial investment challenges. However, our interaction with clients suggests that the governance challenges this presents are equally pressing. In this paper we assess the investment options schemes have for addressing these issues and consider how robust governance arrangements can help schemes achieve their long-term objectives.

The onset of negative cash flow

Defined benefit pension funds have increasingly found employer and employee contributions insufficient to meet near-term benefit payments in recent years. In many ways, this was inevitable given that most corporate pension schemes have closed to new members and, increasingly, to future accrual. Previously these acted as a source of regular cash flow allowing schemes to efficiently meet their near term payment needs. While Local Government Pension Schemes have the comfort of receiving ongoing contributions, the reduction in the public sector workforce have seen contributions decline rapidly.

These structural factors have been compounded by demographic factors and, in particular, increased life expectancy (illustrated in *Figure 1.1*).

Figure 1.1 Life expectancy at birth, United Kingdom, 1980-1982 to 2010-2012



Source: Office for National Statistics

The increased lifespan of pension members means that pension benefits will need to be paid to members for longer. This is a recognised trend but we are approaching a new phase in the journey where pension funds have found themselves becoming cash flow negative as increasing numbers of members have begun to retire, placing greater demands on the need for cash.

Measures to meet cash requirements... but are they the right ones?

Many pension schemes have recognised this trend and have employed a range of techniques to seek to meet their cash requirements. However, dealing with this issue in an unstructured fashion can actually crystallise or exacerbate any existing funding gap.

"The public sector workforce grew by over 600,000 over the 2000s. Even so the scale of the reductions expected over the next few years looks challenging. If delivered, the 1.1 million drop in general government employment forecast by the OBR between 2010–11 and 2018–19 would be almost three times larger than the previous drop during the early 1990s."

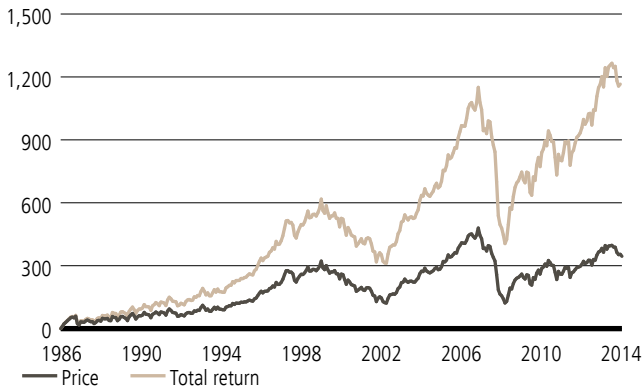
Jonathan Cribb, Research Economist at Institute for Fiscal Studies

Some pension schemes simply utilise a cash balance to meet near term cash calls. Whilst this provides schemes with a liquid pot from which to draw funds, some pension schemes have allocated as much as 5-10% of scheme assets to cash. Clearly, with cash rates at historic lows, this has the potential to act as a drag on performance if employed in the longer-term.

Another solution has been to draw down investments to fund near-term cash calls. The decisions about what asset to sell, when to sell, how to avoid expensive transaction costs and the potential for becoming a forced seller at inopportune times can present a huge governance burden. Achieving this without impacting on growth may be a challenge for even the savviest of trustee boards. The equity market rally of the past few years may have given trustees a false sense of security in this regard. It has been comparatively straightforward to utilise this strategy in an environment of sharply rising asset prices. However, it may prove more challenging to determine what to sell when asset prices are falling sharply. In addition, evidence suggests that some schemes may focus their efforts in this regard on more liquid asset classes, like equities, which are less expensive to trade. However, equities also tend to be more volatile and thus – by definition – capital values fluctuate more widely meaning the risk of crystallising losses is higher.

Utilising dividend income from existing investments – often the most readily available source of cash flow – is tempting, but can present a similar governance challenge. This is because equities are likely to be in the portfolio to drive growth – and yet the compounding power of dividend re-investment has historically been a major driver of equity returns (as shown in *Figure 1.2*).

Figure 1.2 Capital return vs total return when dividend income is reinvested



Source: Lipper. Data in Sterling terms to 31/12/2014

Building a sustainable cash flow solution

As a consequence of this burden, pension schemes have increasingly begun to seek out more cash-flow generative asset classes. But what should a cash flow solution look like?

In our view, it should provide cash flows which are predictable and frequent. Additionally, the underlying assets should be readily realisable in the event that the cash flows it produces are insufficient to meet the immediate payment requirements. It should also have some degree of capital stability so that if it does have to be sold, the amount that can be expected to be received is also fairly certain – this also helps to avoid crystallising losses due to having to sell these assets after a fall in value.

Asset classes considered

Equities

Equities offer a number of desirable characteristics for pension schemes such as the opportunity for capital growth, potentially higher future cash flows which may grow in-line with inflation and offer little re-investment risk in comparison to other asset classes.

Equities may not, however, provide the most reliable source of income. The income they produce may be relatively infrequent, unpredictable and, as highlighted earlier, the underlying asset, whilst being liquid, can be volatile.

Fixed Income

At the other end of the spectrum is high quality, short-duration fixed income. This provides a cash flow which is highly predictable and, equally as important, regular.

Capital volatility is fairly limited and the asset class is highly liquid. Short-duration fixed income offers schemes a number of the desirable characteristics of a cash flow solution, but at the cost of any opportunity for capital growth, and with the prospect of exceptionally low yields at present. This is exacerbated once the impact of inflation is taken into account.

By buying longer dated fixed income instruments or bearing credit risk and buying lower quality issues, it is possible to attain higher yields. Nevertheless, investors need to be mindful of the additional risks they would be bearing in these circumstances, as well as understanding that yields here too have fallen sharply in recent times.

Figure 1.3 Considerations for addressing cash flow negativity

	Cash	Bonds	Real Assets	Equities
Stable & predictable cashflow	High	High	Medium	Low
Frequent cash flow	High	Medium	Medium	Medium
Size of cash flow	Low	Low	High	Medium
Capital growth	None	None/Low	Medium	High
Volatility of capital	Low	Medium	Medium	High
Inflation protection	Low	Low	Medium	Medium
Liquidity of underlying	High	Medium	Low	High

Source: UBS Asset Management. For illustrative purposes only.

1. Current thinking in UK pensions

Buying longer-dated high quality fixed income and achieving a higher yield through earning a term premium may allow investors to retain the nominal value of their investment at maturity. However, should a pension fund need to meet an unexpected payment (such as a large transfer out of the scheme) and have to sell the asset before maturity, it is possible that a mark-to-market loss could be realised.

It is also possible to earn extra yield through being exposed to credit risk. Trustees should be aware that bearing exposure to lower quality issues, in addition to the risks above, could subject the pension fund to the lower liquidity of the corporate bond market, where trading costs are markedly higher. Indeed, exposure to default risk means there is no guarantee that an investor would maintain the nominal value of their investment even if they were able to hold it until maturity. Finally, either option would subject the pension fund to significant reinvestment risk at some point in the future.

Real assets

Some real assets, such as property, can provide excellent sources of long-term income. However in the event of unforeseen circumstances the capital may not be readily realisable, and indeed, recent events have shown that the values of such capital can be volatile.

Factors such as whether the scheme is open or closed; the size of its governance budget; and whether it is in deficit or fully funded will likely influence how the scheme prioritises meeting long-term liabilities, generating growth and achieving positive cash flows.

How a scheme prioritises these challenges will in turn influence the asset mix which it employs. It might be that combining different asset classes into a single cash generative solution with the ability to navigate the market cycle may be more appropriate and could help to alleviate the ongoing governance challenges schemes face.

The governance challenge

In understanding how to respond to this cashflow challenge, trustees will therefore need to consider what the end goal of the pension scheme might be. For example, are they seeking a buy-in or a buy-out?

Perhaps a date when benefit payments cease can be predicted, but schemes that wish to achieve self-sufficiency will increasingly require near-term as well as longer-term streams of cash.

Following on from this, considerations should also be given to individual schemes' funding levels when utilising a cash flow solution. For example, not only should a cash flow solution not hinder schemes' growth requirements but some additional

benefits may be derived from some solutions which actually provide the opportunity to achieve capital growth.

Partnering with providers who can provide pooled and bespoke solutions can alleviate this governance burden. Suitability will be dependent upon schemes' aims as well as their existing governance budget.

Building your solution

Schemes with a larger governance budget may wish to allocate to individual asset classes or may create bespoke portfolios focused on the delivery of income.

For schemes with a smaller governance budget the utilisation of a pooled solution may be optimal. In a similar vein to the advent of diversified growth funds which can help schemes to achieve their growth goals whilst alleviating the governance burden, diversified income funds may help them address some of their near-term income needs.

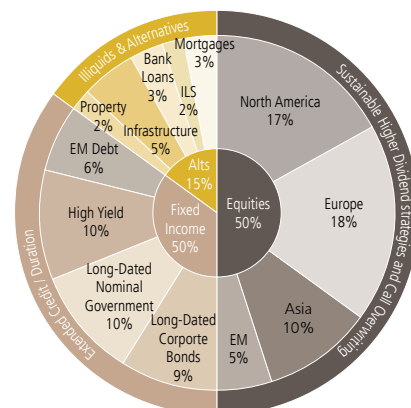
However, in either case, careful consideration must be given to how the allocation to income-generative asset classes is funded in order to ensure that the pursuit of other objectives, such as deficit recovery, is not impeded.

Balancing the requirements for growth, matching long-term liabilities and meeting shorter-term cash flow targets presents both an investment and a governance challenge.

Add to this the increasing range of considerations schemes must factor into their asset allocation strategy, it is clear that UK pension schemes are facing an increasingly complex world.

Pension schemes should therefore consider the full range of options at their disposal in order to meet their long-term objectives.

Figure 1.4 Broadly diversified multi-asset income strategy



Source: UBS Asset Management

Note: For illustrative purposes only. ILS refers to Insurance-linked Securities.

Strategically pushing to protect retirement savings from environmental change

Mark Fawcett, CIO NEST



As investors, we are facing a global tipping point. The old world order dominated by fossil fuel extraction and energy production is due to give way to a new industrial revolution built on green energy and technology. There has been much speculation over whether President Trump's decision to withdraw the US from the Paris climate accord will alter this long term picture. It's not clear what impact it may have, but we believe the future of the global economy is still green.

The reasons are partly political, partly technological and partly financial. The response to the US withdrawing from the Paris accord was telling. A number of US states with a combined GDP equivalent to the world's fourth largest economy immediately pledged their ongoing support for the principles of the agreement. 187 US cities have also pledged to uphold earlier promises to cut their emissions by 26-28 per cent below 2005 levels, by 2025. This may not replace the US's commitment to the Paris accord, but it is a signal to business that large parts of the economy will be expected to transition regardless.

Closer to home, many businesses are already beginning to take decisive action. Utilities companies in almost

every EU country pledged in March to phase out coal-fired plants from 2020. These companies aren't waiting around for governments to shift the ground under their feet, they are taking matters into their own hands. Those that aren't thinking ahead about how to diversify away from heavily polluting fossil fuels are likely to face future losses as policies begin to penalise them.

The cost of generating new power from solar and wind is also becoming cheaper than fossil fuels in many parts of the world. Renewable capacity overtook coal-fired generation for the first time in 2016. China and India, respectively the world's first and third largest polluters, have been investing heavily in green energy at home. China is planning to spend £292bn on its domestic green energy market in the next three years and India's Central Electricity Authority announced earlier this year that no new coal-fired power stations will be built over the coming decade beyond those already in the pipeline.

The energy infrastructure market hints at the same direction of travel. Once again, where the US appears to be pulling back, China is stepping forward. Not only has it boosted spending on clean power at home, it's invested \$165.4bn in energy infrastructure across emerging markets since 2000. And the focus of that money, while fossil fuels still dominate, may be starting to shift to cleaner sources like nuclear, hydropower and renewables. China outspent any other country in the world on overseas investments in green technology in 2016.

So for institutional investors with long term horizons, the debate isn't whether there'll be a transition to a lower carbon economy, just how quickly it occurs.

In the UK, pension fund trustees have spent some time questioning whether climate aware investment approaches are within the bounds of their fiduciary duty to members. Now these strategies are becoming an investment imperative. Short term policy shifts may well have short term impacts. But for workers saving into pensions for the next forty to fifty years, the long term global transition to a low carbon economy is a more significant trend.

For NEST and other large institutional investors, that long term picture is guiding our thinking. The smart money is being used to signal to businesses that a profound economic change in the way power is generated is happening. This is not about divestment. It's not in our members' interests for companies to make losses or become unprofitable. But we do need to plan ahead and prepare their portfolios for the evident investment risks and opportunities that climate change and the transition to low carbon represent.

That's why we've spent the last year working with UBS Asset Management to find a scalable, cost-effective way to invest more in those companies that are well-positioned for the low carbon future, invest less in those that aren't and engage with companies to encourage progress. Together we launched the UBS Life Climate Aware World Equity fund earlier this year, which now makes up a key building block in NEST's default strategy, serving millions of NEST savers. As responsible long term investors on behalf of our members, we can't afford to ignore climate change risks and we've committed to being part of the solution. We believe the opportunities for our members of doing so are clear.

Why sustainable investing is a game-changer for all investors

By Michael Baldinger, Head of Sustainable and Impact Investing at UBS Asset Management



Of all the reasons investors might want to develop a sustainable portfolio, the one most often overlooked, but in my opinion the most compelling, is that it makes for a well-balanced investment strategy. Incorporating sustainability metrics is no longer just a nice-to-have, or something to help you sleep at night. It's sound investment sense.

Sustainable investing is one of the fastest growing segments in finance, with assets under management increasing by 61% from 2012 to 2014 to USD 21.4 trn, according to the Global Sustainable Investment Alliance. No matter who you work for in the investment industry. I joined UBS Asset Management as head of sustainable and impact investing from a prior role as CEO of RobecoSAM - senior executives can no longer ignore clients' interest in sustainability factors or their effect on performance.

"No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be"

Isaac Asimov

All sustainability factors must be integrated when researching investment assets to get a full picture of their risks and benefits. Does a company understand what the risks are in a supply chain, or with respect to climate change, and how to manage them? I could never imagine investing my own money without understanding what the risks and future revenue drivers of a company are. Nowadays that must include environmental, social and governance, or ESG, criteria. An analysis without answering these questions is not complete.

Making accurate and reliable investment decisions based on sustainability criteria has improved dramatically in recent years. This is largely thanks to greater disclosure of sustainable investing factors in company reporting, as reporting requirements evolve, and companies themselves recognise the value placed by investors on transparency of ESG issues.

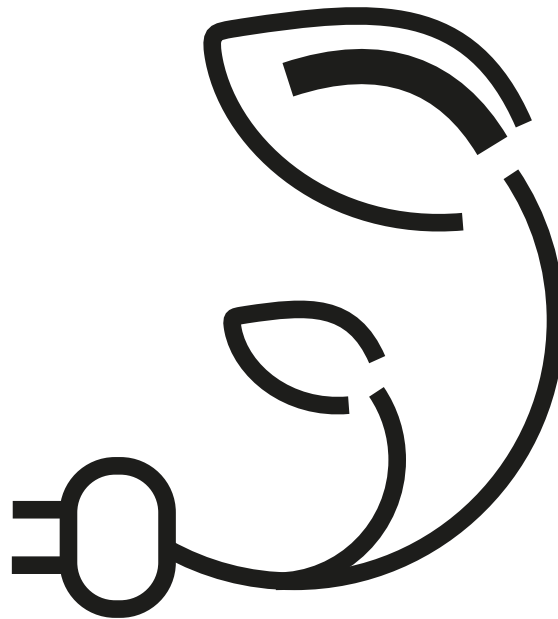
The team at UBS Quantitative Research has examined a number of recent studies to determine whether ESG investment bias in portfolios produces better returns. They found that while it is sometimes statistically insignificant, investment strategies that screen for ESG criteria on average outperform those that do not.

Sustainable investing will also be a major driver for innovation in finance. For instance, by measuring the exact environmental and social impact of holdings in which we and our clients invest, we can create transparency in our clients' portfolios and optimize them according to their impact preferences, with pretty much the same projected risks and returns. This is a real game changer and empowers our clients to act on their sustainability interests.

"Sustainable investing will be a major driver for innovation in finance"

Overall, ESG integration is a natural progression in the investment research process. It not only gives us a better understanding of the inner workings of a company or an industry and how environmental or other sustainability factors may impact it. It is also about doing better research that incorporates long-term extra financial factors that allows professional investors to make better informed decisions for their clients.

UBS AM Sustainable and Impact Investment Strategy



UBS Asset Management has extensive experience in sustainable investing and has managed Sustainable funds for well over two decades. We have increased our focus on sustainable investing solutions in response to growing demand from institutional clients. UBS Group recently committed to 'mainstreaming' sustainability by integrating ESG considerations into core investment processes throughout the firm. In UBS Asset Management, we are working on integrating sustainability considerations into the research used in our active investment strategies and dedicating resources to providing customized sustainable investment solutions.

UBS Asset Management has increasingly focused on partnering with institutional clients to meet both their sustainability and financial goals. Below are two recent examples of collaborations that have led to innovative sustainable investment solutions.

Both of these recent collaborations point to the importance of working directly with larger institutional investors to meet their combined financial and sustainability objectives. They also demonstrate how such collaborations can serve as an important basis for innovation. Innovative partnerships such as these will be essential in driving the assets of larger institutional investors into sustainable investment strategies over the next few years.

Collaboration with large European pension fund: Impact measurement for public equities.

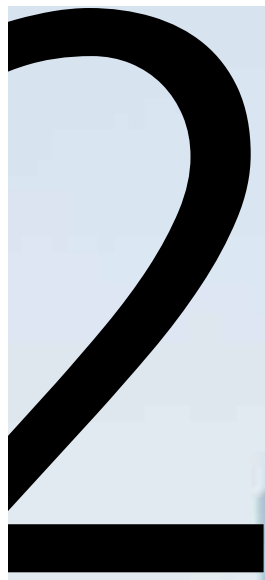
The large European pension fund needed to develop better disclosure to its beneficiaries on the social and environmental impacts of its global impact equity portfolio. Recognizing that such metrics go beyond traditional ESG data provided by traditional sustainability research providers, the client needed an asset manager capable of measuring the external environmental and social impact of companies' products and services. At the same time, they required an asset manager with global research and portfolio management capabilities that could deliver competitive active returns on its diverse portfolio of companies.

UBS was able to meet the client's objectives by establishing a research partnership with Harvard University's School of Public Health and the City University in New York to develop a proprietary set of impact measurement metrics. UBS can simultaneously leverage the financial research of its global network of financial analysts to deliver strong financial performance while engaging with companies directly to obtain greater insight into impact measurement. The metrics developed as part of the mandate will be the first of its kind and can help provide a basis for allowing other institutional investors to apply impact investment principles to various areas of their actively managed portfolios.

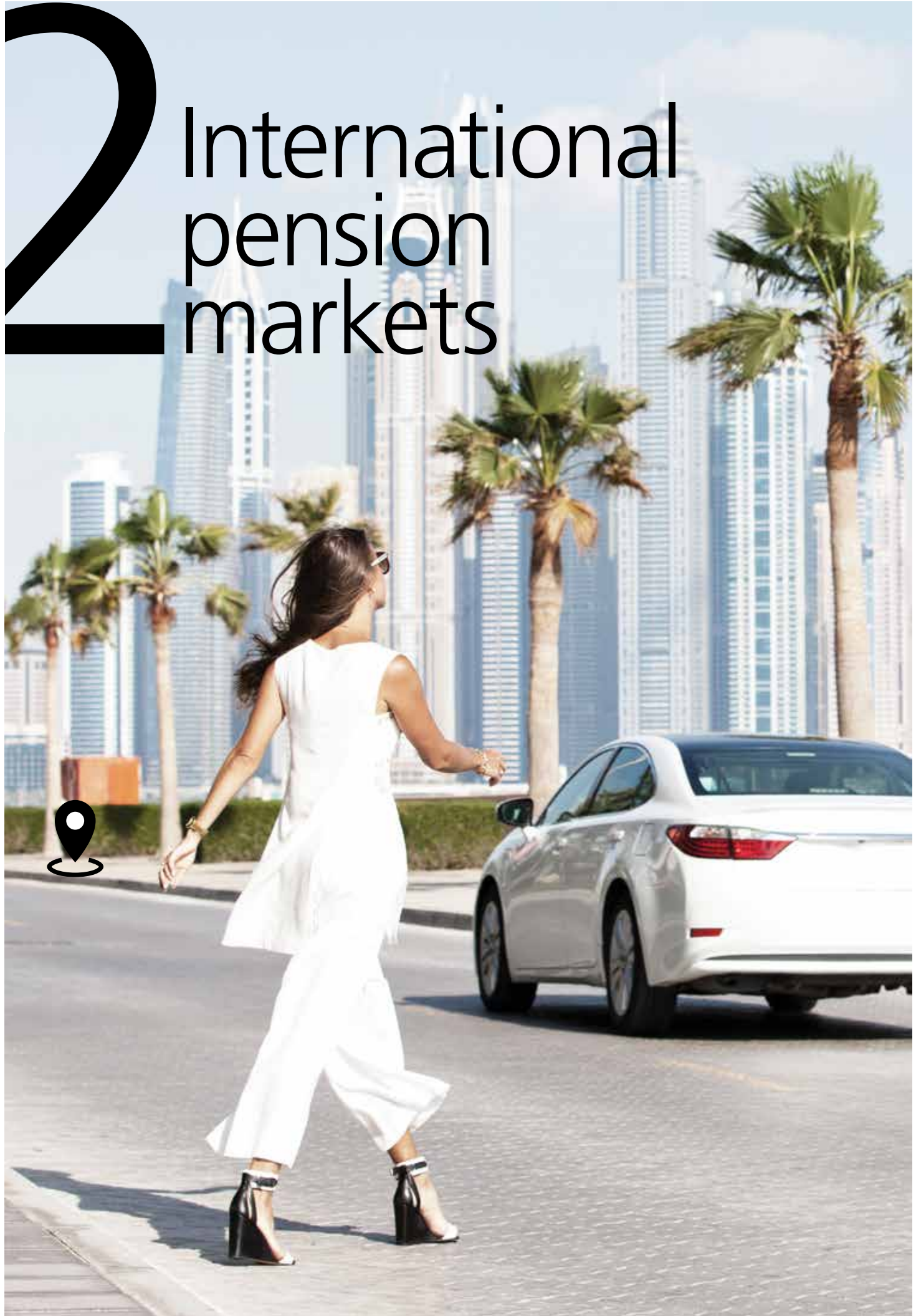
Collaboration between UBS and the NEST Pension fund: The Climate Aware Strategy

NEST, a major UK pension fund, faced the challenge of managing climate change risks in the passive portion of its equity portfolios. The fund needed to account for climate risks in its passive strategies while maintaining relatively strict limits on tracking error to the FTSE Developed World Index benchmark. It was important not only to limit exposure to current CO₂ emissions but also to manage future risks in order to ensure that the portfolio was aligned with the Paris climate summit's two degree scenario and carbon reduction targets.

By combining environmental data from several sources, UBS Asset Management developed a portfolio optimization model which reduces exposure to climate risk while simultaneously maintaining the restrictions on tracking error. Rather than simply reducing exposure to companies with higher CO₂ emissions, UBS AM's team examined the trajectory of emissions reduction over time, as well as company management commitment to emissions reduction, to orient the portfolio toward companies that are better prepared for a low carbon future and the two degree reduction scenario. Moreover, the strategy reduces the exposure to, rather than excluding, companies with higher carbon risk in order to pursue strategic engagement with these companies. UBS AM's engagement team explains the climate risks that have been identified from the research and provides concrete suggestions to these higher risk companies in order that they can learn and make improvements in their performance over time.



International pension markets



The need for a global view

Providing for income in retirement would seem to be essentially the same task in any country. Yet, in practice, it is a complex and challenging process. While some common threads exist, the variety of approaches around the world remains surprising.

The purpose of this chapter is to provide an overview of seven diversified and leading pension markets: Australia, Denmark, Japan, the Netherlands, Switzerland, the UK and the US.

Populations are ageing

It is an accepted fact that, in the developed world, populations are ageing. Sometimes referred to as the 'demographic time bomb', the rate of ageing varies from country to country.

Figure 2.1 shows the historic and predicted progression of the old age dependency ratio in our selected group of countries. The ratio is an important indicator, measuring how many people there are of the working population relative to the number at retirement age.

The key implication of increasing dependency ratios is that state pension systems that operate on a pay-as-you-go (PAYG) basis become less viable. Under PAYG systems, today's pensions are paid out of today's revenues. In simple terms, if the working population declines relative to the number of pensioners, there will be less revenue from taxes, yet an increasing bill for pensions.

Recent reforms have attempted to address this issue in many countries, with many PAYG systems being decommissioned or amended (i.e. by increasing the retirement age). Individuals are being increasingly encouraged to hold a private pension to reduce the reliance on the state pension.

Compulsion to save

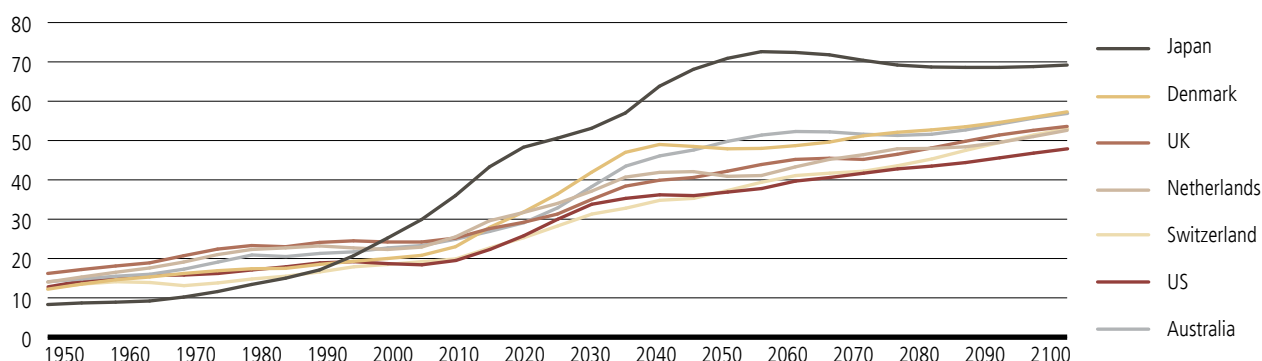
As part of the shift towards individuals saving for retirement, a government policy consideration is whether to make personal contribution mandatory — that is to compel those who are able to save for their retirement to do so. Compulsion can be viewed as an additional tax and is often unpopular with electorates. Australia introduced compulsion in 1992 and its positive effect on Australia's total pension assets is clear; assets totalled AUD 150 billion in 1992 and now stand at AUD 2.3 trillion¹ (as at 31 March 2017). The Australian experience has demonstrated that compulsion has some benefits but is not without its drawbacks. Integration of pensions policy and state benefits policy has emerged as a key issue, with pensions effectively privatised.

A further lesson which can be learnt from Australia's experience of compulsion is putting a system in place to allow for pension consolidation as employees move between jobs. At its peak, Australia had 30 million pension accounts, despite having a workforce of only 11.5 million — 12 million of which, 8 million to 9 million were declared as lost accounts². Although reforms have since been put in place to rectify this, it is something to be aware of for markets considering introducing mandatory pension policies.

¹ Australian Prudential Regulatory Authority (APFRA) Quarterly Superannuation Statistics and historical data

² FT, "Pensions – the Australian lesson" as at 24 February 2014

Figure 2.1 Old age dependency ratio, actual and forecast, 1950-2100



Source: United Nations. World Population Prospects: The 2015 Revision. Old age dependency ratio is the ratio of the population aged 65 years or over to the population aged 15 – 64, expressed as a percentage. The ratio is derived using a medium fertility variant.

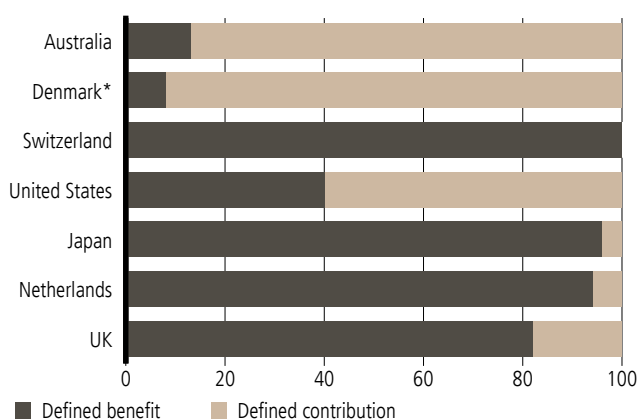
Switzerland introduced compulsion in 1985 through legislation requiring employers to provide schemes for their employees. However, the mandatory level of contribution only provides for a minimum level of benefits. In the UK, the government introduced automatic enrolment into workplace pensions in October 2012, with full roll-out of the programme expected to be completed by 2018. UK law requires employers to provide their workers with access to a qualifying pension scheme. Although workers can opt out, given the automatic nature of enrolment, it is hoped that only a minority of people will actively seek to leave a scheme.

The shift of DB to DC?

In traditional defined benefit (DB) schemes, sponsoring employers guarantee a fixed amount of benefits to plan members, whereas with defined contribution (DC) schemes, the plan member bears the investment risk, with the level of retirement income not guaranteed. There is a clear global trend showing the switch from DB to DC arrangements in funded schemes. Among occupational pension schemes, the major factors in this trend are scheme sponsors' desire for greater certainty over their contributions and the introduction of accounting standards that make the position of DB pension schemes clearly visible on corporate sponsors' balance sheets.

Figure 2.2 shows the relative split between DB and DC pension fund assets for the seven markets covered in this chapter. Interestingly, DB schemes only account for a very small part of the Australian and Danish pension markets, noticeably less than the other countries mentioned. DB funds currently dominate in Switzerland, Japan and the Netherlands and the UK.

Figure 2.2 Relative shares of DB and DC pension fund assets (%)



Source: Towers Watson's Global Pension Assets Study 2017

However, it is important to note that in Switzerland, the government sets contribution rates, minimum rates of return and the annuity rate at which the accumulation is converted into a pension for mandatory occupational plans. These schemes are therefore categorised by the OECD as DB even though they may not operate in the same way as a traditional DB scheme.

Pension structures

Broadly speaking, most countries have a 'three pillar' approach to providing retirement income: a state pension system, a range of occupational schemes provided by employers and products that allow individuals to contribute to their own personal pension.

Australia

Australia has the following pension arrangements:

- The Age Pension — a means-tested, non-contributory basic state pension. Current state pension age is 65 for both men and women, rising to 67 by 2023.
- The Superannuation Guarantee — funded by compulsory employer contributions, currently set at 9.5%.
- Superannuation — will usually be directed to either industry, corporate, retail or a self-managed super fund and is compulsory. Employees can voluntarily top-up (but only up to a certain level before higher tax penalties may be applied).

Australia was an early mover in terms of introducing compulsory work pension schemes, back in 1992, under the Superannuation Guarantee Scheme. Since the "Super Choice" laws of 2006, employees may place their superannuation in the fund of their choice instead of the employer's choice, which is the default. This has led to strong competition and also to a wave of mergers between the industry funds. Almost all industry funds and top-up superannuations operate on a DC basis; thus new entrants to DB schemes are almost non-existent, while legacy beneficiaries remain. As part of the Stronger Super reforms announced in 2011, from 1 January 2014, employers must pay into a super fund that offers MySuper if an employee has not chosen a super fund. A MySuper account is supposed to lower fees, simplify features and offer a single diversified or lifecycle investment option.

Denmark

Denmark has the following pension arrangements:

- Old-age pension scheme with basic age-related payments, non-contributory. This is supported by a means-tested supplementary pension benefit. State pension age is currently 65. This will gradually increase to 67 during the period 2019 — 2022.
- Statutory DC pension schemes — supplemental pension insurance schemes which are regulated by Danish law and administered by the ATP (the Danish Labour Market Supplementary Pension). Contributions are shared between employee and employer.

2. International pension markets

- Compulsory occupational pension schemes — typically fully-funded DC schemes based on collective agreements stipulated by social partners. Coverage of these schemes is almost universal.
- Private pensions — voluntary, supplementary pension schemes typically managed by banks or insurance companies.

Denmark is considered to have one of the best pension structures in the world. In fact, in the latest Melbourne Mercer Global Pension Index (2016), it came out on top for the fifth consecutive year and is one of two countries (out of 25 studied) to achieve an “A” rating. Mercer notes that Denmark has a “first-class and robust retirement income system” which “is sustainable and has a high level of integrity”.

Japan

The Japanese pension system can be summarised as follows:

- Basic, flat-rate pension (National Pension) — paid from the age of 65 with a minimum of 25 years’ contributions
- Earnings-related pension (Employees’ Pension Insurance) — paid from the age of 65 on top of the basic pension provided by the National Pension System
- Voluntary supplementary pension plans — typically corporate DB and DC schemes (formerly Employee Pension Funds and Tax-Qualified Pension Plans)

Conscious of its particularly pressing demographic trends, Japan has been reforming its pension system. After a few years of discussions, DC pensions were formally introduced in Japan in 2001. However, recent research from Towers Watson (Global Pension Assets Study 2017) shows that DB schemes still saturate the market with 96% of pension schemes being DB.

Netherlands

The pension system in the Netherlands consists of the following:

- The General Old Age Act or Algemene Ouderdomswet (AOW) — basic state pension system, financed on a pay-as-you-go basis. Current state pension age is 65, increasing to 67 by 2021.
- Occupational pension plans (often CDC schemes) — industry-wide pension schemes, company schemes and insurance contracts. Although there is no statutory obligation for employers to offer a pension scheme, industrial relations agreements mean that 91% of employees are covered⁴.
- Individual savings schemes.

The Dutch pension system has gained increased interest in recent years, particularly in the UK as part of the UK government’s pension review looked to the Netherlands for a potential solution to the current issues it faces. In particular, the CDC schemes which operate in the Netherlands have gained the UK’s interest as a way of sharing risks amongst members. However, like most countries, following the recent financial crisis, the Dutch have experienced increasing pressures on its own system with a new pensions contract in place for 2015.

Switzerland

The Swiss pension system consists of the following:

- Compulsory pay-as-you-go state pension insurance (AHV/IV). Current statutory retirement age is 65 for men and 64 for women, with plans to bring both ages in line by 2020
- A highly-funded occupational system — compulsory for all employees whose annual income exceeds a minimum level
- Voluntary individual retirement savings, which have favourable tax treatment

The Swiss occupational market is highly regulated in terms of investment constraints and regulatory benchmarks

Legislation requires that pension funds return a minimum percentage on the statutory minimum level of contributions. The current minimum interest rate, set by the Federal Council, was reduced from 1.25% in 2016 to 1% in 2017.

UK

More details of the UK system can be found in Appendix A but the main types of pensions can be summarised as follows:

- State pension — a pay-as-you-go arrangement. Current pensions are paid from today’s revenues. The additional State Second Pension (S2P, formerly SERPS), provides an earnings-related pension for those employees who do not ‘contract-out’⁵. Changes to the current state pension structure are detailed in the Pensions Act 2014.
- Occupational pension schemes — funded arrangements provided by private companies and public sector employers. These may be funded on a DB or DC basis. They may be self-administered by the sponsoring entity or insurance companies. Nearly all DB schemes are self-administered. From October 2012, the government began to roll out automatic enrolment into workplace pension schemes, whereby employers must enrol eligible employees into a qualifying pension scheme.

⁴Source: Pensions at a Glance 2015: OECD and G20 Indicators

⁵From 6 April 2012, only members of final salary and career average schemes can opt to contract out.

- Personal pensions, including group personal pensions and stakeholder pensions.

The government introduced reforms to the state pension system under the Pensions Bill 2013 — 2014, which received Royal Assent on 14 May 2014, and became the Pensions Act 2014. These changes mean that from April 2016, the current basic State Pension and additional State Pension have been replaced with a single-tier pension that is set above the basic level of means-tested support.

In the March 2014 Budget, the government announced a fundamental change to pension legislation. Not only will this have a large impact on the GBP 13.3 billion annuities market⁶, but the pensions landscape as a whole is likely to be affected. It is perhaps too early to say how this will evolve, but it is interesting to look at the options available to retirees in other countries, which are detailed in a recent report from the Pensions Policy Institute (PPI). In Switzerland, despite there being no compulsion to buy an annuity, take-up is high at 80%, with financial prudence being noted as the primary reason for this. In Denmark, the provision of an annuity is mandatory for those saving in an ATP pension, thus annuitisation levels are relatively high. Annuity demand is significantly weaker in the US and Australia.

US

The US main pension arrangements are:

- Social security — the fundamental level of government-sponsored retirement income, as part of the Old-Age, Survivors and Disability Insurance Program. Pension benefits have a progressive benefit formula based on lifetime earnings. There is also a means-tested top-up benefit for low-income pensioners. The average retirement age is currently 66 for both men and women.
- Voluntary occupational pensions offered by private and public sector employers. These can be DB or DC plans (including 401(k)).
- Voluntary Individual Retirement Account (IRA) programme: IRAs are a type of tax-advantaged savings account for retirement and other purposes.

The pension market in the US originated in 1920 when pensions for federal employees were authorised. The US pension market is the largest and most established in the world.

The Pension Protection Act (PPA) of 2006 was the most sweeping reform of the US pension system in more than 30 years. In a nutshell, and among many other provisions, the PPA speeds up the time over which companies must amortise deficits to

their DB schemes, requires at-risk schemes to make additional contributions and encourages scheme sponsors to enrol their workforce automatically in 401(k) plans. Since the introduction of 401(k) plans, DC schemes have grown in popularity and, according to a recent study done in 2017, now represent a greater proportion of the market than DB schemes, at 60%⁷.

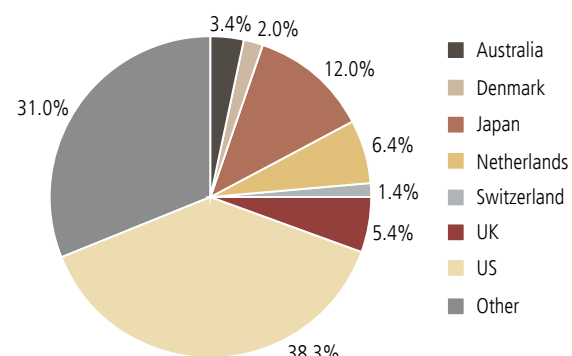
Pension assets

Data from the OECD (Pension Markets in Focus 2016) shows that pension assets reached USD 38 trillion at the end of 2015. Pension funds have established their growing prominence in the institutional space, with market share reaching 68% in terms of total assets held by institutional investors. Other categories included by the OECD are investment funds and insurance companies, holding 20% and 11% of assets respectively.

The amount of private pension assets invested differs considerably between countries. The largest values of invested assets can be found in North America (United States, Canada), Western Europe (United Kingdom, Netherlands, Switzerland), Australia and Japan. Pension fund investments have been increasing over the last 10 years. This growth in investments is partly explained by the positive real investment rates of return pension funds have been experiencing over the period.

As touched on previously, the distribution of pension assets is far from uniform, with the US holding a large majority. The Towers Watson 300 survey of the world's top 300 pension schemes shows total assets for this group at USD 14.8 trillion at end 2015 (latest data available). *Figure 2.3* shows a breakdown by country of these assets. The eight key pension markets we focus on account for 70% of the total assets covered by this survey.

Figure 2.3 Assets of world top 300 pension schemes by country



Source: Willis Towers Watson, survey data to end 2015, published September 2016. Latest data available.

⁶IPE, "UK announces secondary annuity market for 2017", 15 December 2015.

⁷Towers Watson, Global Pension Assets Study 2017.

Adequacy of pension assets

A basic assessment of the adequacy of accumulated assets in each country can be made by comparing them with economic output (GDP) and population. *Figure 2.4* summarises the relevant data for the seven countries highlighted in this chapter. There is no 'right' answer; the data merely gives some means of comparison between countries.

The value of pension assets as a proportion of GDP provides an indication of the scale of pension funds activity. Noticeably, in Denmark and Switzerland, pension funds play a large role in relation to their economy as a whole, with asset-to-GDP ratios of 215% and 153% respectively.

Pension fund investments

Funding provides the opportunity to invest pension assets with the aim of growing them further. In this context, the investment choices made by pension funds or their members can have a large influence on the overall funding position. *Figure 2.5* shows the development of the asset allocation of occupational schemes in our eight countries as they stand today and, by way of comparison, in 2001. Two particular aspects of asset allocation merit further attention: the split between equity and bond investment and the relative balance of domestic and international investment.

Equity/Bond investment

Figure 2.6 shows the split between equity and bond investment. Encouraged by the equity bull market of the 1990s, funds began to embrace equity investment in the late 1990s and early 2000s. As you would expect, most countries showed a shift away from equities and back towards bonds (and cash) from 2008 to 2009, partially because of the flight to safety but also due to the significant fall in the value of equity assets held.

This trend is still apparent in some markets today, with Denmark and the Netherlands showing high allocations to bonds. Denmark, in particular, allocates a large portion of its assets to bonds (62%) and a very small share to equities (17%). This demonstrates Denmark's prudent approach to pension management.

In Japan, where allocations to bonds totalled 40% in 2016, it is expected that pension funds' exposure to bonds will face downward pressure over the coming years, as Japan's government encourages a move to equities / riskier instruments in an attempt to pull Japan out of its period of deflation⁸.

Domestic/International investment

Figure 2.7 shows the relative balance of domestic and international investment. It's not surprising that international investment by pension funds has generally increased over time. Academic research suggests that international investment can produce superior investment performance in terms of risk and return. General recognition of the diversification benefits of international investing is evidenced by a tendency for governments and regulators to remove, or at least relax, any remaining restrictions on investing outside of home markets.

In the US and the UK equity allocations dominate, yet it is interesting to note the UK's significant reduction in equity exposure in recent times. This is the result of a number of factors, including the above-mentioned underperformance of equities during 2008-2009, changes to accounting standards, more stringent regulation and increased longevity which have driven many schemes to de-risk.

However, a recent report from Mercer (2015 European Asset Allocation Survey) suggests there is little evidence of the 'great rotation' from bonds to equities — instead, investor allocation has shifted towards alternatives.

Figure 2.4 Funding levels compared

Country	Total pension assets (USD billion)	GDP (USD billion)	Total pension assets as % of GDP	Population (millions)	Total pension assets per capita (USD)	Old-age dependency ratio (%) 2010	Old-age dependency ratio 2100 (% projected)
Australia	1,583	1,184	134%	24	65,958	22.7	53.0
Denmark	599	278	215%	6	99,833	29.6	52.7
Japan	2,808	5,287	53%	127	22,110	43.3	69.1
Netherlands	1,296	871	149%	17	76,235	27.9	57.3
Switzerland	817	533	153%	8	102,125	26.9	57.0
United Kingdom	2,868	2,813	102%	65	44,123	27.6	53.5
United States of America	22,480	18,569	121%	321	70,031	22.3	47.9

Source: GDP: OECD (2016), except Denmark (2015). Old-age dependency ratio: ratio of population aged 65+ per 100 population 15-64: UN World Population Prospects (2015). Population: World Bank (2015). Total Pension assets (2016): Towers Watson Global Pension Assets Study, except Denmark: OECD (2015).

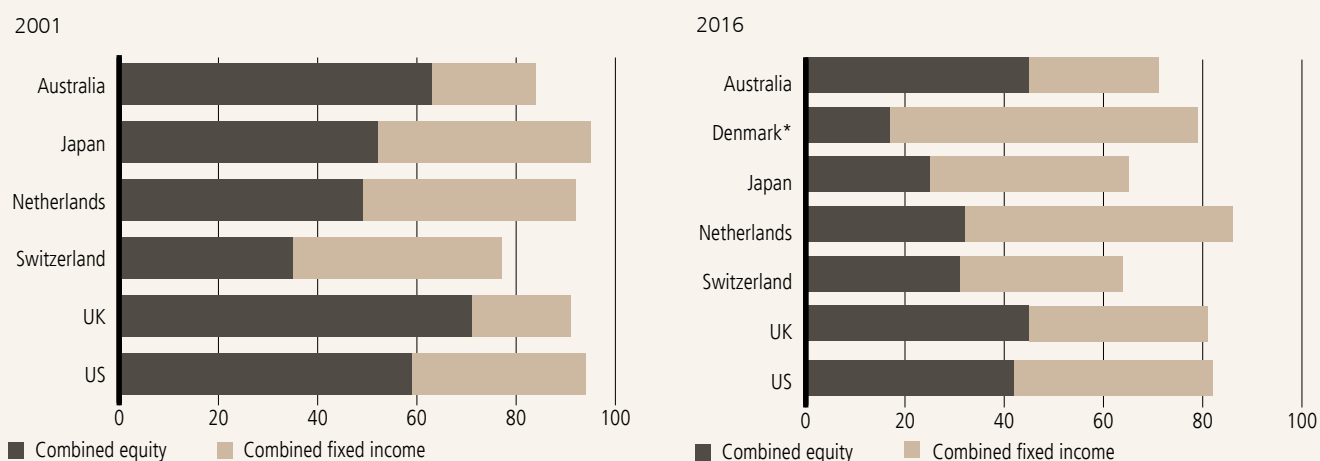
⁸ Towers Watson, Global Pension Assets Study 2015/9 FT, "Foreign fund houses compete for \$170bn of Chilean retirement money", 13 April 2014.

Figure 2.5 Asset allocation – key pension markets

Country		Domestic equities	International equities	Domestic bonds	International bonds	Cash	Real estate	Other
Australia	2001	38	25	16	5	5	9	2
	2016	21	24	19	7	10	9	10
Denmark	2001							
	2016		17		62	0	1	20
Japan	2001	34	18	33	10	2		3
	2016	12	13	26	14	7		28
Netherlands*	2001	9	40	17	26	2	6	0
	2016		32		54			14
Switzerland**	2001	19	16	27	15	8	12	3
	2016	13	18	22	11	5	23	9
UK**	2001	46	25	17	3	2	6	1
	2016	16	29	31	5	2	8	9
US	2001	47	12	34	1	1	2	3
	2016	28	14	39	1	2	2	14

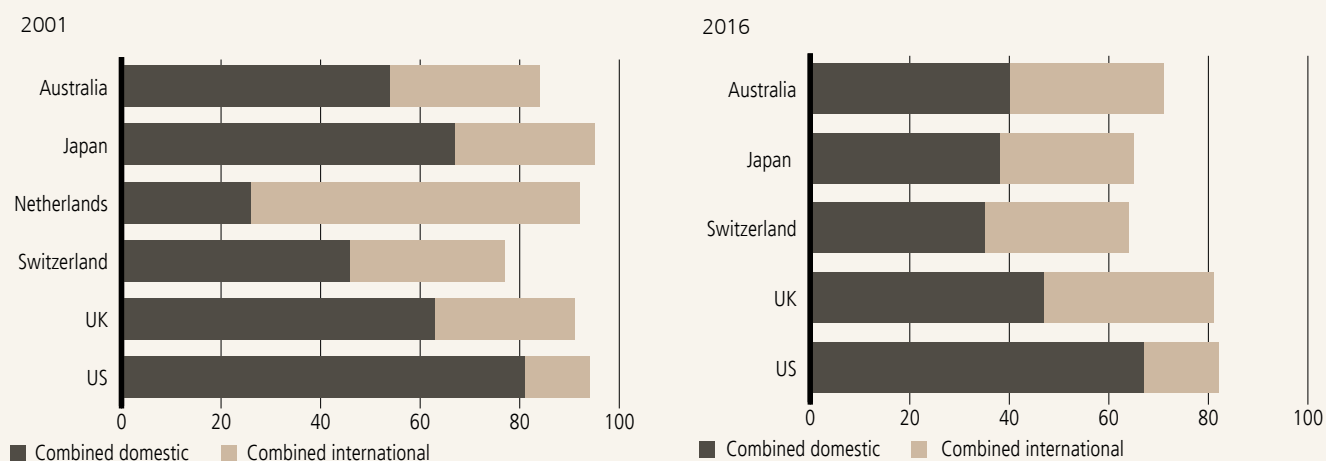
Source: Australia: Rainmaker (31 December 2016). Denmark: OECD Pension Markets in Focus 2016). Japan: Pension Fund Association (at 31 March 2016). Netherlands: Towers Watson Global Pension Assets Study 2017 (at 31 December 2016). Switzerland: Pensionskassenstatistik Swisscanto Study 2017. UK: WM (at 31 March 2016). US: Callan Associates (at 31 December 2016). Rounding may occur.

Figure 2.6 Trends in equity/bond investment



Source: As per Figure 2.5. ¹ Latest data available is 2016

Figure 2.7 Trends in domestic/international investment



Source: As per Figure 2.5

Australia's allocation to equities is almost twice that of bonds, with 45% of assets allocated to equities compared to only 26% for bonds. In fact, Australia has the lowest bond exposure out of all the other markets, demonstrating its appetite for riskier assets. However, its relatively high allocation to cash should also be highlighted here, which provides a source of liquidity in a market offering fund choice and is possibly a result of the asset allocation of self-managed superfunds.

In Switzerland, allocations to fixed income have decreased over time, from 42% of assets in 2001 to 33% in 2016. However, pension funds have reallocated this mostly to real estate and alternatives, rather than to equities.

It is worth noting that although equities and bonds remain the most dominant asset classes in which pension funds invest, allocations to alternatives continue to increase and is a trend we would expect to continue as pension funds look to diversify their investments. Out of all the markets covered in our analysis, Denmark allocates the highest proportion to alternatives, with 21% of the total assets invested in 2015.

The US invests the majority of assets domestically, with domestic investment at 67%, due to the great scale of their capital markets.

Conclusion

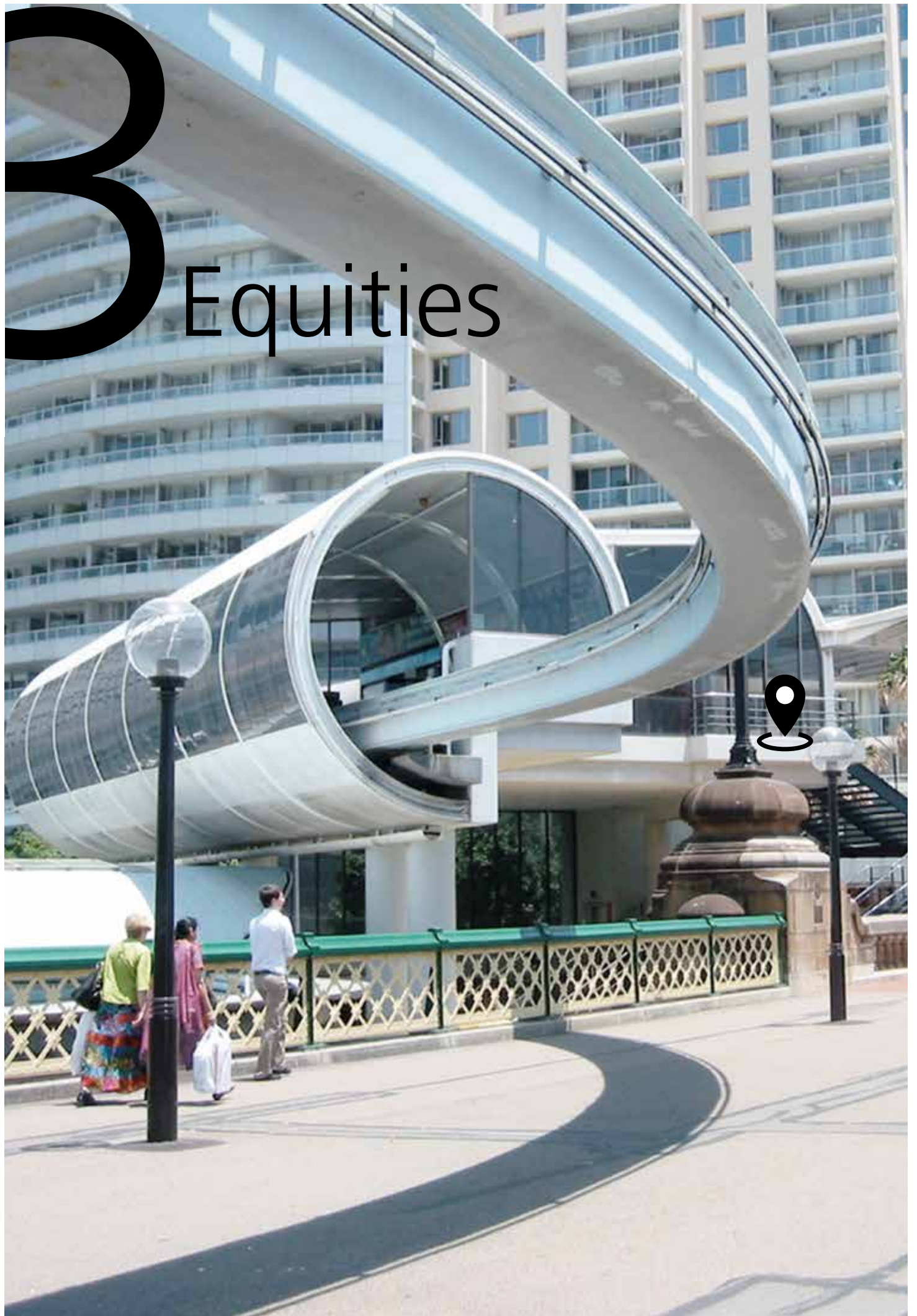
The analysis presented here allows for some basic comparisons to be made among seven diversified pension markets. There are some common strengths and some common issues to a varying degree for each country.

Two markets commonly recognised as having superior pension systems are Denmark and the Netherlands where, despite the crisis, five-year average real net returns are above 5%.¹⁰

However, reforms continue to be proposed in these countries demonstrating that there is still scope for improvement and that no perfect model exists.

The challenge of improving private pension provisions remains a pertinent one with the task of shifting risk and responsibility to individuals continuing to test policymakers across the world.

¹⁰ OECD, Pension Markets in Focus 2016



3 Equities

Introduction

The past year has been highly volatile with many geopolitical events impacting market sentiment towards equities. Despite those concerns, the bull market, which started in March 2009, continued to move ahead, helped by low bond yields, loose monetary policy and an increasing swing of many governments towards a more pro-growth and pro-reflationary stance.

The earnings cycle has flattened over the past year or two after a particularly strong earnings cycle in the US. Weak commodity prices have caused a collapse in earnings of energy and materials stocks, which in turn impacted the overall level of market earnings. A recovery in 2017 — in turn influencing overall inflation — may bode well for a better earnings environment.

The UK equity market experienced a significant setback around the time of the Brexit referendum, with domestic stocks falling substantially. However, due to the fact that over 75% of UK company earnings come from overseas, the decline in sterling was in fact a net positive for the majority of companies. Since then, the stock market has rallied and has achieved new highs.

Equities typically offer superior returns to bonds and cash as well as play a crucial role in enabling pension funds to pay affordable benefits over time. However, pension fund investors should not forget they are 'risk' assets, and can be prone to substantial setbacks, or drawdown periods. Such periods, as seen during the global financial crisis, for example, can present excellent buying opportunities to increase further long-term returns.

Equity characteristics

What is an equity?

An equity is a share in a company. The company is owned by the shareholders. They have the right to the income and capital of the company's business after it has satisfied its obligations to creditors. Shareholders usually have voting rights allowing them to influence the management of the company.

Practically all companies enjoy limited liability. Should a company become insolvent, shareholders are not liable to creditors for any payments beyond their previous subscriptions of capital. Shareholders, therefore, have the benefit of potentially unlimited gains from their investment combined with limited losses. This compensates them for the higher risks inherent in equity investment arising from the fact that shareholders rank last behind other creditors in their claims on the company's assets.

Most larger companies have their shares listed on one or more stock exchanges — in other words they are 'publicly quoted'. The use of an exchange facilitates the buying and selling of shares and usually makes it easier for the company to raise new equity capital. As almost all trading and settlement of shares is now done electronically, stock exchanges have been able to compete with each other and other new trading systems.

While most large companies remain publicly quoted, the private equity industry has grown significantly over the past decade, with global fundraising for private equity totaling USD 527 billion in 2015. This sounds like a large figure, and has certainly grown over the years, but in reality is only around three quarters the size of Apple's market value.

Private ownership may improve management incentivisation and control, and offers greater flexibility in the use of tax-advantaged debt finance.

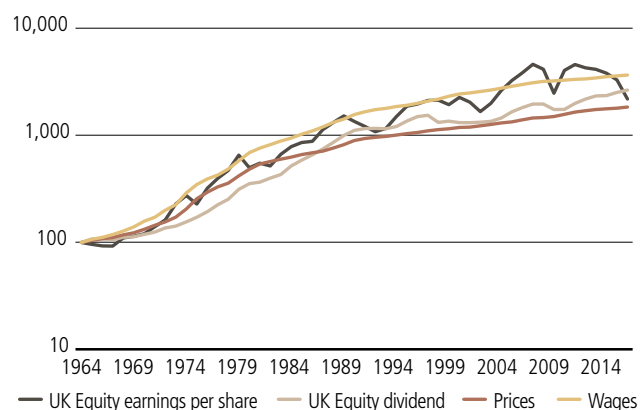
As will be seen in Chapter 7, private equity is generally associated with providing better returns than publicly-listed securities, which is needed to compensate investors for the relative lack of liquidity and higher risk associated with such investments.

Uncertain long-term returns

Shareholders participate directly in the profits of the companies they own. Profits fluctuate from year to year and are subject to increasing uncertainty as projections are made further into the future. Equities usually offer a higher return than bonds to compensate for this greater uncertainty.

Long-term capital appreciation of equities is strongly related to growth in corporate earnings and dividends. *Figure 3.1* shows how, in the UK, earnings and dividends have grown at about the same rate as wages and prices, as a whole, over the long-term. However, progress has not always been smooth and there have been some periods when real earnings and dividends have declined.

Figure 3.1 Growth in UK equity earnings, dividends, wages and prices



Source: Thomson Reuters Datastream, rebased wealth series. Data as at 31 December 2016.

For example, over the past 10 years in the UK market, we have seen annual growth in company earnings range from -40% to +64%. Such fluctuations in earnings have been particularly extreme and have made forecasting difficult. When it comes to predicting stock market returns, there is the additional complication that the market's capitalisation rate for earnings (the price-earnings or P/E ratio) also fluctuates (see *Figure 3.6* in this chapter). Despite the difficulties, long-term projections of equity returns are necessary, particularly for calculating the funding requirements of defined benefit pension schemes. There are several possible methods, discussed below.

One rough method is simply to project long-term historic returns into the future. Depending on the historic period chosen, this typically gives a return of around 6% to 7% p.a., in real terms, for developed equity markets.

Is this historic trend return realistic for the future? One way to assess this is to combine the current income yield on global developed equities with the potential future growth in dividends. This, in turn, is linked to the rate of economic

growth. The world economy is returning to 'trend' growth after the setback of recent crises, and in the long-term, it is likely that global GDP growth will be between 3% to 4% p.a. in real terms, with emerging economies delivering higher than average growth and developed markets rather less. In practice, dividend growth usually lags economic growth by between 1% and 2% p.a., so it is probably fair to assume real dividend growth in the long-term will be between 2% and 3% p.a. Combining the 2.4% yield on global equities¹ with the long-term real dividend growth rate suggested above, it is perhaps not unreasonable to expect a long-term prospective real return from equities to be between 5% and 6% p.a. — broadly in line with the historic long-term trend.

An alternative approach is to look at the return on equity, or ROE. This is a company's accounting profit divided by the net asset value. In the UK, for example, this has averaged about 11% p.a.², over the long-term.

Historically, companies have retained approximately half their profits to finance future growth. If companies continue to generate similar returns and apply similar retention policies, a nominal growth rate of about 5.5% p.a. would be sustainable in the long-term. If we assume long-term inflation in the UK of around 2% p.a. — the Bank of England's formal target — this would imply that real growth would be about 3.5% p.a. With a starting yield for equities in the UK of around 3.5%, this implies a long-term real return of about 7% p.a.

The final methodology we highlight to estimate prospective returns is that of equity risk premia. The theory is that the extra return derived from a risky asset, such as equities, should reflect the volatility it displays relative to a lower risk asset, such as cash.

Estimating future volatility and risk premia is not a precise science but most academic estimates suggest the risk premia for equities (relative to bonds) should be between 2% and 4% p.a. in the long run. The main problem with this approach is that it assumes real yields on bonds are 'fair' at the outset, which is not always the case. Given the relatively low real yields for 10-year index-linked bonds in the UK — which are now actually negative at -2.0%, and an equity risk premium of 5.0% — this would imply a real return of only 3.0% p.a. This is notably lower than other methods, particularly when considering the effects of compounding over time. However, we believe that real yields for sovereign bonds are at artificially low levels. Using a long-term real yield of 2% to 2.5%, added to the equity risk premium, this method would suggest a return for equities of around 7% p.a.

¹ Source: Bloomberg, as at 31 March 2017

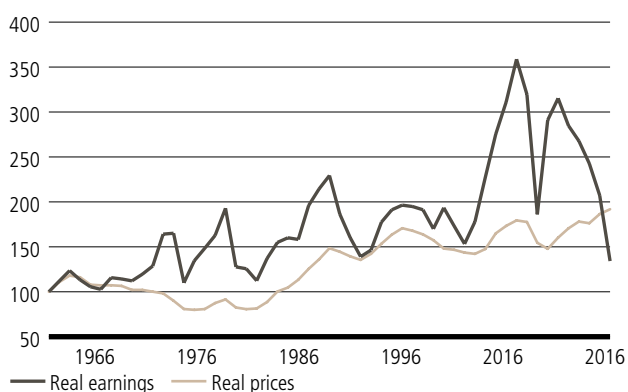
² Source: Thomson Reuters Datastream, as at 31 March 2017

The conclusion that can be drawn from these various approaches is that it is reasonable to expect a long-term real return from equities of about 5% to 7% p.a., broadly consistent with the historical long-term trend. Ultimately, however, this is not a surprising result since most of the methods described above derive their future expectations for economic growth, return on capital or risk premia from observations in the past.

In addition to the difficulties involved in making simple arithmetics-based return projections against a background of stable economic growth, the vulnerability of equity values to economic disruption, such as recessions, nationalisation and wars, needs to be considered. This factor is hard to quantify and might sometimes be underestimated because equity markets that have completely collapsed in earlier periods, such as the German market before World War II, tend to be dropped from historic return series.

Figure 3.2 shows how UK real earnings and dividends have not shown a smooth progression but have tended to come under pressure during recessions and periods of rising inflation. However, significant changes in the composition of the FTSE All-Share Index over time make it difficult to be precise about earnings and dividend trends. For example, the relevance of comparing a UK stock market of 100 years ago, dominated by railways and textile companies, to one today, where the biggest sectors are financials and oil and gas, is questionable. Indeed, today's UK market bears little relationship with the UK economy, with nearly three quarters of sales coming from overseas markets³.

Figure 3.2 UK real dividends and earnings



Source: Thomson Reuters Datastream, rebased wealth series.
Data as at 31 December 2016

Volatility

Individual equity prices are generally much more volatile than fixed income security prices because assessments of the value of future profits from a company change continually. Equity markets as a whole are less volatile than individual equities but are still subject to fluctuation as overall economic prospects change.

Volatility is a disadvantage to investors who need to realise assets at times that offer unfavourable values or who wish to cover fixed liabilities. Volatility can be advantageous if it allows purchases and sales at attractive prices, but patience is required to benefit from market fluctuations.

The difference between investing at the peak of the MSCI World market in July 2007 and the trough in March 2009, for example, would have significantly impacted returns, even over the long-term. Indeed, while asset allocators may be able to exploit such swings in markets, investors should be wary of the inherent difficulties in doing so.

By way of example, we look at data going back to 1969 for the UK equity market. Missing only the 100 best performing days out of the last 12,000 would have greatly impacted long-term performance, reducing the annualised return from 11.7% p.a. to a mere 2.1% p.a.⁴, a very meaningful difference when compounded over such a period. Interestingly, this data is highly symmetrical. Missing only the 100 worst performing days in the market over this same period would increase the return to 22.6% p.a.⁵

To put this latter scenario into context, an investment in 1969 of only GBP 100 would increase from a present value of GBP 16,656 to over GBP 1.2 million.

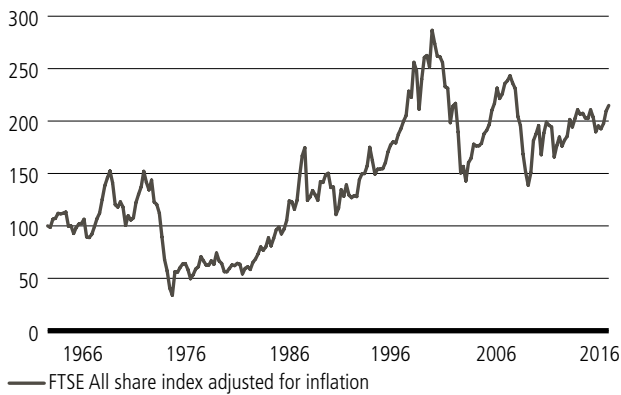
The volatility of the real value of UK equities, as shown in Figure 3.3, casts some doubt on the asset class' ability to match inflation-linked liabilities, especially in the short-term. Volatility can be measured; past volatility can be calculated from data on previous market price movements, while expected volatility can be calculated using option prices to derive the implied volatility that makes the option price 'fair'. These calculations tend to be complicated by the fact that volatility changes over time and sometimes spikes up dramatically during periods of market turmoil.

The most commonly-used measure of volatility is the Volatility Index (VIX), a measure of option-implied volatility of the US equity market. The VIX, also known as the 'fear gauge', provides a snapshot as to what extent the market is expected, at the time, to fluctuate on an annual basis.

³ Source: Citigroup. As at end February 2016..

^{4&5} Source: UBS Investment Bank. As at end February 2015..

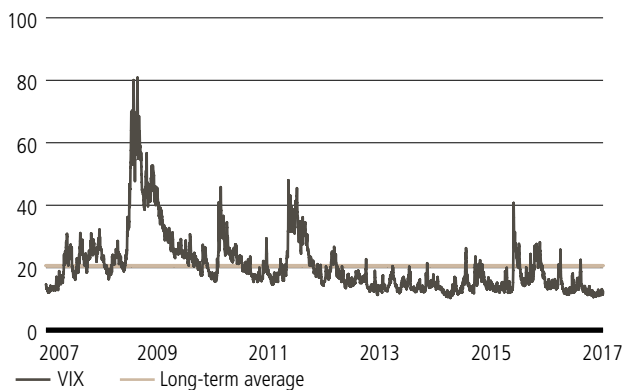
Figure 3.3 FTSE All-Share Index adjusted for inflation



Source: Thomson Reuters Datastream, rebased wealth series. Data as at 31 December 2016.

As can be seen in *Figure 3.4*, the VIX typically suggests that the equity market might move up or down by around 20% p.a. However, following the global financial crisis, we saw periods of heightened volatility, notably following the collapse of US bank Lehman Brothers in late 2008 (where the VIX reached an unprecedented 80%). Interestingly, markets experienced a decline in volatility starting in 2012. Indeed, the VIX's average over the past three years of 15.3% is well below its long-term history⁶. The key to this reduction is improved sentiment towards equities, largely due to supportive monetary policy across the world.

Figure 3.4 VIX implied Volatility Index



Source: Thomson Reuters Datastream, to March 2017.

Diversification

Volatility of returns may be mitigated by diversification; the spreading of investments within and across different equity markets or between equities and other asset classes.

⁶ Source: Datastream. As at 31 March 2017.

Within individual markets, the benefits of diversification can be achieved by investing in a surprisingly small number of holdings, such as 10 or 20 equally weighted positions spread across different industries. However, in practice, institutional investors' performance is usually measured against an index benchmark comprising several hundred different shares. In order to avoid the risk of underperforming the benchmark significantly, it is necessary to hold highly-diversified portfolios, typically with more than 50 holdings. Inevitably, this also limits the scope for outperformance. Reducing the risk of underperformance must also reduce the potential to outperform the benchmark.

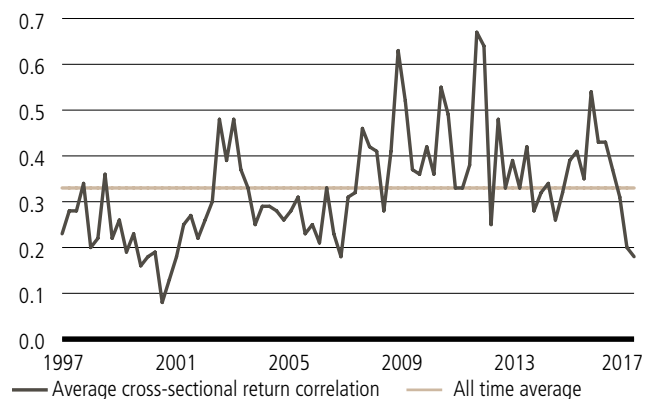
Within the pension fund market, there has been some dissatisfaction with managers over-diversifying portfolios, often referred to as 'closet-indexing'. This has led to a polarisation in demand between fully passive strategies and an increase in demand for 'unconstrained' or high alpha approaches. These are discussed in more detail towards the end of this chapter.

Over the long run, the case for diversification is clear. However, there have been times more recently where some of the benefits of diversification were reduced due to the high correlations between share price movements.

Correlations quantify the relationship between changes in asset prices. As markets, after the global financial crisis were largely driven by macro concerns and not company fundamentals, investors either bought or sold equities en masse rather than differentiating between companies. For example, in the US, correlations reached more than 90% in 2012. This meant that stocks moved in the same direction 90% of the time, thus reducing the benefits of diversification in the short-term.

To put this into context, correlations have averaged 33% over the long-term (see *Figure 3.5*). More recently, correlations have fallen to below their average over the past five years; a sign that stock specific factors are once again becoming a more important driver of share prices.

Figure 3.5 US Large cap stocks: Average cross-sectional return correlation, April 2000 to March 2017.



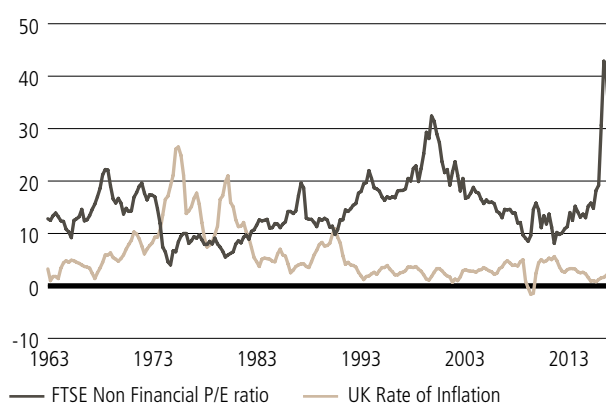
Source: Empirical Research Partners Analysis. Note: Computed using daily data, averaged over a quarter. US Equity Large Cap Universe consists of 750 of the largest market cap companies.

Sensitivity to interest rates and inflation

As mentioned earlier in this chapter, long-run returns on equities are heavily influenced by long-term trends in corporate earnings and dividends. However, equity market levels are also sensitive to interest rates and inflation. High rates of interest and inflation tend to be associated with low valuation levels for equity markets.

For example, *Figure 3.6* shows the inverse correlation between inflation and the price-earnings (P/E) ratio of UK equities. Indeed, academic studies suggest that, in the short-term, inflation and equity returns are negatively correlated in the US and the UK.

Figure 3.6 UK P/E ratios and inflation



Source: Thomson Reuters Datastream. Data as at 31 December 2016.

When inflation is high, interest rates on cash and bonds tend to be high, because fixed income investors require a real return and macro-economic policies designed to contain and reduce inflation usually involve higher-than-normal interest rates. Equity investors tend to suffer in these situations for two reasons. Firstly, prospects for economic growth tend to deteriorate as a period of austerity is required to dampen inflation, impacting corporates' earnings potential. Secondly, in practice, companies find it hard to raise their nominal return on capital fast enough to compensate for the erosion of their real profits by inflation.

In the longer run, over periods of five years or more, there is more of a positive correlation between equity returns and inflation, possibly because corporate behaviour eventually adjusts to cope with the new environment. Equities therefore appear to provide some protection against inflation for long-term investors. Nevertheless, their primary attraction as an asset class is their superior expected rate of return versus other traditional asset classes, such as bonds, rather than their

uncertain ability to match liabilities related to inflation, such as pensions based on final salary.

With central banks targeting positive inflation, recent intervention across the globe provides a clear signal to markets that policymakers would rather take inflation risks, in ensuring they deliver a robust economic recovery, than risk a sustained period of deflation and weak growth. Furthermore, the high debt levels in most developed economies give an added incentive to 'reflate', which is generally positive for equities, and negative for bonds.

Equity valuation

In principle, equities can be valued, like any other asset, on a discounted cashflow (DCF) basis. The cashflows accruing to shareholders over the lifetime of a company can be forecast and then discounted at an appropriate rate of interest to reflect the time value of money and the risks to those cashflows. In practice, there are significant difficulties in both forecasting future cashflows and choosing appropriate discount rates. Therefore, while many investors use DCF valuations, they typically also use more simple valuation yardsticks combined with judgement about future prospects.

Some common yardsticks are described in *Figure 3.7*. Most can be used for either individual equities or equity markets as a whole. These common yardsticks can be related to valuation criteria for other assets. For example, the earnings yield on equities can be compared to bond yields or real estate yields to see which asset offers the highest rate of potential accrual in the short-term.

Some institutional investors are moving towards more sophisticated valuation methods in order to gain greater insight and accuracy. Generally speaking, these methods are closer to explicit cashflow forecasting and discounting than the simple rules of thumb presented in the table.

Forecasts can involve future dividend payments which are then discounted at the required rate of return. For example, a share paying a dividend of five pence per year, growing at 5% p.a. indefinitely, would be worth 100 pence if the required rate of return was 10% p.a. Changing the assumptions can make big differences to discounted dividend valuations. In this example, raising the growth rate from 5% p.a. to 8% p.a. increases the value of the share to 250 pence. This does not mean that this valuation method is wrong, it simply highlights the difficulties in valuing equities and the high sensitivity of DCF valuations to moderate changes in discount or growth rates.

Figure 3.7 Common equity valuation methods

Price earnings ratio (P/E)	Calculated by dividing a company's current share price by its earnings per share. The earnings figure depends heavily on accounting conventions so the P/E is not always useful for international comparisons.
Earnings yield	The reciprocal of the P/E.
Dividend yield	The annual dividend of a share in relation to the current share price. Calculated by dividing the annual dividend per share by the current market price.
Price to book value (P/B)	The ratio of equity market value to the accounting value of shareholders' funds. Sometimes an indicator of value in relation to assets, but depends heavily on accounting methods. It is open to debate whether goodwill arising from acquisitions should be included in shareholders' funds.
Enterprise Value (EV/EBITDA)	Enterprise value (market value of equity plus net debt of the company) divided by earnings before interest, tax, depreciation and amortisation. A measure that attempts to assess short-term cash generation in relation to market valuation. It can be used for international comparisons, because it is not heavily influenced by different accounting methods. Furthermore, it is fairly independent of the capital structure of companies. However, by ignoring depreciation it is a rather crude measure.
Economic Value Added (EVA)	Economic Value Added. This approach is patented by Stern Stewart, although rivals have similar metrics, such as cash return on capital invested (CROCI) from Deutsche Bank or the system developed by HOLT Value Associates. Generally, they attempt to quantify the value of a company by assessing the returns it makes on the capital it employs compared to the cost of that capital. The difference between the two is the value added. The sum of these differences in the future is the value of the company above its book value. It is a sophisticated approach that is useful in judging the performance of a company in the past, but suffers from the uncertainties of forecasts of the future in the same way as discounted cashflows.
Tobin's Q	The ratio of the market value of equities to the replacement cost of the companies' net assets. This ratio is mostly used when looking at an entire market rather than individual companies. In purely competitive markets, arbitrage between the price of assets and the price of equities should ensure the value of Q converges towards one. In practice, competition is far from perfect so many companies with strong market positions consistently trade at multiples of the value of their underlying assets. Similarly, some industries are chronically unprofitable and trade at discounts to replacement cost asset value because it is difficult to realise the assets.

Source: UBS Asset Management

While dividend discounting is still used as a valuation technique, it is most useful for high yielding shares with very predictable future prospects. However, the majority of shares fall outside this category. In some cases, analysts set up detailed models which forecast future profits, cashflows and balance sheets for a few years ahead. The company is then valued as the sum of discounted cashflows for the forecast period plus a terminal value at the end of the period. The terminal value is often determined by conventional criteria such as price-earnings ratios.

New valuation techniques are often, quite rightly, treated with suspicion as they must ultimately be related to long-term cash generation. For example, the valuations of social network companies such as Facebook and Twitter appear to defy conventional valuation techniques, as did many companies in the dotcom bubble of the late 1990s. Where conventional valuation metrics have appeared not to work, many investors have looked at other measures such as market cap per subscriber, or per customer. While such companies are relatively unusual, their sheer scale in the market presents challenges to investors to understand how such companies will generate profits their business models in the future. Over the long-term, their share prices will reflect the cashflows they are able to generate, but the timing of such cashflows presents a much higher level of uncertainty than many more mature industries. While forecasting long-term cash flows can be subject to wide margins of error, statistical studies can be used to check the plausibility of growth assumptions.

There is a clear tendency for high growth rates to 'fade' to the average as the forces of competition and the difficulty of growing from a larger base have an effect over time. Investors with a 'growth' style try to identify companies with a competitive advantage which will enable them to overcome the 'fade' effect. 'Value' investors often seek to exploit the fade effect by investing in lowly valued, out-of-favour shares where prospects might improve (fade upwards towards the norm). A more detailed discussion on styles and approaches can be found later in this chapter.

Equity markets

The global equity market

The total value of the world's equity markets, represented by the MSCI World Index, stood at USD 40.3 trillion at end February 2017 — roughly USD 5,400 per head of global population. Equities represent about 43% of the global investible capital market (which also includes bonds and real estate).

The total capitalisations of some major equity markets are shown in *Figure 3.8*. The US economy is the largest in the world and has the biggest equity market, accounting for over half the global total. However, there is no simple link between the size of the stock market and the size of the underlying economy. The UK market, for example, is around twice the size of Germany's, despite the German economy being considerably larger. Note also, that in 1989 the Japanese equity market was the biggest in the world, but is now only a seventh of the size of the US market.

Figure 3.8 Capitalisation of major equity markets at end 2016

	Market capitalisation ¹ USD trillion	GDP USD trillion	Capitalisation/ GDP
US	20.2	18.6	1.1
Japan	2.9	4.6	0.6
UK	2.2	2.4	0.9
Germany	1.1	3.3	0.3
China	1.0	10.7	0.1

¹MSCI standard index market capitalisation, including foreign inclusion factors as applicable. Source: Rimes and Thomson Reuters Datastream

A number of factors affect the size of stock markets compared to their underlying economies. The most obvious is that countries will have differing proportions of privately-owned companies compared to publicly-owned and quoted companies. The UK in particular has relatively few government-owned companies after a sustained period of privatisation during the 1980s. Therefore, a higher proportion of the country's gross domestic product (GDP) may be quoted rather than unquoted. The UK also has fewer mutually-owned or family-owned businesses than other European countries.

Another reason is the presence of large multi-national companies. These are fully represented in the indices but not necessarily exposed economically to the country where the shares are listed. Many of these companies are also dual-listed, such as mining giants Rio Tinto and BHP Billiton, which are quoted in both the UK and Australia. The UK market has a particularly high proportion of these multi-national companies such as BP and HSBC. Indeed, the sensitivity of the UK stock market to the UK economy is relatively modest, with around 75% of revenues coming from outside the UK. Given that the majority of those revenues and profits are gained outside the home currency, a decline in sterling actually increases the value of the profits to shareholders.

Furthermore, stock market ratings also vary widely across countries. A company may be large in terms of output but if its prospects are deemed to be unattractive or domestic interest rates are high, the value placed on it by the stock market may be low. Thus the output of an economy is not necessarily directly related to the value of its stock market. The benefits of diversification, discussed earlier, are illustrated in *Figure 3.9* where the wide variation in returns between equity markets can be seen.

Figures 3.10 and 3.11 show the cumulative total returns for four major equity markets and a world index, in local currency and sterling terms. A discussion on currency management can be found in Chapter 7.

Emerging market equities

Definitions

There are no agreed definitions of what constitutes an emerging equity market. MSCI and FTSE differ in how they classify a country like Korea as emerging or developed. Around 24 markets are generally considered to be mature (a developed market or DM) and the rest are frequently classified under emerging markets (EMs) and/or new frontier markets. Of the emerging market equity indices, MSCI indices have the largest investor following and comprise of about 23 countries.

Why invest in emerging market equities?

There are many reasons used to justify investing in emerging market equities. The most common arguments are:

Higher relative growth and potentially higher capital appreciation: Conventional wisdom suggests that investors in emerging markets are able to access economic growth rates that are not available in more mature markets. These growth rates, together with cheaper company valuations, usually translate into higher returns that can be very attractive for investors prepared to take the long-term view. However, there can be significant periods of underperformance, as illustrated in *Figure 3.12*.

Figure 3.9 Equities – annual returns converted into sterling

% p.a.	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10 yrs (% p.a.) 2016
Global	10.3	-19.5	20.6	16.8	-6.2	11.7	21.1	11.2	3.8	29.4	9.0
US	4.2	-12.5	13.2	18.8	2.5	11.2	30.4	20.3	6.9	33.4	12.1
Japan	-6.5	-1.3	-5.9	18.9	-13.1	3.3	25.0	2.7	17.6	22.7	5.6
UK	5.3	-29.9	30.1	14.5	-3.5	12.3	20.8	1.2	1.0	16.8	5.6
Germany	33.4	-23.8	13.2	12.4	-17.8	25.6	29.4	-4.0	4.7	23.5	7.9
Switzerland	3.9	-3.2	13.0	16.4	-6.1	16.1	25.2	6.9	7.5	14.3	9.0
France	12.9	-21.9	16.6	0.1	-15.0	18.2	26.9	-3.3	7.4	26.1	5.6
Netherlands	15.3	-33.2	32.6	1.9	-17.2	13.6	26.0	1.0	7.0	26.8	5.4
Italy	6.3	-28.8	11.3	-12.8	-22.8	8.9	20.6	-2.2	8.9	7.6	-1.6
Sweden	-1.6	-32.4	51.5	40.0	-16.4	20.4	24.4	-0.8	2.1	22.5	8.2
Spain	20.3	-17.4	24.0	-18.2	-10.5	0.7	29.7	1.7	-10.9	19.6	2.5
Belgium	-1.0	-46.0	45.9	2.9	-8.0	33.9	26.4	11.6	19.4	11.6	6.4
Denmark	24.7	-28.0	30.3	37.9	-14.7	26.0	23.8	15.3	31.7	2.5	12.8
Norway	33.6	-48.3	73.3	15.7	-9.5	14.6	9.8	-14.0	-8.3	37.8	5.5
Austria	2.7	-56.1	45.7	16.8	-37.4	28.0	11.6	-23.0	7.5	31.7	-2.9
Canada	28.8	-24.7	38.1	22.0	-11.7	5.3	4.2	9.2	-19.1	48.9	7.6
Australia	27.3	-32.4	56.1	18.5	-10.1	16.2	2.6	2.7	-4.3	34.4	8.5
Singapore	29.1	-29.0	56.4	27.9	-17.1	25.2	-0.5	9.6	-12.6	21.7	8.2
Hong Kong	50.0	-30.5	45.3	22.6	-16.7	23.3	7.4	9.7	1.9	23.7	11.0

Source: Index returns for 2012 – 2016 are from Thomson Reuters Datastream, previously they were sourced from BNY Mellon (formerly MAS, formerly CAPS and are quoted net of non-recoverable withholding tax.

Figure 3.10 Total cumulative equity returns – local currency

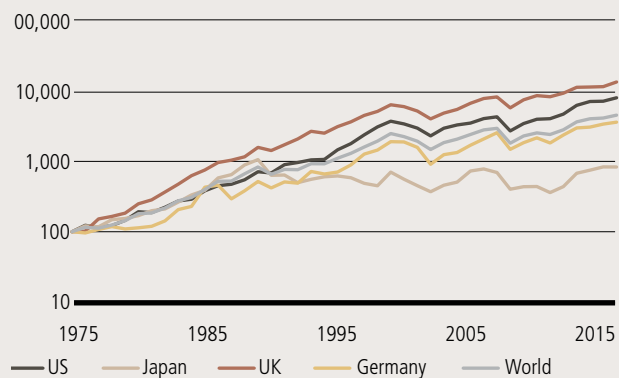
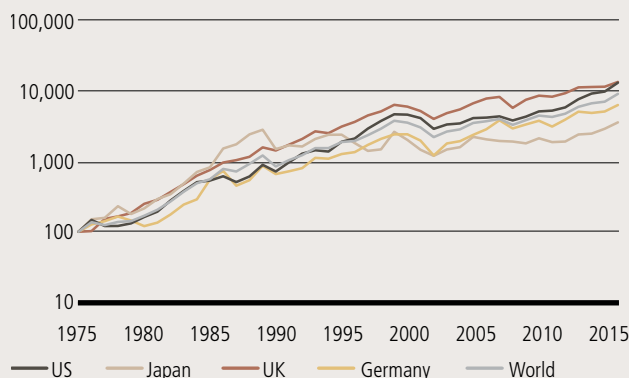


Figure 3.11 – Total cumulative equity returns - sterling



Source: Thomson Reuters Datastream, rebased with wealth series. Data to and as at 31 December 2016.

Figure 3.12 Emerging markets versus S&P 500



Source: Thomson Reuters Datastream, data as at 31 December 2016.

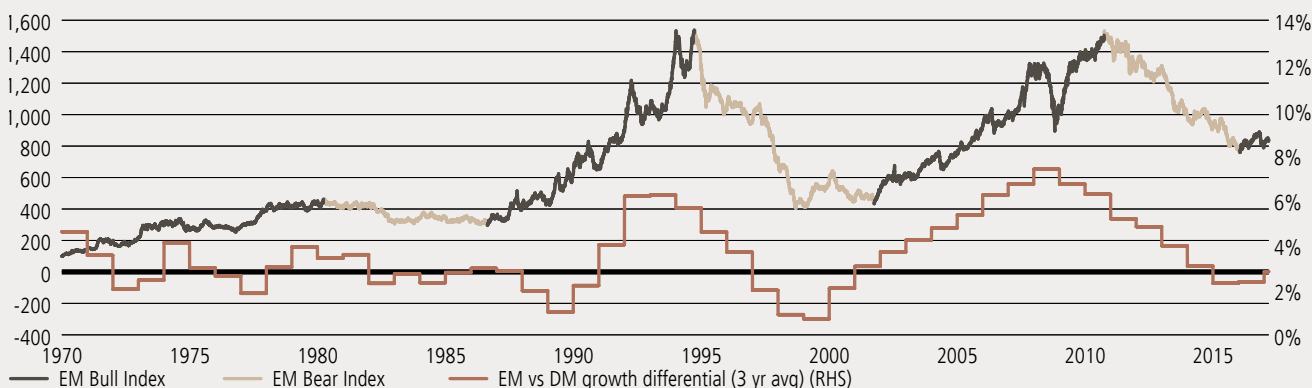
To put this into context, real economic growth rates in advanced economies have surpassed developed economies by an average 2%+ p.a. over this long period, a very meaningful difference. Historically, this growth premium has been a powerful support for the performance of emerging equity markets as shown in *Figure 3.13*, which displays the relative performance of EM vs.DM.

EM growth bottomed in 2016 at about 2% above DM. While V-shaped economic recovery is unlikely, EM growth is gaining in both absolute and relative terms to the developed world. Looking ahead, the scope for continued catch-up growth in EM remains substantial, even if the growth of EM will likely settle at lower rates than in the past decade.

Portfolio diversification

Emerging markets represent a fragmented asset class whose constituents are driven by factors that are often different from those which move developed markets. This feature can be useful in multi-asset portfolio management. By adding exposure to EM equities, an investor can obtain a stronger risk/reward mix that improves return for any given level of risk, thus increasing portfolio efficiency (see *Figure 3.14* and *3.15*). However, history shows that the correlations between large and liquid global emerging market companies and their counterparts in mature markets can, at times, be high, thus reducing the benefit of diversification.

Figure 3.13 EM vs. DM Relative equity performance index



Note: We used the MSCI World as a proxy for DM. For EM, MSCI EM was used from Dec 1987 onward. Prior to this, the EM index was reconstructed using individual EM exchange-level data available at the time.

Source: FactSet, Thomson Reuters Datastream, Bloomberg, Goldman Sachs Global Investment Research, data up to 31 March 2017.

Figure 3.14 Historically, adding EM equities improved risk-reward

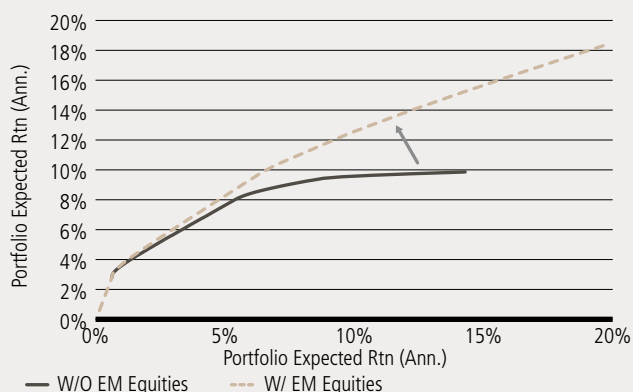
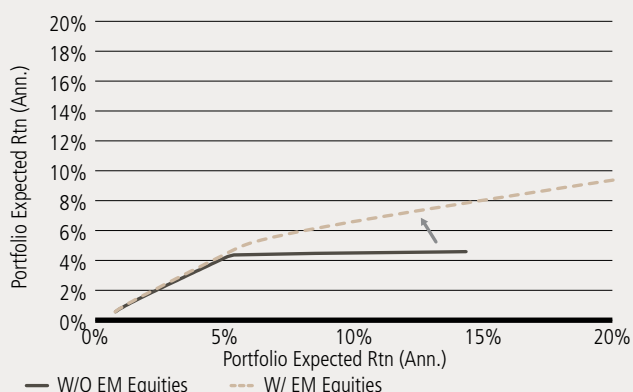


Figure 3.15 Looking ahead, EM equities can also be a yield-enhancing asset



Source: Morgan Stanley Research forecasts; Note: Based on realised returns, correlations and vol of 5 USD assets: S&P 500, UST 10Y, USD IG Corp, USD HY Corp and cash.

How to invest in emerging market equities

While sampling approaches have been developed to provide passive exposure to emerging markets, an active approach makes sense given that the exploitable characteristics are greater market inefficiency and higher levels of volatility.

There exists a number of reasons why pricing anomalies can persist for sustained periods in emerging markets:

- Emerging market companies are less heavily researched than their developed market counterparts
- Fewer hedge funds and other arbitrageurs exist to exploit market inefficiencies
- Accounting standards are of variable quality
- Many companies remain state-owned with potential national service obligations

While large divergences exist at company level for reasons cited above, top down considerations also need to be incorporated in the investment approach as:

- Macro-economic and geopolitical views have stock/sector selection implications. This is especially the case with cost of capital issues and exchange rate assumptions, which impact the balance sheet; and
- The country's approach to issues of transparency, accounting standards and minority shareholder rights has major implications for active management. The active manager seeks qualitative insights into pricing anomalies, but latent value can only be realised within the appropriate institutional environment.

Equity management

Approaches

There are two broad approaches to equity management; active and passive. Historically, active investors have been tasked with outperforming a well-known benchmark such as the FTSE All-World Index. At the other end of the spectrum, passive management attempts to match the performance of an appropriate index by holding shares in direct proportion to the index weightings. Increasingly, active investors are developing

more absolute return strategies rather than relative returns. This so-called separation of alpha (gains made from active stock selection) and beta (gains made from markets rising or falling) enables much clearer delineation of asset allocation and stock selection. There are many variants of active and passive approaches, some of which are outlined below.

Active management

Active managers can use a number of techniques to attempt to outperform the market. One approach is for investors to make their own assessment of the valuation of a company's share price, and buy and sell shares according to the premium or discount to their perceived fair value. This is known as fundamental investing. In essence, the approach is straightforward, although in practice many fundamental investors fail to deliver performance as identifying mispriced shares is harder to achieve than it may appear on face value. Alternative approaches include momentum investing, which aims to take advantage of trends in share price movements. However, this approach tends to incur heavy transaction costs as it often involves holding shares for quite short periods. Many managers aim to combine fundamental investing with momentum and monitor closely both earnings and price trends.

Style

Statistical studies of active portfolio manager behaviour suggest that many managers stick to a particular style of investing. Indeed, many managers are hired on the understanding that they follow a particular style in which they have expertise. Fundamental investing styles can be roughly divided into value and growth. In addition, small company and large company performance can also diverge significantly. It is important to be aware of both 'style' and 'size' effects on performance in terms of how portfolios are managed.

Value

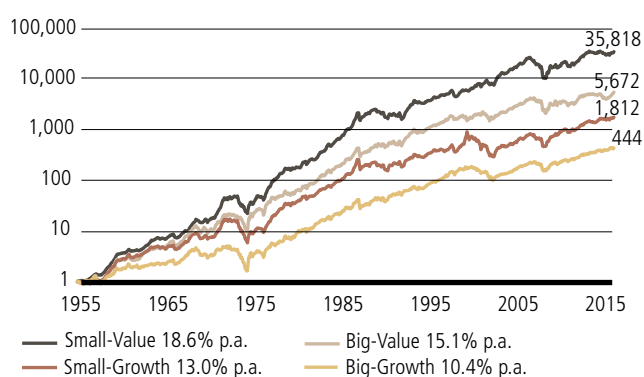
The concept of value investing dates back to the teachings of Benjamin Graham at Columbia Business School in the 1930s and the publication of Graham and Dodd's influential *Security Analysis* in 1934. The fundamental concepts of valuing companies and seeking a 'margin of safety' have been the cornerstone for some of the world's most successful investors, notably Graham's most famous student, Warren Buffett, who was ranked the third richest man in the world in *The Forbes Rich List 2015*.

Value investing can be broadly defined as a fundamental, long-term approach that seeks to invest in undervalued companies. However, in practice it is often defined more narrowly as an investment style that concentrates on investing

in shares with certain characteristics, such as low price-earnings ratios and high dividend yields. In principle, value investors aim to exploit valuation anomalies. As anomalies get bigger due to price falls, the typical value manager will increase their position. In periods of high momentum, investors 'chasing' stocks that are performing well can lead to the price mis-valuations getting larger and hence this results in periods of underperformance for value-based investors who have not held these shares.

While value has underperformed growth during three of the past five years, statistical studies show that over the long-term, value-based strategies tend to outperform, as illustrated in *Figure 3.16*. Furthermore, the best returns tend to come to value managers after a period of poor performance.

Figure 3.16 Cumulative return from size and book-to-market portfolios, 1955 to 2016



Source: Credit Suisse Global Investment Yearbook 2017, Copyright © 2017 Elroy Dimson, Paul Marsh and Mike Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns*, Princeton University Press, 2002.

Growth

Growth investors typically seek to identify companies with good prospects for sales and earnings growth. Typically, 'growth stocks' enjoy a higher market rating, as measured for example by the price-earnings ratio than 'value stocks' because they are perceived to have better prospects. The key to successful growth investing is identifying companies with superior long-term prospects which are not already discounted in the share prices of the companies. Some investors aim to combine a growth approach with a valuation discipline and refer to their style as 'growth at a reasonable price' (GARP). Growth is typically seen to be a complementary strategy to value and many investors seek to blend the two. The combination of a successful value manager and growth manager can help reduce the volatility of returns. While it is generally accepted in academic studies that value strategies work best over the long-term, growth strategies can work well in certain market

environments. For example, as noted above, growth has outperformed value in three out of the past five years¹².

Momentum

Momentum investors focus on companies that have a combination of stronger-than-average earnings and/or price momentum, in the expectation that this trend will continue. Such strategies can struggle when a trend is broken, however. Momentum trends can be very strong and are typical of the latter stages of bull markets. The bull market at the end of the 1990s saw very pronounced momentum trends, driven by the dotcom bubble. Similarly, the tail end of the bull market that ended with the start of the financial crisis in summer 2007 saw one of the strongest momentum markets in history.

Small company equity

Most markets now have small company indices going back many years. The Numis Smaller Companies Index (formerly the Hoare Govett Small Companies Index), for example, covers the smallest tenth by equity market capitalisation of the UK market, whereas the FTSE All-Share Index covers the vast majority by value of the entire market.

The long-term outperformance of small caps is usually underpinned by faster growth. Investors in small caps can often capture the early stages of new industries as they develop and benefit from the dynamism and entrepreneurial management that is more likely to reside in smaller companies. By definition, it is much easier for a business to grow from USD 5 billion of sales than from USD 50 billion.

Another key influence on long-term faster growth rates is the different structure of indices. Large cap indices are dominated by the typically more mature energy and consumer staples stocks, whereas small cap indices tend to be populated more by consumer discretionary and industrial stocks. However, it is also worth noting a number of potential issues with small cap investing. By their very nature, small company stocks at an individual level can be more volatile and domestically-focused. They are typically less liquid and usually more expensive to trade. Small caps typically have a higher beta, so usually suffer more in a falling market environment. In addition, small caps have more variable standards of corporate governance with smaller boards and typically, management with a higher financial stake in the business.

Quantitative research

The use of quantitative analysis originated in academia with such names as Louis Bachelier (1900), Harry Markowitz (1952)

¹² Source: Datastream, MSCI World. December 2015.

and Robert Merton (1969) to name but a few, and at investment banks where analysts were concerned with derivative pricing and risk management. However, the meaning of the term and application of available techniques expanded over time and found their way into the investment management industry. These days, virtually all large asset managers employ quantitative methods to some degree, with a view to help generate consistent alpha and diversification from other styles of investment. In December 2000, an estimated 15% of assets were managed with quantitative methods, increasing to approximately 17% by the end of 2009. While a large proportion of such assets are invested in so-called 'enhanced indexing' strategies, alternative beta assets have captured a lot of potential quantitative ground over the past few years. However, most recently, we have seen the first period of outflows from those strategies.

Unconstrained equity investment

One topic that has attracted a high degree of attention in recent years is that of 'unconstrained' investment. The term can cover a range of concepts but generally embraces approaches that give the fund manager more latitude in choosing investments, either in asset allocation or in stock selection.

At the asset allocation level, such approaches usually require managers to achieve a greater degree of strategic diversification and take larger tactical asset allocation views. At the stock selection level, unconstrained investment can mean a variety of approaches. Some seek to address issues of stock concentration within UK equities, for example, by setting either equally weighted or other non-market value weighted equity indices. Others combine the stock selection and asset allocation concepts by looking to achieve positive real returns – in effect, measuring an equity portfolio against a cash benchmark. The common thread tends to be an expectation that managers hold a smaller number of stocks and thereby concentrate the portfolio in their most favoured holdings, regardless of the benchmark's composition and individual stock weightings.

Consultants have, in general, increasingly advocated a combination of passive management and higher alpha strategies (commonly known as the 'core/satellite' approach), many of which are 'unconstrained'. Pension funds, typically, have multiple managers, so it is important to ensure that individual managers take enough risk to deliver meaningful net of fees performance.

This trend towards higher performance strategies has led to a growth in the number of smaller boutique investment companies, and also in large organisations setting up in-house

boutiques. In looking for higher returns, managers tend to have a bias towards small and mid-sized companies as they are typically less well covered by analysts, which can create higher volatility.

Long/short investing

A number of asset managers have chosen to loosen their portfolios' long-only constraints in the pursuit of higher alpha. Academic research suggests that by relaxing long-only constraints and introducing the short-selling of overpriced securities (i.e. borrowing shares and then selling them), asset managers can enhance the risk-adjusted performance of their active equity strategies.

There are potential benefits of shorting. For example, if a manager believes a share is overvalued in a traditional long-only portfolio, they are constrained not to hold the stock. If the market capitalisation was 0.10% of the market and the stock underperformed the benchmark by 50%, the portfolio would make a relative gain of 0.05%. If, on the other hand, the portfolio was permitted to increase the negative view by 'shorting' the stock, to say 1.0% of the total fund value, and the share price underperformed by 50%, the portfolio would gain 0.5% in relative terms. Furthermore, to offset the 'short' position in the stock, the manager could increase the overweight to a favoured long position using proceeds from the short sale.

In this example, if the manager invested the additional 0.9% (raised from the 'short' position) of the portfolio in a stock that outperformed by 50%, the portfolio would gain an additional 0.45%. As such, the total by which the manager would outperform the benchmark is 0.95% rather than 0.05%. Clearly, this is an extreme example but it does highlight the increased opportunity managers can have in a long/short strategy to generate higher returns. For example in the US, 81% of stocks represent less than 0.25% of the index, this representing a substantial increase in the opportunity set for managers.

Long/short funds may take a variety of forms, including short extension (or 130/30), absolute return, market neutral and market directional strategies. After initially taking off, mainly in the US, 130/30 strategies were slow to gain acceptance by institutional investors, while market directional and absolute return strategies have seen greater interest in recent years.

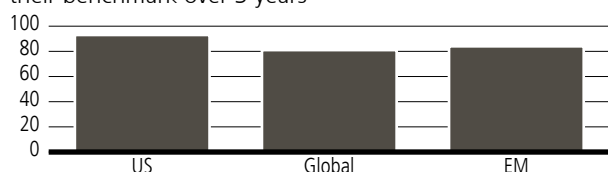
While intuitively they may make sense, many trustees remain generally sceptical about 'shorting' and portfolios that derive performance from this activity will tend to be contained within the 'alternatives' section of their portfolios, as described in Chapter 7.

Index equity

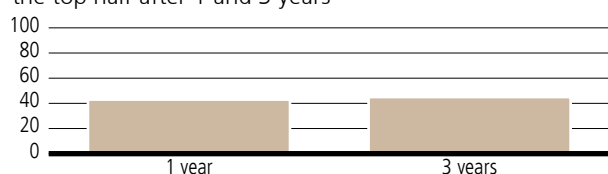
Assets under management in index funds have risen dramatically over the years, from less than USD 10 million in the 1970s to over USD 10 trillion at present. One of the key catalysts for this progress has been the inability of the average active manager to outperform their respective benchmark on a consistent basis, as illustrated in *Figure 3.17*.

Figure 3.17: Asset management trends: passive vs. active debate: S&P Indices versus Active Funds (SPIVA®) Scorecard

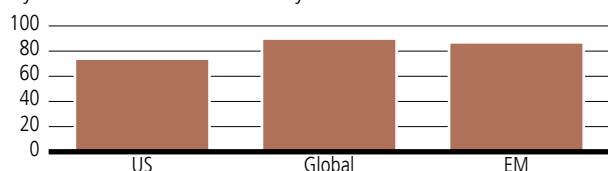
a. Percentage of US managed equity funds outperformed by their benchmark over 3 years



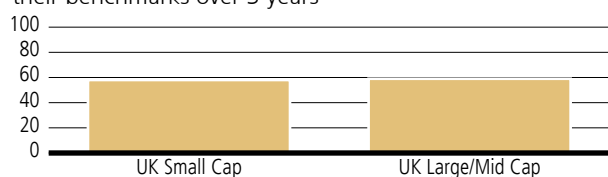
b. Percentage of US managed equity funds remaining in the top half after 1 and 3 years



c. Percentage of European managed equity funds outperformed by their benchmarks over 3 years



d. Percentage of UK managed equity funds outperformed by their benchmarks over 3 years



Source: S&P Dow Jones Indices, CRSP, UBS Asset Management. Data to 31 December 2016 for total return index data. Outperformance is based on equal weighted fund counts. Data on funds persistence to 30 September 2016. Data in USD for US funds, in EUR for European funds and in GBP for UK funds. Past performance is not a guarantee of future results.

Looking at *Figure 3.17 (a)*, summarising US managed equity funds performance vs. their benchmarks, historically more than 90% of these funds have, on average, underperformed their respective benchmarks over three years. But even if investors have managed to identify successfully the outperforming 10% of funds, the outperformance of these funds would not have necessarily lasted. This is shown in

Figure 3.17 (b), where only 43% and 45% of these funds have historically remained ranked in the top half by performance after one and three years respectively.

The inability of the average active manager to deliver alpha on a consistent basis, as illustrated in *Figure 3.17*, has, among other industry developments, led to the growing popularity of index investing over the past two decades. Equity index funds have a simple objective: to perform in line with the underlying benchmark. Index funds typically hold either all stocks in the underlying index at the same weight as in the index (full replication), or a representative sample of stocks in the index (optimisation or stratified sampling). Tracking error measures how closely an index fund tracks the index it is benchmarked to.

One of the most common type of equity indices are market capitalisation weighted indices. Their construction is based on market capitalisation (share price multiplied by number of shares): stocks in the index are selected and weighted by their market capitalisation, i.e. companies with the largest market capitalisation have the largest weight in the index. Market cap indices are typically adjusted for free-float: shares not directly available to the investing public (e.g. those owned by the business founder or held by other companies) are excluded from the index series.

For UK equities, one of the most popular benchmarks used by UK pension funds tends to be FTSE All-Share Index. This index is often divided into its three major components, based on company size, as measured by market capitalisation: FTSE 100, FTSE 250 and FTSE Small Company Index. In addition to its leading position in the UK, FTSE Russell is also one of the major providers of global equity indices, alongside MSCI and S&P Dow Jones.

The key advantages of market capitalisation weighted indices — simplicity, transparency, broad diversification/economic representation, scalability, low turnover, and reduced transaction costs — make a strong case for index management against these types of indices. However, market cap indexing is not without its flaws. As a stock price increases, so does its weight in the index. Unless the market is perfectly efficient (i.e. the market correctly prices all companies), investors using market capitalisation weighted indices could end up holding more overvalued stocks and less undervalued stocks, which is the opposite of common sense investing. Additionally, market cap indices tend to be highly concentrated in a few large stocks and sectors, potentially exposing investors to large stock-specific risk, which is not typically rewarded.

The inefficiencies of market cap indices have led to the search for and creation of alternative stock selection and weighting methodologies in recent years.

Alternative beta indexation

Alternative beta indices stand between alpha and beta, aiming to provide better diversification or active-like returns at passive-like fees. Their goal typically is to alleviate the systematic flaws associated with market cap indices by exploiting one or more equity risk premia factors (e.g. value, volatility, size, quality, momentum) or by spreading exposure across many risk factors (diversification strategies).

These indices, similarly to market cap indices, are rules-based, transparent and tend to have large capacity, but at the same time they aim to deliver better risk-adjusted returns than the market. Given the appealing traits of alternative indices, it is not unexpected they have gained popularity amongst investors in recent years, evidenced by the estimated USD 350 billion⁸ tracking alternative beta indices at present.

As one of the early adopters of alternative beta indexation and now a leading alternative beta index manager, over the past five years we have developed our in-house alternative beta analytical framework — the 4 keys — allowing us to research factors, select indices, blend them efficiently and implement portfolios effectively.

Over the past 60 years, more than 330 return-predictive signals, commonly referred to as 'factors', have been identified in academic research. For UK pension fund clients, we have narrowed down the vast factors space to three: value, volatility and quality, which we feel meet our factor selection criteria. Extensive academic research and empirical evidence suggest the positive added value associated

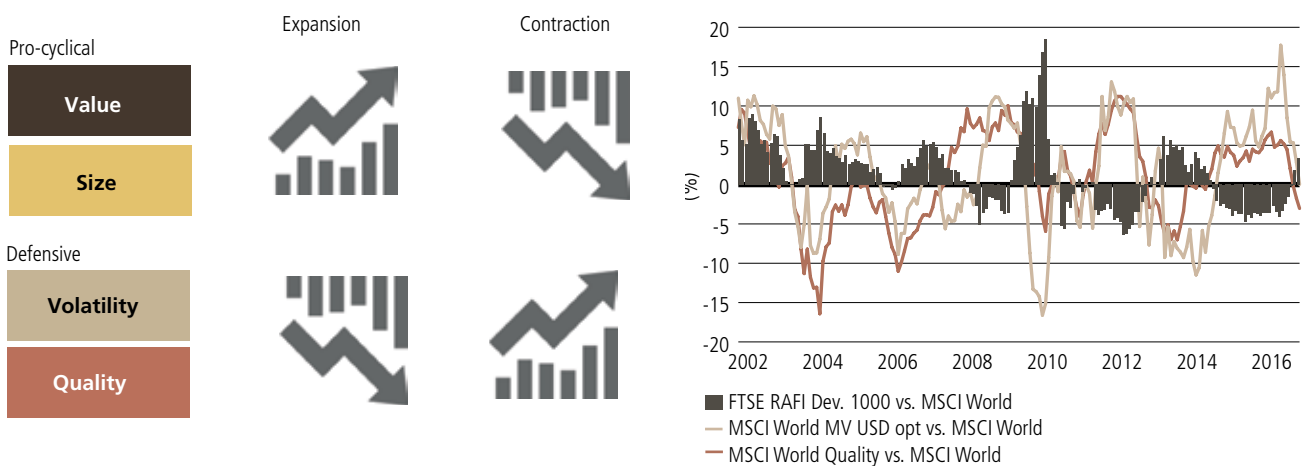
with these three factors is not based on mispricing but on inherent risk premia and behavioural finance characteristics, therefore, the excess returns associated with them are more likely to persist in the future.

While alternative beta indices capturing value, volatility and quality factors have delivered better risk-adjusted returns than the market historically, they tend to display different performance patterns, as illustrated in *Figure 3.18*. Indices capturing the value factor tend to be pro-cyclical (outperforming market in the expansion phase of business cycles) while indices capturing the low volatility and the quality factors tend to be defensive (outperforming market in the contraction phase of business cycles).

For example, during the global financial crisis of 2007-2009 and following the Brexit referendum in the summer of 2016, while value underperformed the market, low volatility and quality outperformed the market which would have helped to protect a blended portfolio.

Combining alternative beta indices capturing different equity factors can be a highly effective strategy which could potentially reduce performance cyclicality and produce diversification benefits. When alternative beta index blends combining several equity factors are constructed, they tend to benefit from lower tracking error and higher information ratio vs. the market cap index, compared to the component indices comprising the blend. Additionally, such index blends can benefit from potential turnover and transaction costs reduction and crossing opportunities.

Figure 3.18: Alternative indices performance tends to be cyclical



Source: UBS Asset Management, Bloomberg, FTSE Russell, MSCI, Research Affiliates, RIMES.
 Note: Data from 31 January 2001 to 31 December 2016. TR gross index performance data in USD. Data for alternative indices contains live and back-tested data sourced from index providers. Past performance is not a reliable indicator of future results.

⁸ Source: UBS Asset Management estimate based on data sourced from third party index providers and other index managers, data as of December 2016.

Building upon our extensive alternative beta research, in 2014 we launched a series of UK Life Co (life company) alternative beta index funds capturing different factors. In 2015, we enhanced our clients' access to the factors we favour, by expanding our range of UK Life Co funds, UK OEICs and ETFs. Our in-house 'all-weather' alternative beta index blends combine efficiently value, volatility and quality factors. Clients following our suggested blends outperformed the market by 1.5% p.a. on average for the three years since inception in March 2014 to 31 March 2017, as shown in *Figure 3.19*.

Figure 3.19: UBS 'All-weather' Three Factor Indexing Blend Composite performance to 31 March 2017

Data in %, in GBP	3 year p.a.
UBS 'All-weather' Three Factor Indexing Blend Composite	18.2
FTSE Developed Index TR Net*	16.7
Difference: UBS 'All-weather' blend vs. market	1.5

Source: UBS Asset Management, FTSE Russell, MSCI, Research Affiliates.
 Note: Arithmetic difference between composite and index. Figures greater than one year have been annualised. These figures refer to the past. Performance figures are gross of fees. Past performance is not a reliable indicator of future results.

* Index net of withholding tax applicable to UK pension funds.

Exchange traded funds

Exchange traded funds (ETFs) have become one of the most popular globally available investment instruments available to investors today. They combine the benefits of stocks and funds while offering investors the opportunity to invest inexpensively, flexibly and transparently to access entire markets, thereby diversifying their portfolio in a single transaction. ETFs trade like ordinary shares on a stock exchange and offer broad exposure across developed, emerging and frontier markets, equities, fixed income and commodities. ETFs are used widely by institutional investors and increasingly by financial advisors and retail investors alike.

Like traditional funds, ETFs are mutual funds. They are unaffected by any insolvency of the ETF provider or custodian bank as the fund's assets are not included in the bankruptcy estate. This lower risk profile distinguishes ETFs from that of exchange traded products (ETPs). ETFs will also have different tax and regulatory profiles to ETPs.

ETFs trade just like single stocks, which means they can be sold and purchased on the stock exchange throughout the day. ETFs can also be traded over the counter (via 'creation' and 'redemption' orders). Unlike most traded shares whose prices can be distorted by imbalances between supply and demand, ETFs have a unique process whereby market makers can create or redeem shares at net asset value (NAV) on a daily basis. This ensures that fund shares generally trade close to asset value at all times when the underlying market is open and liquidity in the fund shares is closely linked to the liquidity of the underlying market. For private investors, ETFs provide a viable alternative to index-tracking pooled funds as charges are generally lower.

As ETFs are pegged to an underlying index, they are passive investment vehicles that merely act to replicate the performance of their underlying asset. Thus, when the underlying index increases in value, so does the value of the ETF. When the underlying index declines, so does the ETF. Notwithstanding the development of 'active ETFs' — which make up less than 1% of the overall ETF market — ETFs are by their very nature passive investment vehicles.

ETFs provide investors with the opportunity to diversify their portfolio in a very inexpensive and efficient manner by distributing risk across multiple risk carriers, allowing them to optimise the risk profile of their investment. ETFs are easy to buy and sell with investors able to act on market views within seconds. ETFs can be used as part of an investment strategy in a variety of ways such as:

- Implementing a core and/or satellite investment approach
- Accessing a long-term investment strategy
- Using as building blocks to create broad market portfolios
- For short-term tactical investment view
- Use during transition periods within an active management approach
- For hedging purposes
- For cash equitisation
- As an alternative to futures or swaps.

ETFs are particularly transparent investment instruments because they match the performance of the underlying index, net of fees. All key trading and other information can be viewed on an intraday basis or in real time.

ETFs do not incur any issue or redemption surcharges — just the transaction costs of buying and selling an ETF. Moreover, only a minimal management fee is charged.

Corporate governance and responsible investment

The consideration of environmental, social and corporate governance (ESG) factors within the investment decision making and post-investment monitoring process can often be described in different ways.

References to responsible investment, sustainable investment, corporate governance, stewardship, socially responsible investment (SRI) and ESG integration are terms used to outline a general framework that essentially reflects that such factors may have a direct impact on the future revenues and costs of companies, and thereby on the long-term risk adjusted rate of return to investors and their beneficiaries or clients.

Investors increasingly realise that material, non-financial factors that are indicators of sustainability can be helpful to the investment process by broadening the range of data being considered.

To ensure that sufficient non-financial data is available to investors, efforts are made to systematise and codify the way material ESG data is gathered and disclosed, particularly in Europe and in the US, with a variety of initiatives including the Integrated Reporting Initiative as well as the Sustainability Accounting Standards Board.

However, the separation of ownership (by shareholders) and management (by employees) of a company can make it harder to operate a business when differing interests conflict. Good corporate governance practices aim to ensure that management operates in the long-term interests of all stakeholders, including shareholders. Across the world, the approach to corporate governance can differ. However, in many countries, there is increasingly clearly-defined and accepted best practice for companies.

Governance issues tend to drive corporate behaviour and if a company displays effective governance then it will usually have a well-considered approach to environmental and social issues. However, simply complying with governance best practices or codes does not necessarily constitute good governance.

In the UK, the Corporate Governance Code represents a set of best practice guidelines for companies. One important component of the code is the 'comply or explain' principle – the process whereby companies deal with exceptions to established guidelines. It can be difficult to judge the effectiveness of a board from outside the boardroom, and it is therefore crucial that this process works well.

There is greater emphasis being placed on 'shareholder value' on the part of both company management and shareholders. One manifestation of the adoption of the shareholder value

objective has been an increase in companies' willingness to return cash to shareholders rather than pursue value-destructive diversifications or acquisitions. Despite the shareholder value mantra from companies, acquisitions that fail to generate any value are still taking place.

To ensure that a company operates effectively, the most critical need is for a boardroom environment in which there is an effective challenge of the executives before decisions are made, particularly those involving strategic issues.

Having an experienced chairperson is key to this, as a key role of the chair is to assemble a suitably balanced board in terms of skills, diversity of thought, experience, independence and knowledge of the company. Among the topics that have increased in focus are the skillset of boards and the incentives required to attract and motivate senior management. Having a balanced board led by an effective chair can help ensure that these factors are thoroughly considered, as well as providing the board with the appropriate structure to oversee the organisation's risk appetite.

The latest review of the UK Corporate Governance Code concluded that more attention needs to be paid to follow the spirit of the code to the letter, and that the impact on shareholders could and should be enhanced by better interaction between boards and their shareholders.

To facilitate improved communication between shareholders and companies, the UK Stewardship Code aims to enhance 'the quality of engagement between institutional investors and companies to help improve long-term returns to shareholders and the efficient exercise of governance responsibilities'. Signatories are required to produce a statement of commitment to the stewardship code or explain why it is not appropriate to their business model.

Stewardship responsibilities go beyond the traditional financial analysis performed by many investors and seek to ensure that companies are sustainable and run for the long-term benefit of all stakeholders, as well as expecting investors to work with others in the investment chain to improve best practice and transparency.

Since the introduction of the code in the UK, various other countries have reviewed the effectiveness of the dialogue between investors and companies. Similar types of investor stewardship codes are now in place in a number of countries and the European Commission is also looking into the possibility of a comply-or-explain regime for institutional investors. Investment managers and asset owners who are signatories to the Principles for Responsible Investment are obliged to consider ESG issues within the investment analysis and decision-making process and report upon their activities in this area.

3. Equities

As well as the continued trend towards improved stewardship and dialogue, how investors exercise their voting rights is subject to greater scrutiny and investors are more willing than ever to vote against proposals deemed not to be in line with shareholder interests or accepted best practice.

Many investment institutions and asset owners now publish statements relating to their approach to corporate governance and stewardship. This is a positive step which is likely to continue.

4 Bonds



Introduction

This chapter first provides some context as to the characteristics and main issuers of bonds, including a review of passive fixed income investing. Current trends in the bond markets are then assessed from a global perspective, then focusing on emerging markets specifically. Finally, we explore the suitability of the asset class for pension fund investment.

What is a bond?

A bond is a debt instrument requiring the issuer (the borrower) to repay the lender (the investor) the amount borrowed (principal), plus interest (coupon), over a specific period of time.

Who issues bonds?

Government issues

Central governments are the world's primary issuers of bonds, normally in their own currencies, to finance shortfalls in current revenues against current spending and also to finance investment projects. During the 1980s, chronic deficit financing in many countries created a sharp increase in outstanding bonds. With the notable exception of Japan, the 1990s saw a marked reversal of attitudes on the part of governments of developed economies.

In recent years, many developed world governments have run high budget deficits leading to increasing bond issuance, credit rating downgrades, high volatility in yield spreads and increasing levels of debt to GDP (see *Figure 4.1*).

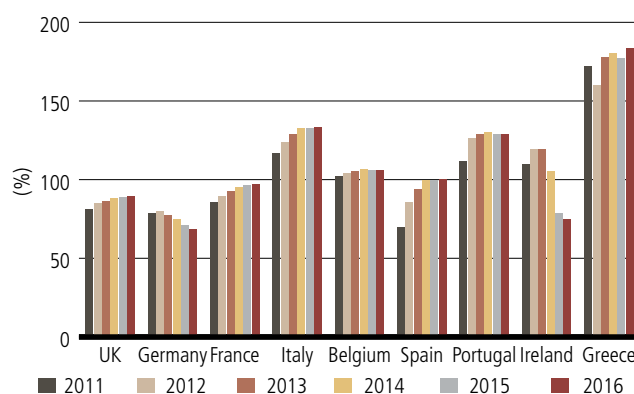
In 2011/2012 many developed market governments saw their credit ratings downgraded to reflect their reduced ability to meet outstanding debt. This contrasted with the relatively robust quality of corporate credit, with the notable exception of the financial sector.

Figure 4.2 shows the development of yield spreads for European peripheral sovereigns since the start of 2010. For certain peripheral European sovereigns, this trend has developed to such an extent that they have, at times, no longer been able to finance themselves independently and have required both financing support and bailouts.

As can be seen from *Figure 4.3*, the UK benefits from a longer average debt maturity profile than many other European sovereigns. This is a result of the well-developed long-dated gilt market. The exceptions on this graphic are for Ireland and Greece, both of which received bailout support.

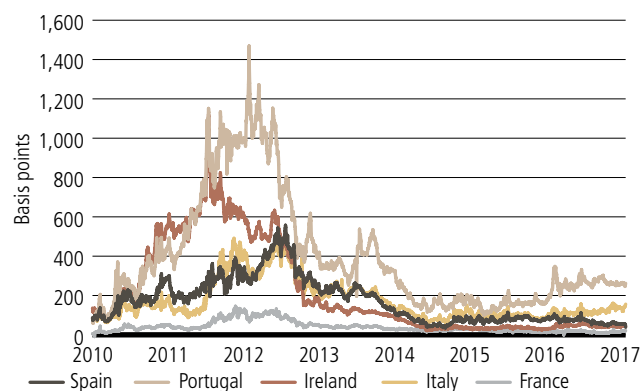
Bonds issued by central governments are normally, but not always, considered the highest credit quality in each country. Government agencies may also issue bonds. State and local governments have some power to raise funds via bond issues, again to cover shortfalls in revenue against expenditure, but more commonly to finance capital expenditure. However, credit quality can vary widely across issuers.

Figure 4.1 Gross government debt to GDP ratio (%)



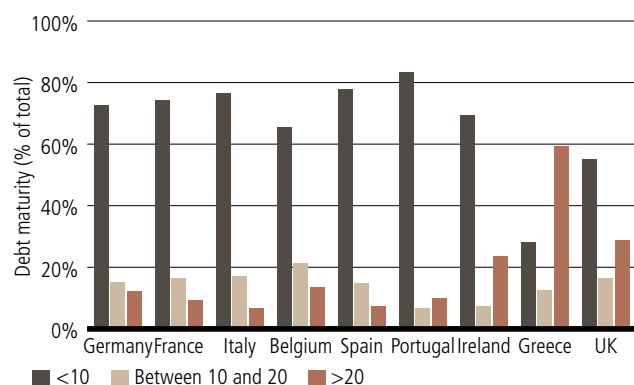
Source: Bloomberg, as at December 2016.

Figure 4.2 Sovereign CDS 5 years spreads over Germany



Source: Bloomberg, as at December 2016.

Figure 4.3 Debt maturity profile



Source: Bloomberg, UBS Asset Management. Data as at December 2016. Please note this data contains term loans paid by bailout countries.

Non-government issues

Bond issues, other than those by governments issuing in their own currency, are 'non-government' issues and are often referred to as 'credit' or 'corporates', though true corporate bonds are only those issued by companies. The key feature that typically distinguishes non-government debt from central government debt is a higher level of default risk. The credit risk of the bond is dependent on the issuer's ability to pay the coupons and the principal at the agreed times.

Supranational institutions, such as the World Bank, are important bond issuers across many currencies and are, typically, regarded as very high quality credits.

Credit risk and the growing importance of non-government bonds

Credit risk is a function of the credit quality of the issuer. The key factor distinguishing domestic government bonds from bonds issued by agencies or corporates is that the outright default risk of the former is typically low.

Governments have the ability to raise cash to pay coupons and principal, either by printing money or by raising taxation. Other issuers, or governments issuing in currencies other than their own, vary widely in their ability to make payments and this is recognised in credit ratings assigned by rating agencies, such as Standard & Poor's (S&P), Moody's and Fitch. These ratings range from AAA through to BBB (which are all regarded as 'investment grade' or 'high quality') and then below this from BB to C (often referred to as 'sub-investment grade' or 'high yield'). The credit ratings measure the relative probability of an issuer defaulting and the severity of loss, compared with other rated instruments. The most visible form of loss — default — is defined as any missed or delayed payments of interest and/or principal, or exchange into a new package of securities.

The lower the credit quality of a bond, the greater the premium investors require in terms of a 'yield spread' over the equivalent risk-free (government) bond. Whether this premium is sufficient at the general level can be assessed by looking at historical experience with default, adjusted according to the perceived outlook for the economy and the health of the corporate sector.

Default risk is not the only factor for which investors require compensation. Non-government bonds are typically less liquid — easy to sell in a secondary market — than government issues, meaning that buying and selling is more expensive. In certain market conditions there may also be a risk that selling bonds quickly may be difficult or expensive, or both. Market perceptions of risk may also change, pushing yield spreads tighter or wider with the consequent impact on the current market value of holdings, compared with risk-free assets.

Unlike default risk, these more general risks associated with the asset class as a whole are not susceptible to reduction through diversification.

When looking at non-government bonds as a separate asset class, rather than as an alternative to government bonds, the relevant comparator becomes a non-government bond benchmark. In this situation, holding the universe of non-government bonds removes any stock-specific risk. However, full diversification is rarely achievable or desirable, making careful sector and stock selection an important activity. This is pertinent as the risk of default on a bond is actually less than the probability of a rating downgrade, for example, from AA to A. Downgrades can adversely affect the mark-to-market value of the bond and the portfolio (although the return if held to maturity is unaffected), unless the market has already factored in such a deterioration in credit quality. Conducting independent internal credit research can be used to reduce the 'credit migration' risk.

Within the market, the general pricing of credit risk compared with the government benchmark is typically measured by the 'swap spread'. This indicates the extra yield over a government bond that a good quality bank has to pay to borrow in a specified maturity. It is called the 'swap spread' because it relates to a swap transaction in which a bank pays (or receives) a fixed rate of interest to receive (or pay) the current short-term floating rate. The wider the swap spread, the greater the credit yield premium.

Swap spreads have increasingly come to be preferred as a generic indicator of credit conditions. They are not affected by changes to an individual borrower's credit status, as is the case if an actual single bond is used as an indicator. Nor are they affected by changes to average maturity or credit quality, as is the case if a composite index of bonds is used. This has led to an increasing use of the swap rate itself as an indicator of the general level of yields and the basis for analysis of value. A BBB-rated corporate bringing a bond issue, for example, might look not at the yield premium over government bonds as the relative cost of borrowing, but at the yield premium over 'swaps'.

Passive bonds

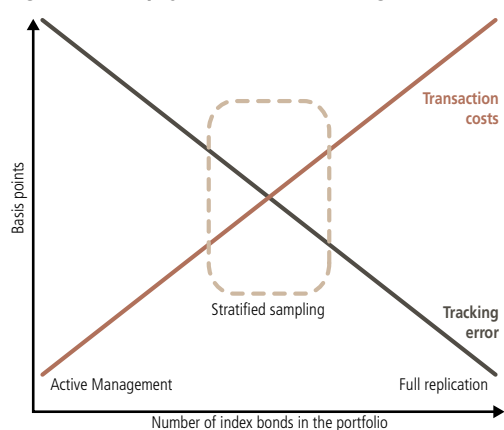
Passive fixed income investing requires manager skill, experience and technology to achieve returns in line with the benchmark. Unlike equities, a very strict and exact replication of the benchmark may not necessarily be the best approach for fixed income. The main objective of a passive bond portfolio is to replicate the index exposures whilst minimising tracking error and transaction costs.

The optimal portfolio may be achieved by "full replication" for indices that have simple universes containing a small number of highly liquid securities with limited sector

allocation. However, this is not the case for most fixed income benchmarks. Bond indices typically have high turnover due to new issues, taps to existing bonds, coupon payments and the natural turnover caused by bonds leaving the index when reaching less than one year to maturity. In addition, bond indices usually contain a larger number of securities than equity indices. For example, the Bloomberg Barclays Global Aggregate Index contained 17,731 individual bond issues at the end of December 2016 compared to 3,076 stocks in the FTSE All-World index¹. Bond markets can also be subject to changing liquidity conditions and market access hurdles, meaning that execution may be more challenging than in equity markets. Consequently, closer replication disproportionately raises transaction costs and can negatively impact returns.

For these reasons, the 'stratified sampling' approach to passive bond management might be the most appropriate method to consider. This is a process which aims to replicate the risk characteristics of the benchmark with fewer securities, complemented with qualitative input from portfolio managers to ensure that the portfolio holdings are sufficiently liquid and diversified. This method fits the overall aim of minimising costs and tracking error, whilst optimising the result, especially for large and complex universes as shown in *Figure 4.4*.

Figure 4.4 The pay-off between tracking error and transaction costs



Source: UBS Asset Management. For illustrative purposes only.

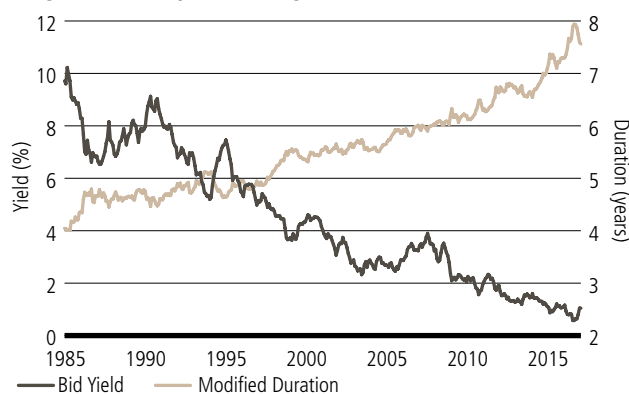
A comprehensive assessment of the index composition and rules are essential for optimal results. The index rules are typically well known by portfolio managers for the main families of bond indices. However, in the case of highly customised mandates, with less standard indices, it is important to understand the mechanics. Such as, rules for inclusion in the index such as issue size, rating, maturity, country; rules for rebalancing such as frequency, reinvestment of cash flows and treatment of new issues; trading information such as pricing source, timing, settlement, market holidays and hedging methodology.

¹ Source: Bloomberg Barclays POINT and FTSE

For fixed income, companies and governments that borrow more money become larger index constituents. This increased borrowing can be associated with decreasing credit quality. Therefore intermediate solutions between a purely passive strategy and one that, for example, seeks to remove the 'worst' credits from the index might be worth considering. One general point is that there are many different ways of adopting a passive fixed income approach.

It is worth noting that index selection is critical and is in fact an "active" decision when investing in passive fixed income. *Figure 4.5* shows the long-term relationship between duration and yields for global developed sovereign bond market, from 1985 to 2015. From this we observe that the duration of the index has steadily increased over this period, whilst yields have steadily decreased. In a normal market environment, as duration increases, it may be expected that yields would also rise to compensate for this increased risk. There are, of course, many other factors which impact yields, such as the macroeconomic environment and central bank policies. However in the current low yield environment, traditional market-weighted indices, like this one, may not always be the most appropriate solution and it may be worth considering alternative indices which take other characteristics into account, such as the credit risk of the underlying issuers.

Figure 4.5 Long-term relationship between duration and yields for global developed sovereign bond markets, from 1985 to 2016



Source: Citigroup Global Markets Inc.

In recent years, index providers have substantially increased the breadth of their offering so it is possible to find solutions that will fit most investors' objectives. The index selection should take into account an investor's risk tolerance and return target. In addition, attributes such as diversification, stability, liquidity, market depth, transparency, ease of replication and independent verification should be factored into the decision-making process. Benchmark selection should be reviewed periodically to assess on-going suitability and changing market conditions.

Pooled funds have been popular in passive management for many years because of the cost savings inherent in aggregating portfolios with similar objectives. However, the past few years have seen the growth of a new form of commingled vehicle for passive investment — exchange traded funds (ETFs). These are similar in many respects to open-ended pooled funds, except that the units are traded on a stock exchange in a similar way to shares. Rather than buying units from the manager of the fund, the investor makes purchases in the market at the prevailing price. Investors (and market makers) are assisted by the publication on a daily basis of the net asset value (NAV) of the fund share, which is also updated, on an indicative basis, in real time during trading hours.

Some important bond terminology

Plain vanilla

'Plain vanilla' bonds specify the principal, coupon dates, coupon amount and the redemption date. See *Figure 4.6* for definitions. Provided the issuer does not default, the holder of a plain vanilla bond is assured of both the size and the timing of cashflows. Beyond this, there are many other types of bonds with a variety of characteristics.

Figure 4.6 Bond terminology

Principal	The amount that is borrowed and the value at which a bond is redeemed. This is also called face value or par value.
Redemption date	The date on which the principal will be repaid.
Coupon	Fixed amounts of interest payable on pre-set dates. A coupon is usually a fixed percentage of the principal.
Coupon dates	Dates on which coupons are paid.
Price	The price at which bonds are traded after the issue date.

Source: UBS Asset Management

Plain vanilla variations

Two common variations on the standard plain vanilla bond described above are floating rate notes (FRNs) and zero coupon bonds (ZCBs).

A floating rate note pays a coupon that is re-set at predetermined intervals according to a set formula (for example, the three month interest rate set each quarter).

A zero coupon bond does not pay any coupons at all but is issued at a discount to the face value. It is particularly suited to matching liabilities precisely because the risk associated with reinvesting coupons is eliminated. In some markets, these

can be created from plain vanilla bonds by 'stripping'. This is where a bond's coupon and principal payments are 'stripped' into individual payments so that an investor can buy, for example, just the coupon payment for December 2016.

Callable bonds

The issuer has the option to redeem a callable bond at par or higher prior to the redemption date. This bond disadvantages the investor and typically pays a higher coupon than the equivalent plain vanilla bond.

Puttable bonds

The investor has the option to demand the redemption of a puttable bond at par prior to expiry. This may be on one or a series of specified dates and is an advantage to the investor. These bonds generally pay a lower coupon than plain vanilla bonds. These are also known as put bonds or retractable bonds.

Convertible bonds

Convertible bonds give the investor the right to convert the bonds into something else in the future. Generally, convertibles issued by a government are convertible into another bond with different characteristics after a specified date. Companies may issue bonds that can later be converted into equity.

Asset-backed bonds

The cashflows of an asset-backed bond are determined and secured by the cashflows of an underlying asset. An important example is the mortgage-backed bond; mortgage interest payments made by homeowners are used to pay the coupon on a bond. The structure of such bonds may allow for early repayment, in part or in full, if underlying assets change — e.g. if borrowers repay their mortgages early.

Gross redemption yield

A bond is typically valued in terms of its gross redemption yield. This is the rate of interest at which the price of the bond is equal to the total discounted present value of the coupon and principal payments.

Yield curve

One way of assessing relative value between different bonds is to compare their gross redemption yields, either across issuers and markets or across maturities. If we take bonds issued by the same issuer, then the different yields for bonds of different maturities stem both from investor preferences for different maturities and their expectations for inflation and interest rates over time.

A plot of the relationship between yield and maturity is called a yield curve. Upward sloping yield curves have typically been deemed 'normal'. There are several possible explanations for this. Some academics have argued that it is investors' preference for liquidity (liquidity preference theory) that has resulted in lower yields for shorter-dated bonds.

The expectations theory argues that it is actually investors' expectations for interest rates that determine yields. The greater the uncertainty in forecasting future inflation and credit risk, the higher the yield demanded by investors as the term increases.

The segmentation theory states that different investor classes have different preferences and it is the relative demand and supply of bonds in each maturity range that determines yields. For example, in the UK, insurance companies and pension funds have a natural bias towards longer-dated bonds.

Yield curves are not always upward sloping. They may invert (slope downwards) to reflect a situation where short-term interest rates have been set at a level that is perceived to be above the 'neutral' level, in order, for example, to slow economic activity and bear down on inflation. Under these circumstances, investors in longer-dated bonds may be prepared to accept a lower yield because they believe that such a policy will be successful in leading to a lower level of short-term interest rates in the future.

Duration

Duration can be defined as a measure of sensitivity of the bond's price to changes in yield. Generally, the longer the bond, the higher its duration and the greater the change in price for a given change in interest rates. Duration is expressed in two ways. Macaulay's duration is expressed in years and is a measure of the present value of the cashflows of a bond, weighted by the life of each of the cashflows. Macaulay's duration, adjusted for the current yield on the bond, gives the modified duration. This measures the percentage change in the price of a bond for a given small change in yield.

Figure 4.7 compares the Macaulay's duration and the modified duration for two hypothetical bonds. *Figure 4.8* shows the sensitivity of the prices of the same two bonds to changes in yield. Note that the price of the bond increases faster when yields fall than it decreases when yields rise. This is called 'convexity' and can be an important feature of bond investment, particularly when yields move significantly. Duration is a key concept because expectations of yield changes will cause investors to select the maturity of their bond holdings accordingly.

Figure 4.7 Macaulay's duration and modified duration

	Bond 1	Bond 2
Coupon	5	5
Frequency of coupon (per year)	1	1
Price	100	100
Redemption value	100	100
Number of years	5	30
Internal Rate of Return (IRR)	5%	5%
Macaulay's duration	4.55	16.12
Modified duration	4.33	15.35

Source: UBS Asset Management. For illustrative purposes only.

Figure 4.8 Bond price sensitivity to changes in yield

Change in yield	Change in price	
	Bond 1	Bond 2
+3%	-12.0%	-33.8%
+2%	-8.2%	-24.8%
+1%	-4.2%	-13.8%
+0.5%	-2.1%	-7.3%
0%	0.0%	0.0%
-0.5%	+2.2%	+8.1%
-1%	+4.5%	+17.3%
-2%	+9.2%	+39.2%
-3%	+14.1%	+67.2%

Source: UBS Asset Management. For illustrative purposes only.

Value in bonds

Investors' concerns with the real return on their assets mean that nominal bond yields include compensation for expected inflation and an expected real return. There is also likely to be some form of risk premium. This allows for the uncertainty about the future, typically in respect of inflation on government bonds. It also allows for default and event or liquidity risk on corporate bonds. This latter element is generally referred to as the 'credit spread'. It follows that the general level of bond yields changes for three reasons. First, as investor expectations for inflation moves. Second, as concerns about uncertainties vary. Third, as investors are willing to, or are forced to, accept different levels of real yield. Determining whether yields are at an appropriate level or are likely to move in either direction is, therefore, dependent on an evaluation of the appropriate levels of:

- Real yields
- The inflation outlook and inflation expectations
- Risk premia

Interest rate risk

This is critical for bonds that pay fixed coupons. If general interest rates (and therefore yields) rise, investors are worse off as they have fixed interest receipts at a lower rate than is now available. Different types of bonds and borrowers have varying sensitivities to changes in interest rates, as measured using duration, which was discussed earlier.

Exchange rate risk

Factors, such as inflationary trends, budgets and monetary policy affect all bond markets but do not operate uniformly across different countries. This was amply demonstrated during 1992 when the US and UK were easing monetary policy at the same time as Germany was pursuing a continued tight monetary policy in the aftermath of unification. The performance of bonds varies over time from country to country because economies worldwide tend, at any time, to be at different stages of the economic cycle.

The desire to invest beyond an investor's domestic base needs to be carefully considered, particularly as two separate decisions need to be addressed: the bond decision and the currency decision. For the bond decision, the selection of the individual bond is frequently less important than the market or country. There are a variety of factors that influence the level of long-term interest rates and hence bond yields. In different economies, it does not follow that the highest nominal yield represents the best value. By adjusting the nominal yield by the prospective inflation rate to produce a real yield, a useful first step is provided in evaluating international bond markets.

While this method of valuing markets is useful, it cannot be the final determinant of whether to invest or not. There must be a full analysis of the country in question to determine whether the economic and monetary fundamentals, and hence the risk, are matched by the yield.

Having made the decision to invest in an international bond market, a separate decision needs to be made regarding the currency position. Essentially, there are two choices. First, to hedge the total cost of the international asset back into the investor's base currency through the forward foreign exchange market (i.e. cover the currency risk). Second, to leave the international asset unhedged. The decision will be influenced by the outlook for the currency. More discussion on currency management can be found in Chapter 7.

Inflation risk

Conventional bond coupon and principal payments are fixed in nominal terms. Inflation erodes the real value of these payments and represents the most serious threat, other than default, to the value of bond investments. Governments that allow inflation to develop can be regarded as defaulting by stealth, even where they honour the actual payment schedule on their bonds.

Inflation risk can be significantly reduced by investing in inflation-linked bonds (index-linked in the UK, Treasury Inflation Protected Securities (TIPS) in the US) which have their coupons and final redemption amount fixed in real terms. In other words, the coupon and redemption amount are increased by a specified measure of inflation experienced during the bond's term.

Figure 4.9 sets out a comparison with a hypothetical conventional bond. Both governments and corporates have issued inflation-linked bonds but the corporate market is small and liquidity can, therefore, be difficult. The motivation to issue bonds that protect investors from inflation stemmed from the 1970's experience of very high inflation. This had led investors to demand exceptionally large risk premia against the risks of future inflation. Inflation-linked bonds reduce the risk of unanticipated inflation to an investor.

Figure 4.9 Comparison of inflation-linked and nominal bonds

	Inflation-linked bond	Nominal bond
Assumptions		
Fixed coupon	2.5%	5.1%
Inflation per annum	2.5%	-
Life of the bond	2 years	2 years
Coupon frequency	Annual	Annual
Face value	100	100
Internal rate of return (IRR)	5.1%	5.1%
Modified duration	1.88	1.86
Cashflows/Periods		
0	-100	-100
1	2.56	5.1
2 (coupon)	2.63	5.1
2 (principal)	105.07	100

Source: UBS Asset Management. For illustrative purposes only.

This has two important consequences. First, investors are confident of maintaining the real value of their investment and lock in a real return. Second, there is no risk premium for unanticipated inflation and, therefore, the cost of borrowing for the issuer may be lower. However, the issuer does give up the potential for inflation to erode the real value of its obligations.

Risk premia

Compared to conventional bonds, inflation-linked bonds do not require a risk premium for inflation exceeding expectations. However, risk premia for default risk or rising real yields are still relevant. Liquidity premia can also be significant when markets are newly established or very small compared with their fixed interest equivalents.

Break-even inflation

When comparing a conventional bond with an inflation-linked bond of similar redemption date, the rate of inflation that equalises the return on the two securities can be calculated. This is known as the 'break-even inflation' rate and should provide an indication of the level of inflation expected by the market.

It is most unlikely that inflation will turn out exactly at the rate implied by market levels. If inflation proves to be higher than the break-even rate, the inflation-linked bond provides the better return; if inflation is lower, the conventional bond outperforms.

Inflation-linked bonds have been issued in the UK since the early 1980s. Other governments — notably Australia in 1985, Canada in 1991, Sweden in 1994 and France in 1998 — have issued inflation-linked securities but as *Figure 4.10* demonstrates. The inflation-linked bond market is dominated by the US and the UK and to a lesser extent Italy and France in terms of market in size. The US established a market in TIPS in January 1997, the equivalent of UK index-linked gilts. Since then, there have been several auctions and new issues, covering a wide range of maturities.

Figure 4.10 Size of inflation-linked bond markets

	Market value (USD billion)	Number of issues
Canada	51.3	7
France	142.2	8
Germany	75.7	6
Italy	167.5	10
Japan	50.1	10
Sweden	26.5	7
US (TIPS)	993.2	36
UK (Index-Linked gilts)	701.4	25

Source: Barclays Capital as at 31 December 2016.

The development of the TIPS market was accompanied by the opening of a substantial yield premium over index-linked gilts, though TIPS were issued initially at a yield discount. This highlighted the new opportunities for actively managing inflation-linked securities in an international context. Volatility in the real yield spread means such opportunities will continue to ebb and flow.

The global bond market

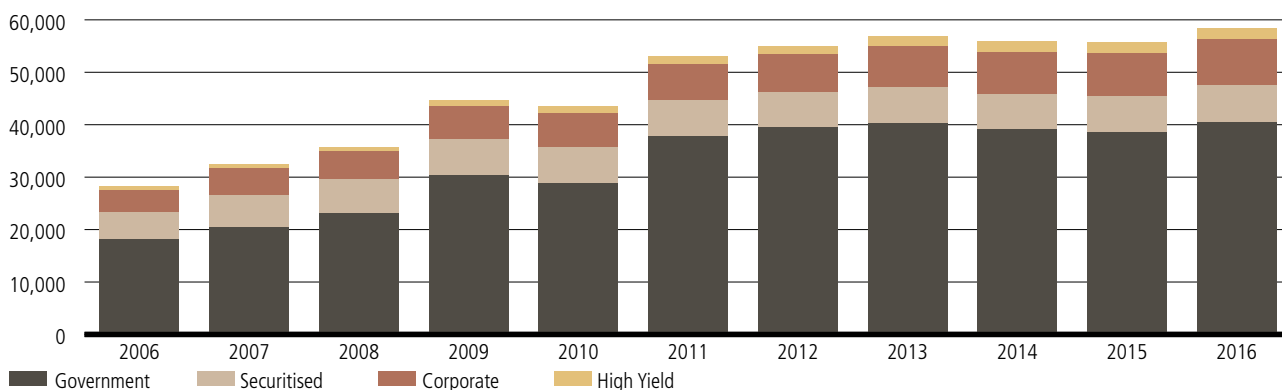
Bond markets in developed economies have more than doubled in size over the last 10 years, due to an increase in both government and non-government bond issues. After very rapid growth of borrowing in the 1980s, most governments in developed economies moved towards a more prudent fiscal policy in the 1990s, operating with lower budget deficits or, in some cases, moving into budgetary surplus. This has now changed given the need by governments to fund the recent extraordinary measures taken to support the global economy.

Greater issuance of non-government debt has been spurred by factors such as:

- **Disintermediation** — whereby borrowers gain direct access to savers through debt instruments, cutting out middlemen such as the banks
- **Securitisation** — whereby finance for new activities can be raised by asset-backed bonds
- **Privatisation** — whereby previously government-run and funded enterprises are transferred into the private sector
- **Globalisation** — the increasing openness of capital markets has allowed borrowers wider access to savers across markets

Index-qualifying securities are bonds that meet the requirements set by providers of bond indices that fund managers are typically measured against. *Figure 4.11* shows the size of index-qualifying

Figure 4.11 Size of the global bond market (USD billion)



Source: Bank of America Merrill Lynch. Total face value of index-qualifying fixed income securities. Amounts outstanding at year ends.

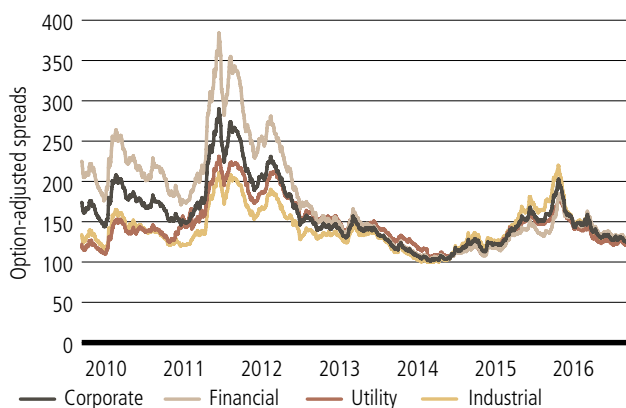
fixed income securities by asset class from 2006 to 2016, demonstrating how the global bond market has grown over the period. The long-term growth in the non-government sectors is particularly notable. Global bond benchmarks are already coming under close scrutiny as the increasing importance of credit makes inclusive 'aggregate' and corporate benchmarks more appropriate for many clients.

Both the USD dollar and EUR high yield markets have shown substantial growth over recent years, interrupted only during the credit crisis, when high yield bond issuance stopped. In particular the euro high yield market has demonstrated a substantial increase in diversification of issuance by companies from different industries and now accounts for just under 20% of the global high yield market (as at end 2016).

As the economic outlook deteriorated during 2008, yield spreads (i.e. the difference in yield between government and corporate bonds) reached record levels, especially following the Lehman bankruptcy in September 2008. However, from Q2 2009 onwards through early 2011, corporate bond yield spreads rallied dramatically (with yields narrowing as prices increased) resulting in high total returns for both investment grade and high yield bonds.

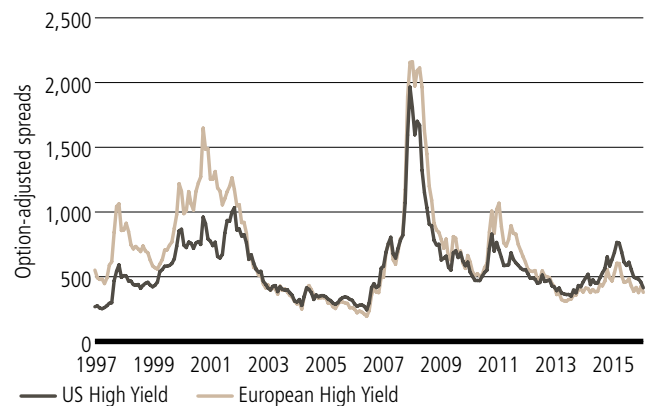
From Q2 2011 onwards, the corporate bond market experienced higher levels of volatility, especially in financials, largely as a result of the continued uncertainty surrounding European sovereigns which continued through 2014. In 2015 we saw a reversal in credit spreads as they widened over the year. This was the result of an exacerbation of fears over a slowdown of the growth in China, ever lower commodity prices and an increase in idiosyncratic risks. In 2016 credit spreads initially widened in the first six weeks of 2016 and then tightened for the remainder of the year. This was the result of supportive central bank action, a muted market response to geopolitical events, a strengthening outlook for global growth and a rally in energy prices.

Figure 4.12 Global corporate bond spreads by industry sector



Option adjusted spread over treasuries for global bond indices. Source: Barclays Capital. Data as at December 2016.

Figure 4.13 High Yield spreads continue to experience volatility



Source: Bank of America Merrill Lynch as at December 2016. BofA Merrill Lynch Euro High Yield Constrained Index (HECO), BofA Merrill Lynch US High Yield Index (JUCO).

During late 2008, the market for new issues of corporate bonds practically closed down as a result of unprecedented risk aversion by bond investors. However, over the recent years the corporate bond new issue market has reopened with high levels of bond issuance across different industrial sectors. Much of this bond issuance has been used by issuers to refinance and extend out their debt maturity profiles, which is positive for bondholders as it reduces liquidity risk.

Despite the increase in the number of countries that can access global capital markets (and therefore, reduce their cost of funding), government bond markets globally are still dominated by a few currencies. *Figure 4.14* shows that in 2016 just over 80% of the index-qualifying government fixed income market was accounted for by issuance in US dollar, euro and yen.

Figure 4.14 Size of the global bond market, end 2016

	Government bonds ¹		Non-government bonds ²	
	USD billion	%	USD billion	%
US	16087	39.7	13775	77.2
Eurozone	8255	20.3	3022	16.9
Japan	8330	20.5	161	0.9
UK	1911	4.7	504	2.8
Other	5,984	14.8	376	2.1
Total	40,567	100	17,837	100

Source: Bank of America Merrill Lynch. Total face value of index-qualifying fixed income securities.

* Includes local sovereign, external sovereign and quasi sovereign.

** Includes corporates and securitised.

The growth of global capital markets has meant that the governments of many developing countries have also established bond markets. These may be in local or foreign currency, typically USD. The growth of emerging bond markets is discussed overleaf.

Bond market structures are not uniform. In the US, for example, government bond markets are relatively liquid up to maturities of 30 years while the liquidity in some other markets has been limited to bonds of 10 years or less.

The price convention, settlement convention and the method of calculating interest, varies from market to market, but perhaps more importantly, yields are expressed on a different basis: semi-annual in the US and the UK, annual in many European markets, and on a simple interest basis in Japan. Fortunately, there is little problem in converting yields to show them on a consistent basis.

Emerging market bonds

Introduction

There has been investor interest in emerging markets bonds for decades, although concerns about political, structural and debt problems among the issuers kept these securities outside the mainstream. This changed with the Brady Plan, where the resulting bonds were an important catalyst for the acceptance of emerging markets debt in more traditional institutional portfolios. The Brady Plan, created by US Treasury Secretary Nicholas Brady, was a response to a series of bank loan defaults by developing countries in the 1980s. These defaults had negatively affected the global financial system, as they had forced a number of US and foreign commercial banks to write down the value of their assets.

Narrowly defined, the plan was an innovative debt renegotiation format, whereby defaulted sovereign bank loans were written down and converted into bonds. More broadly, however, it also encompassed an entire set of economic policy prescriptions that developing countries adopted in order to receive additional international aid. This aid, in turn, allowed the participating countries to meet their obligations under the plan.

The Brady Plan differed from previous approaches in a number of respects. Among other things, the underlying structural problems of the debtor countries (such as protected markets and controlled prices) were addressed for the first time. Also, the commercial banks' loans to private and sovereign entities were transformed into sovereign bonds, which thus enhanced their appeal to investors. Another important feature of the plan was that the terms of Brady bonds vary. Most bonds were issued with a final maturity of between 10 and 30 years and had semi-annual coupons, and many had amortising principal payments. Coupons may be fixed, floating, step-up or a hybrid combination. Moreover, unique characteristics, such as principal collateral, rolling interest guarantees and value recovery rights, were added to Brady bonds in order to improve creditworthiness and attract investors.

As of today, Brady bonds have been matured and disappeared nearly completely from the market. However, they changed and improved the recognition of EM bonds significantly.

Currently, investors can access bonds from over 70 countries that are classified as emerging markets. Many of these countries have liquid markets for bonds denominated in USD or another international currency such as the euro or yen. A smaller number, around 30 countries, also have growing local currency bond markets through which investors can get exposure to both local yields and currencies.

However, there is no commonly accepted definition on emerging markets countries. You could argue that all countries excluding those classified as developed markets by MSCI, are emerging markets in a broadest sense. All additional cluster as frontier markets or convergence markets are included in emerging markets as a whole. As a consequence, index providers use different approaches and definitions when creating the benchmarks. Therefore it is essential to compare the potential indices in great detail before choosing one as the appropriate benchmark.

The most widely used sovereign USD-denominated emerging markets index family is the JP Morgan Emerging Markets Bond Index Global (EMBI Global family) and JP Morgan GBI-EM Global for local currency denominated debt².

Which kind of debt is available?

Sovereign debt (USD)

Governments are usually the biggest and most important issuers. Quasi-government institutions, like PEMEX in Mexico, are also major players in many countries. There are some important points to be made with regard to these bond issuers. The creditworthiness of emerging countries' governments is less uniform than that of developed countries. In that context, rating agencies such as Moody's and Standard & Poor's play an important role as they assign credit ratings EM bonds, mirroring the current and expected default probability of this specific bond.

Euro bonds are now the most important type of EM bonds. They are internationally issued securities denominated in USD or — to a lesser extent — local currencies. Most euro bonds have a fixed coupon and a defined single maturity. As a portion of trading volume, euro bonds now make up the largest portion of the USD denominated emerging debt market. Although the volume of outstanding USD denominated euro bonds has been increasing only marginally due to the stronger fiscal framework in emerging markets countries, trading volume of euro bonds has been growing significantly over the last few years.

² Both indices are available as a country weights capped versions, offering a better diversification

The JP Morgan EMBI Global diversified contains the most liquid USD denominated sovereign and quasi-sovereign securities (100% government owned only); the total market value of the JP Morgan EMBI Global diversified was around USD 691 billion at the end of 2015 according to data from JP Morgan.

The JP Morgan EMBI Global diversified includes countries with a low or medium per capita income (as defined by the World Bank). As such, the country inclusion methodology used by the JP Morgan EMBI Global diversified is income-based and risk-based rather than rating-based. The underlying principle for this is that emerging countries, irrespective of their credit rating, share similar risks. In contrast, other index providers, such as Bank of America Merrill Lynch and Barclays Capital, have created emerging debt benchmarks that include countries strictly on the basis of their credit rating (BBB- to Baa3 or lower). Based on long-term economic improvements and political stabilisation in many emerging market countries, roughly 60% of the universe is now rated investment grade. As a consequence, investors are increasingly considering emerging market bonds as a core part of their fixed income portfolio, rather than just a satellite.

Sovereign local debt

Due to strong fundamental improvements over the last decade, many emerging markets countries used their reserves to buy back USD denominated debt while issuing domestic bonds. This was made possible through governments raising cash from domestic investors, for example pension funds and insurance companies, but also due to increasing participation from foreign investors.

Local currency bonds are issued in the country's own local currency, regardless of whether such a bond is issued and settled locally or as a global bond under foreign law. Similar to US Treasury bonds, these local bonds carry local duration risk and currency exposure. Expectations for local interest rates, domestic inflation or the valuation of the currency itself are important drivers of the overall total return. In that context, managers must predict not only just the future direction of interest rates but also the speed and magnitude of interest rate moves.

From an issuer point of view, local currency bonds often provide the most attractive financing source for issuers for two reasons:

- Risk premium mainly depend on domestic yield developments
- As these bonds are issued in their own local currency, currency risk due to a mismatch between the FX of the revenues and the FX of the expenses is eliminated from the issuers' point of view

Investors and issuers are becoming increasingly focused on domestic market investments. This shift in interest is partly based on historic performance that exhibits a low correlation to other asset classes and attractive risk-return profiles. On the other hand, access to emerging markets debt became easier due to the ongoing improvement in liquidity and transparency, as well as a better developed capital market infrastructure.

In 2006, JP Morgan created a new local currency index family for the domestic markets, which includes bonds denominated in local currency. These indices are calculated in the same format as the JP Morgan Global Bond Indices (JPM GBI) for developed markets. The most diversified index (JP Morgan, GBI-EM Broad) includes 17 countries/currencies with a market capitalization of approximately USD 1,868 billion at the end of 2016. This market value is already more than two times larger than the EMBI Global and underlines the importance of this relatively young market segment.

Corporate debt

Corporate issuers complete the group of bond issuers and emerging markets corporate bonds are becoming increasingly popular with investors, demonstrated by the increase in their market capitalisation over the last years. Those corporates and quasi-sovereign issuers with a government ownership below 100% located in emerging markets countries are increasingly able to tap international capital markets and access cheaper and more regular funding than through traditional bank borrowing. This sector is still relatively young but fast growing, and offers exciting opportunities for investors who are willing to spend time identifying value.

Even if there are some corporate debt bonds issued in domestic currency, the vast majority of these issues are denominated in USD. Therefore, investing in emerging markets corporate debt carries US duration risk as well. In addition, the spread between US treasuries and the yield of the bond should mirror the default risk of the domiciled country as well as the default risk of the issuer itself.

Emerging markets corporate debt is represented by the JP Morgan CEMBI family. As at the end of 2016, the market capitalisation of all USD denominated emerging market corporate bonds (measured as JP Morgan CEMBI broad) was already slightly above the market capitalisation of the USD denominated sovereign index (EMBI Global) at around USD 855 billion. Please note that JP Morgan departed from the common definition of emerging markets countries for the corporate bond universe and adopted a regional based approach instead (corporates need to be headquartered in emerging markets countries or they need to have 100% of their operations there, i.e. local subsidiaries).

Performance of emerging markets bonds³

Emerging markets bond indices have evolved over time and still have a somewhat limited history. To get an introduction on historical returns, we use JP Morgan EMBI Global since 1991. Since that time, emerging markets bonds (adjusted for defaulted securities) have shown an average return of 12.2% p.a in USD terms. This compares with an average annual return for US treasury bonds of 5.5% p.a. over the same period. The excess return comes with higher volatility because of the inherent risks associated with investing in emerging markets bonds, which have an average volatility of 10.1% p.a. (for the period 1994 to 2016), compared to US Treasury bonds at 4.3% p.a, both in USD terms.

Figure 4.15 shows how the 'Tequila Crisis' in Mexico in 1994, and the Russian and Brazilian crises in 1998, resulted in negative returns in those years. At times the market is more resilient and, despite the Argentine crisis in 2001, the return of the overall market was positive that year. The negative return in 2008 was due to the global financial crisis.

Whilst this crisis was not triggered by any country specific credit event, emerging markets bonds were hit hard by increasing investor risk aversion. However, 2009 posted a significant return due to a solid economic stability in emerging markets countries and an impressive recovery.

The increase in US treasury (UST) yields in 2013 was completely reversed in 2014 as the expected end of the quantitative easing did not materialise. Emerging markets bonds in USD profited from declining UST yields and duration exposure added to the performance. Local yields followed UST yields downward and provided a positive return as well (see *Figure 4.16*).

Figure 4.17 shows the yields and sovereign spreads for some key emerging markets bonds. While the spread measured the idiosyncratic risk of the issuer, the yield includes additionally the relevant part stemming from the underlying US yield curve. As spreads vary, thus providing opportunities to outperform indices through active management.

The term 'spread' is a measure of the yield on a bond expressed in excess basis points (100ths of one percent) above the yield on a benchmark bond, such as a UST. For example, at the end of December 2016, the yield of the Brazilian government bond (2023) was 5.46%, giving it a spread of 330 basis points (bps) over a 10 year generic UST yield of 2.16%. This spread can be interpreted as a measure of compensation for accepting the higher risks and, by extension, value, which exists between the Brazilian government's 2023 bond and an equivalent US treasury security.

Finding value in emerging markets bonds

Value in emerging markets government bonds can be identified through quantitative and qualitative techniques. Historically, a variety of factors have been responsible for both, crises and recoveries. The Mexican crisis, for example, was precipitated by a highly indebted government sector, while the crisis in Asia was due to by poor regulation and imbalances within the private sector. However, the most recent severe crisis in 2008/2009 wasn't triggered by poor economic and or social developments in emerging markets countries at all. This crisis spilled over from developed markets, based on a poorly regulated banking sector and overwhelming debt burden in the private sector.

The most important factor for the expected return is the country's ability and willingness to pay back its debt. To judge on this, investors are interested in the governments' ability to service external debt, which also requires the ability to generate foreign exchange. The capacity to do so will eventually be reflected in the spread. Some of the key factors that are useful when analysing and comparing USD denominated debt are:

Economics

- Government balance sheets, external debt, debt service capacity
- The openness of the economy — competitiveness of exchange rates, the development of the export sector and the level of import competition
- The state of the world economy and the demand/supply balance for commodities
- Company specific factors, sector trends, currency trends etc.

Political & Social Structures

- Institutional strength, socio-economic composition and stability, geographic significance, investor base

Security selection aspects

- Relative value between issues of the same issuer or between sovereign and non-sovereign issuers
- Market technical conditions, liquidity, positioning, pricing

In order to allow such analytical work in a transparent, comparable and repeatable way, quantitative models are used to support these processes (economic momentum models, debt sustainability analysis, credit vulnerability model etc).

³ Source JP Morgan as at December 2016

Figure 4.15 Emerging market USD denominated bond return history

	Annual return (%)	Volatility (%)	Spread (bps)
1991	38.8	8.6	751
1992	7.0	6.4	635
1993	44.2	8.9	687
1994	-18.3	21.9	751
1995	26.4	16.8	1209
1996	35.2	12.2	724
1997	11.9	14.6	438
1998	-11.5	32.0	795
1999	24.2	12.4	861
2000	14.4	10.2	651
2001	1.4	10.2	792
2002	13.1	13.5	629
2003	25.7	8.2	318
2004	11.7	8.6	276
2005	10.7	5.5	235
2006	9.9	5.7	171
2007	6.3	4.5	255
2008	-10.9	19.1	724
2009	28.2	7.1	294
2010	12.0	4.8	289
2011	8.5	4.7	426
2012	18.5	3.5	266
2013	-6.6	6.6	327
2014	5.5	5.1	404
2015	1.2	4.9	446
2016	10.2	5.9	365
Average 1991-2016% p.a.	12.2	10.1	528

Source: JP Morgan Emerging Markets Bond Indices; spreads adjusted for defaulted securities.

Figure 4.16 Emerging market local currency denominated bond return history

	Annual return (%)	Volatility (%)	Yield (%)
2004	23.0	8.6	6.9
2005	6.3	7.0	6.7
2006	15.2	10.4	6.7
2007	18.1	8.2	7.6
2008	-5.2	20.4	7.4
2009	22.0	14.9	7.3
2010	15.7	11.4	6.7
2011	-1.8	14.0	6.6
2012	16.8	12.8	5.5
2013	-9.0	11.4	6.9
2014	-5.7	11.2	6.5
2015	-14.9	9.4	7.1
2016	-14.9	14.9	6.8
Average 2004-2016% p.a.	5.9	11.6	6.8

Source: JP Morgan Emerging Markets Bond Indices; spreads adjusted for defaulted securities.

Figure 4.17 Emerging market bond yields and spreads

	Bond ¹	Yield (%)	Spread (bps)
Argentina Discount	8.28% 2033	7.21	476
Brazil Euro	2.625% 2023	5.46	330
Colombia Euro	11.75% 2020	2.46	102
Indonesia Euro	7.75% 2038	5.40	266
Mexico Euro	7.5% 2033	4.99	237
Panama Euro	9.375% 2029	4.79	234
Peru Euro	8.75% 2033	4.65	203
Philippine Euro	9.5% 2030	3.83	134
Russia Euro	5.625% 2042	5.03	217
Turkey Euro	6.75% 2040	6.62	385
Venezuela Euro	9.375% 2034	20.27	1,797

Source: JP Morgan. As at end December 2016.

¹ For bonds with variable coupons, the table shows only the most recent coupon.

When it comes to investments in local currency denominated debt, the local currency should be seen as an additional source of return and needs, therefore, be analysed as an asset class in its own right. The challenge in evaluating emerging markets currencies is the result of their relatively short history as, in the past, many of these currencies were managed, linked or pegged to the USD. Long-term currency models, such as purchasing power parity (PPP), have only limited expressiveness.

However, other factors are seen as more important for emerging market currencies, for example, the inner value of a currency, carry to risk approach, the analysis of the basic balance or the expected real rate for a country.

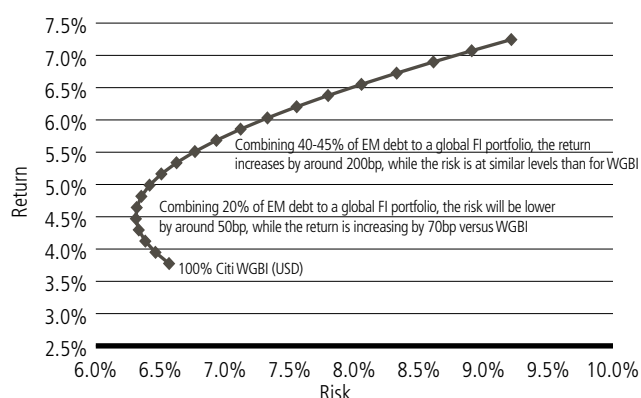
What about diversification?

Another, not less important dimension is the risk diversification when investing in emerging markets debt. In that context, the investor should differentiate between the

- Diversification of the portfolio itself
- Diversification effects when adding emerging markets debt to an existing fixed income portfolio.

For diversification of the portfolio itself, a well and broadly diversified portfolio is one of the pre-requisites and criteria for success which needs to be defined when starting investing in emerging markets debt in the same way as the investor will do it in all other asset classes as well. The higher the concentration towards single names, trends, events etc, the higher might be the volatility versus the overall market and the higher the potential losses and/or gains.

Fig 4.18 Risk vs. return



Source: JP Morgan

Equally important is the diversification within an existing fixed income portfolio. Due to a lower correlation between developed and emerging markets debt, the addition of a higher riskier asset class (JPM EMBI Global div) into a global

fixed income portfolio (Citi WGBI) can reduce the overall risk of such combined portfolio and/or can increase the overall return, while keeping the risk at similar levels. This characteristic makes it even more attractive investing in emerging markets debt.

Emerging Markets debt passive

Over the last two to three years, there has been an increasing interest in investing passively into emerging market debt (EMD). Given the improving transparency of emerging market indices as well as higher liquidity in the debt markets, this trend should establish as a longer term trend, which could underpin the importance and recognition of emerging market debt substantially. Many long term investors use passive strategies for strategic investments, while the tactical allocation is done in active strategies.

Pension fund allocation to bonds

In the early 1960s, pension funds allocated over 50% of their assets to bonds. This fell steadily until 1993, to a low of 10%. Since 1994, the proportion has been on a rising trend again, to a peak of 39% in 2011. This fell slightly, but still remains relatively high at 37% in Q1 2016. General trends in pension fund asset allocation are discussed more fully in Appendix B.

Three factors can be cited as encouraging greater allocations to bonds:

- Increasing maturity of pension funds, so that more bonds are held to match known liabilities to pensioners, either in current payment or deferred
- The Minimum Funding Requirement (MFR) contained in the Pensions Act 1995, which required such liabilities to be valued using a bond yield. This was replaced with less prescriptive requirements under the Pensions Act 2004
- FRS17, the UK accounting standard that requires companies to incorporate their pension fund into their balance sheet, specifies that all pension fund liabilities should be valued using a AA corporate bond yield. A similar approach is now required in the relevant international accounting standard, IAS19

None of these developments actually require pension funds to invest in bonds. However, they act as powerful incentives to do so in order to avoid the volatility associated with investing in assets that do not move in line with liabilities. In some well-reported cases, companies have closed their defined benefit schemes, citing either the cost of such schemes or the balance sheet risk they represent for the



company, or both. The closure of schemes reinforces the trend towards bonds in such schemes, as they then mature more rapidly. It is not yet clear what asset allocation pattern will emerge as defined contribution schemes grow in importance.

As noted earlier, growing demand for long maturity bonds in the UK has been sufficient to create a relatively flat yield curve. It seems likely that these pressures will persist as asset allocation moves towards a better match to the maturity structure of pension funds.

The search for alternatives may lead investors back to overseas markets — with the crucial addition of currency hedging. Whilst the behaviour of such markets does not exactly match that of the UK, they may prove a better ‘fit’ than other asset classes.

Real estate



What is real estate?

For institutional investment purposes, real estate usually refers to the commercial sectors of office, retail, industrial (including logistics) and the leased, rather than owner-occupied, residential sector. Increasingly, real estate investment also refers to debt secured against property assets and other niche sectors such as student accommodation, hotels or healthcare.

The types of real estate that make up the investable market vary, often dramatically, between countries, as do their financial characteristics. That said, in most countries, both developed and increasingly emerging markets, institutions are active investors in the three main property sectors. Institutional investment in the residential sector is less common, but where possible, it serves as an important sector. For example, in the UK, institutional investment in the residential sector is very low, but in the Netherlands, the US and Switzerland, it is relatively high.

Owning real estate not only buys the physical asset and the rights which have been granted to the land on which that asset is developed, but also the rights to the future income stream from that land and/or building. As an investor, the right to these income streams is governed by a lease with a tenant. The lease provides for the tenant to occupy, use, and possess the space for the length of the lease. The owner continues to own the property, and at the end of the lease term the use and possession reverts back to the owner. A variation to this exists in countries where property investors themselves buy a long-term lease to land from the government or other owner; so-called leasehold or ground lease properties. These do exist in the UK, but are less common in Europe and the US. In parts of Asia and particularly China, they are used quite commonly.

The value of an asset reflects a number of key factors:

- Current and expected income growth
- The risk of the current and future income profile
- Duration of the income
- Liquidity risk
- Management costs

Real estate valuers, or appraisers, typically reflect these factors in a yield, or capitalisation rate (cap rate), which is used to capitalise the current and expected income streams. In the UK, real estate valuers are usually members of the Royal Institution of Chartered Surveyors (RICS). In the US, an external appraisal is performed by a Member of the Appraisal Institute (MAI). Other countries also have similarly qualified professionals to undertake valuations.

Looking at the factors above, real estate can offer a range of investment characteristics with varying risk levels. The lower-end of the risk spectrum includes investing in properties in the best locations with long leases in place from tenants with low probabilities of default on their rental obligations. These investments are referred to as core strategies.

Risk is reduced when a building is already operational and generating income. Loans made to high quality borrowers which are secured against properties with stable cash flows can also be classified as core investments. Riskier investments that aim to improve either the physical environment or the security of the income profile of existing properties are commonly referred to as value-added and opportunistic strategies. These strategies often have higher vacancy rates, shorter lease lengths, and less secure tenant covenants than core properties.

The riskiest strategies include: speculative real estate development, which delivers vacant properties to the market; purchasing property assets from distressed sellers; and purchasing debt secured against real estate assets from distressed lenders. Development risk is reduced by signing up a tenant before commencement or during construction of the project. The range of investment styles available means real estate income streams may be derived in many ways, offering investors a wide spectrum of risk and return trade-offs.

Gaining exposure to real estate

There are four key ways to gain exposure to real estate as detailed below.

Private and public equity real estate

- The private equity market via direct investment, unlisted funds or a fund-of-funds vehicle
- The public equity market via indirect investment through real estate company shares or real estate investment trusts (REITs)

It is important to note some major distinctions between the private and public equity routes: price and valuation. Publicly-traded real estate company shares and REITs can be traded instantly on a stock exchange. While the underlying assets are properties, the shares do not typically trade at prices which equal the sum of the individual properties' prices, net of liabilities (e.g. debt), otherwise known as net asset value (NAV).

Share prices can reflect a discount or premium to NAV since investors are not only buying exposure to the underlying properties, but also the management team's abilities and strategy, and will independently assess the value of the properties owned by the company. In contrast, the private market operates based on the system of valuations.



Valuations are estimates of the price at which a property might trade and can be above or below the realised sales price. In real estate markets, the limited transactional information available on pricing has led to the construction of indices based on regular valuations of a sample of properties. The price of units in unlisted funds is based on these valuations and trading takes place at NAV often with a bid/offer spread to reflect the cost of acquiring and disposing of the underlying assets.

Accessing real estate markets via either the private or public equity routes brings its own advantages and disadvantages (see *Figure 5.1*). Direct investment provides investors with control and undiluted income, in that no fees are paid to a third-party manager. However, as the funds involved in buying individual assets are often large, the formation of a diversified portfolio requires a substantial allocation and significant management time. This route is generally limited to the largest investors. Even then, most have to award mandates for certain strategies because of the challenge and cost in replicating local expertise across the globe. In contrast, gaining exposure to the asset class via the public equity route can be a low cost alternative to acquire diversified exposure and access expert management without the enormous funds needed for a direct portfolio. Investors also benefit from higher levels of liquidity over the private market route.

The downside is that in the short to medium-term, shares in real estate companies exhibit volatility similar to the wider stock market, rather than the underlying property assets. The price of liquidity is higher levels of volatility. However, over the long-term, real estate shares can deliver a similar return profile to holding direct real estate, after accounting for pricing issues and leverage.

Between direct investment and the public markets lies the unlisted funds route. Unlisted funds may be closed-ended or open-ended. They offer a balance between volatility

and liquidity, though not all investors are eligible to invest in them or find them tax efficient, especially cross-border. Nonetheless, they enable an investor to access unitised real estate vehicles which come in many shapes, sizes, and risk profiles. In this way, investors can choose a single fund with balanced exposure which would tend to track a broad market index (beta strategies), or can concentrate their allocation in specific funds that invest to particular sectors, markets or styles (alpha strategies).

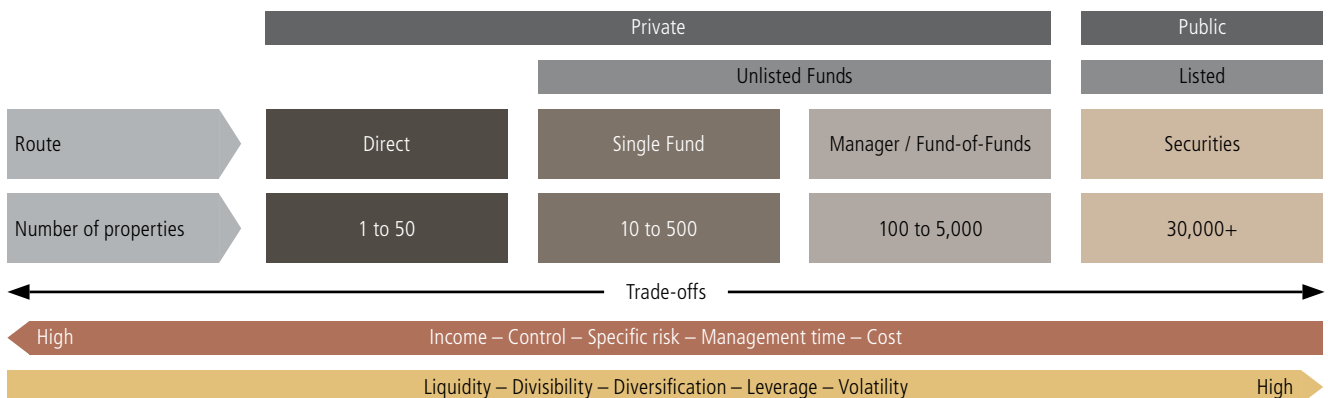
Liquidity is provided through redemptions, often after an initial lock-up period. Investors in these funds will typically seek redemption when the market is deteriorating or expected to do so in the near-term. The redemption price is based on the latest valuations of the properties in the fund. In contrast, closed-ended funds raise capital from investors, close and then purchase properties.

Closed-ended funds typically have a limited life, are more prevalent in the private equity industry and typically exhibit higher risks than open-ended funds. After the initial capital raising process, additional funds are generally not raised from new or existing investors, and liquidity is not available in the form of redemptions. In some markets, there is an active secondary market for investors to trade their units in both open and closed-ended funds. These secondary markets are useful in providing information on pricing of the underlying property assets.

In general, the investment strategy of an unlisted fund can also be classified as core, value-added or opportunistic, depending on the characteristics of the fund and its underlying properties. While these styles have been defined by various industry associations, such as the European Association for Investors in Non-Listed Real Estate Vehicles (INREV) in Europe or National Council of Real Estate Investment Fiduciaries (NCREIF) in the US, there is no single global classification of these funds.

Figure 5.1 Gaining exposure to real estate

Example – investing GBP 250 million



Source: UBS Asset Management, Real Estate & Private Markets, Research and Strategy

Broadly, styles relate to the classification of fund risk. There are effectively three layers to a fund's risk profile: the risk related to the individual assets (specific risk); the geographical and sector diversification within the fund (market risk), and the level of leverage used in the fund, defined as debt as a percentage of gross asset value.

Taken together, these layers combine to determine a fund's style, so not all funds with zero leverage can be considered core. For instance, a GBP 2 billion fund investing in stable assets across the retail, office, and industrial sectors, in a mix of core European countries with no leverage would be widely considered a core fund. At the other end of the risk spectrum, a fund developing office properties in emerging markets, with leverage of 75% would commonly be viewed as an opportunistic fund. In the middle are value-added funds which may take leasing, vacancy and refurbishment risk, but typically would not undertake ground-up development — or at least would seek to limit such exposure.

The private equity route also includes investing via a fund-of-funds vehicle, or multi-manager platform. Here, rather than investing through a single unlisted fund, a portfolio of unlisted funds is selected by a manager and actively (re-) positioned. This removes the risk of being exposed to a single fund and/or manager, but typically adds a layer of fees in recognition of the manager's ability and direct time costs to select and carry out due diligence on funds which are assessed to offer good risk-adjusted returns for a particular strategy. The additional fee may also be warranted by the additional diversification and risk reduction produced by the strategy.

As the fund-of-funds approach has grown, individual unlisted funds have derived a higher proportion of their investors from these vehicles. This route may be appropriate for investors without the necessary in-house expertise or those investors that are heavily invested in their domestic market but with limited global exposure.

Private and public debt real estate

There are two routes to gain real estate debt exposure:

- Through the private debt market by providing loans to finance the purchase of real estate assets
- Through the public debt market by investing in bonds that are secured against real estate assets

There are important differences between gaining exposure to real estate via the equity or debt routes. Equity exposure entitles investors to a share of the residual cashflow received from the tenant under the terms of the lease after all other claims are paid, such as operating expenses and debt servicing obligations. This income is either paid directly or via a distribution to shareholders

or unit-holders. These cashflows tend to fluctuate with macro and credit conditions and investors receive their equity back when the property assets are sold or the unlisted fund units are redeemed or sold in secondary trading.

In contrast, debt exposure involves making loans to leveraged investors that use the credit to purchase properties or engage in capital works, including development. Investors in debt funds are entitled to the interest and principal payments paid by the borrower under the terms of the debt contract. Typically, investors receive their principal back when the loan matures although, increasingly, it is common practice to amortise the principal over the life of the loan.

Debt strategies include senior debt loans, riskier mezzanine financing or subordinate debt. In the event that the borrower breaches their debt obligations, senior debt investors have first priority in recouping their principal by selling the underlying real estate assets, followed by mezzanine or subordinate lenders and then equity investors.

Senior debt positions are considered the most secure position in the capital stack. Generally, the return for investors in debt strategies is less influenced by cyclical swings in property valuations, except where a downturn forces lenders to hold more capital against potential losses on the loan or the borrower defaults on their loan obligations. With a conventional senior loan, the investor does not participate in any capital growth in the property asset. Mezzanine loans, on the other hand, can be structured so that investors participate in any upside should the rental income of the underlying assets grow or the capital value increase. The risk-adjusted returns on this type of instrument will, therefore, change with the conditions in the property market.

The commercial mortgage-backed securities (CMBS) market is the most common route for investors to gain exposure to public real estate debt. A CMBS is a type of fixed-income security that is collateralised by private real estate loans.

CMBS instruments are created when a bank takes a group of loans on its balance sheet, bundles them together, and sells this in a securitised form as a series of bonds. As is the case with private real estate loans, CMBS investors bear the ultimate risk of delinquency, default or forbearance. If the underlying borrowers fail to make their principal and interest payments, CMBS investors can experience a loss.

US CMBS issuance spiked in the 2005-07 period with strong demand from both investors and real estate borrowers driving the market. Although new issuance is below its peak levels, the market remains an important source of real estate financing. Low returns on alternative assets and the large inventory of maturing real estate loans have helped to kick start the US CMBS market.

Across Europe and Asia, the CMBS market has played a much smaller role in commercial real estate financing, with borrowers relying more heavily on the banking sector.

Outcome-oriented funds

Outcome-oriented funds are relatively new to real estate investment, but are growing in popularity as institutional investors, such as pension funds, focus on long-term liability matching. These funds typically target inflation plus x%, for example, or government bond yield plus y%. Whereas typical real estate benchmarks are market-based, similar to those for equity markets, these types of funds rely upon extracting specific elements of value from the various components (capital return and income return) which contribute to an asset's total return.

Real estate derivatives

Derivatives are long established and widely used in the equities and fixed income markets, but their use for real estate is still limited. The UK has the most established market, usually in the form of a total return swap or derivative contracts written against the real estate indices published by MSCI. Derivatives can be used tactically to move portfolios towards favoured sectors or away from those expected to underperform, with reduced performance drag from the trading costs incurred in the direct market. They can also help to address overweight exposures to sectors, negating the need to sell assets that an investor may wish to retain for the long term. Hedging can be used to mitigate the impact of falling market values by selling a derivative on an index when it is expected to fall. The UK derivatives market saw a sharp pick-up in trading in the 2006-08 period, but volumes have dropped significantly as investors have become cautious over pricing, volatility, and counterparty risk.

Key benefits and challenges of investing in real estate

Benefits of investing in real estate

In general, in order to assess the merits of investing in real estate, it is necessary to conduct analysis using published indices. This brings with it various issues related to the way in which these indices are constructed from regular valuations rather than actual prices — this is known as 'valuation smoothing'. The effect of smoothing makes the statistics more favourable to real estate, by dampening volatility, reducing correlations between sectors and markets, and lowering correlations with other asset classes. Smoothing tends to reduce the reported volatility of real estate below the actual level of risk incurred by investors selling into a weak market or purchasing in a strong market. While these biases are present, those researchers that have used adjusted data to account for

the smoothing find that the resulting allocation to real estate, although diminished, is still not trivial. Using de-smoothed performance data shows that the same benefits from holding real estate in a multi-asset portfolio remain, although the extent of these benefits is lessened.

This weakness is gradually being addressed through the introduction of repeat sales indices, predominantly by data provider Real Capital Analytics (RCA). These use repeat-sales regression methodology based on a database of commercial property sales transactions. Introduced in the US in 2007 and more recently in the UK, these indices exist for a limited number of markets and sectors, but are becoming more viable as a de-smoothed estimate of price trends.

Diversification

Figure 5.2 shows historical correlations amongst the asset classes of unlisted property, equities, real estate equities, and government bonds. With correlations below one, the addition of property to a portfolio of equities and bonds can lower an investor's portfolio volatility and boost risk-adjusted returns. The level of diversification available depends upon the route used to gain exposure. As highlighted, real estate equities are more correlated with the performance of the wider stock market than the private real estate exposure and therefore offer lower levels of diversification (at least over short investment horizons). When the effects of smoothing and gearing are accounted over long-term investment horizons, real estate equities have characteristics that are more closely aligned to the unlisted market.

Figure 5.2 Correlations between asset classes, (2000-2016, local currency, total returns)

	Global equities	Global bonds	Global listed real estate	Global direct real estate
Global equities	1.0	-0.8	0.7	0.4
Global bonds		1.0	-0.3	-0.1
Global listed real estate			1.0	0.6
Global direct real estate				1.0

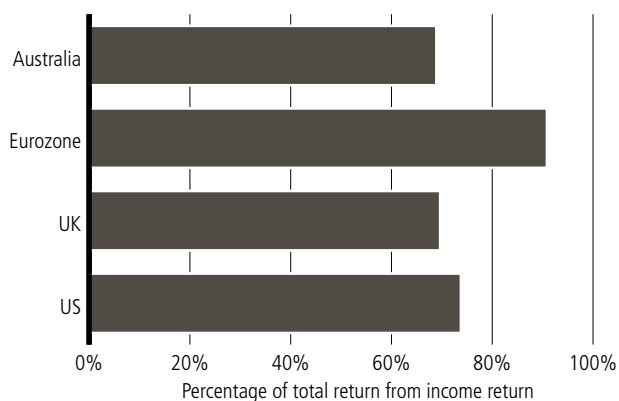
Source: Thomson Reuters Datastream, MSCI, UBS Asset Management, Real Estate & Private Markets, Research and Strategy.

Correlation: Statistical measure of the linear relationship between two series of figures (e.g. performance of a security and the overall market). A positive correlation means that as one variable increases, the other also increases. A negative correlation means that as one variable increases, the other decreases. By definition, the scale of correlation ranges from +1 (perfectly positive) to -1 (perfectly negative). A correlation of 0 indicates that there is no linear relationship between the two variables. Please note that past performance is not a guide to the future.

High and stable income return — capital return linked to economic growth and structural shifts

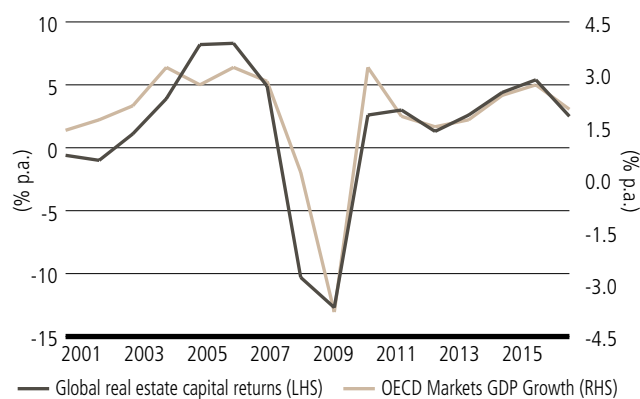
A particular feature of real estate is the high proportion of total return which is derived from the contractual rents paid by tenants; i.e. the income return. Over the long-term it is expected that core real estate will deliver the majority of its total return (70% to 80%) from income, with the remainder from capital growth (Figure 5.3). The relatively stable income return associated with core investment is particularly attractive in a low interest rate environment where yields on other asset classes remain depressed relative to historical averages.

Figure 5.3 Proportion of total real estate return expected from income in the long term



Source: MSCI, UBS Asset Management, Real Estate & Private Markets, Research and Strategy. Chart is for illustrative purposes only and refers to long-term equilibrium assumptions for core, unleveraged real estate. As at end December 2016. Please note that past performance is not a guide to the future.

Figure 5.4 Real estate capital returns and GDP growth (2001-2016, % p.a., local currency)



Source: MSCI, Thomson Reuters Datastream. Please note that past performance is no guarantee of future returns.

Upward pressure on rents typically occurs during the cyclical upswings of the economy as corporates expand capacity by hiring more labour and leasing additional space. This feeds directly to offices and indirectly, via wages and travel, to retail and tourism, and via trade, e-commerce, and manufacturing to industrial/logistics. In theory, the link between output and investment demand implies a relatively high correlation between economic growth and capital returns (Figure 5.4). Yet, how much an improving business cycle affects demand for space and property investment depends on a number of factors including the time horizon of the investors involved.

Relatively low volatility

Looking at the published private real estate indices, such as those created by MSCI and NCREIF, the volatility of real estate appears low compared to other asset classes. Using historical estimates of the sector’s volatility can result in large allocations to the asset class due to the issue of smoothing discussed previously. These theoretical allocations should be viewed with caution. To compensate, estimates of real estate’s volatility are adjusted upwards in an asset liability model (ALM) framework. Depending on the assumption used for liabilities, the resulting hypothetical allocation falls but remains significant, with a typical range of 10% to 20%.

Challenges of investing in real estate

The liquidity of the asset class is the main concern for those investing in real estate. This is defined as the ability to turn a property asset into cash or convert cash into the asset. Real estate suffers from two sources of illiquidity. The first relates to the mismatch between pricing and valuations, and the second is derived from the delays inherent in the purchase and sales process.

In a market which relies upon valuations as proxies for pricing, liquidity is likely to be impaired during periods where valuations and prices differ substantially from one another. This is evident in sharp downturns, where valuations tend to lag pricing as there is limited transactional evidence upon which valuers can make appropriate assessments of pricing. This is often amplified because investors may be reluctant to sell at prices that differ significantly from recent valuations.

In markets where prices and valuations are similar, trading often takes place over a reasonable time frame. In periods of market stress or dysfunction, it will often take longer for investors to buy or sell assets or to enter or exit unlisted funds. The sector’s limited liquidity is most often mentioned during periods of credit stress when investors are looking to reduce their exposure. However, as compensation, a liquidity premium is expected to be earned for funds being locked-up. In theory, this means that real estate should deliver a higher return than cash, if only because of the inability to convert property assets instantaneously into cash, and vice versa. As mentioned above, listed REITs or shares in real estate

companies can offer higher levels of liquidity, but at the expense of greater volatility and a higher correlation to the wider stock market.

Global real estate investment

Across most real estate markets, the conventional practice for investors has been: a) to invest in their domestic market; and then b) to consider cross-border opportunities. Real estate investment has not been exclusively domestic, but there has been a strong home bias for the majority of investors. Real estate markets differ across the globe and are subject to different risks and local practices. With investor expertise typically focused on domestic markets, this forms a deterrent to those wishing to invest beyond their domestic markets, above and beyond the very real concerns around currency risk, transparency, and tax issues.

The starting point for investment in real estate outside the home market has typically been to demand a risk premium over the returns on offer at home, whether or not this is appropriate. Typically, the requirement of higher returns has driven investors to accept risks that they may not choose to take on locally. These risks have often been magnified by the additional layer of volatility introduced through relatively high leverage, not to mention currency and other market-specific risks.

This approach is changing, with global real estate investment becoming more accessible, increasingly transparent, and better understood in a multi-asset context. In particular, the ability to select funds across the globe where the managers are specialists in their local markets has offset the asymmetry of information between domestic and non-domestic investors. Investors can now access real estate globally, with broadly the same risk profiles as they adopt locally. Nonetheless, it is not straightforward to implement a global strategy and a great deal of due diligence is required to make the correct decisions along the way.

Benefits of global real estate investment

Global real estate investment opens up a set of opportunities at four key levels.

Wider opportunity set

For smaller markets, by definition, the domestic real estate stock that is available to investors is limited. This can result in a strong underpinning of demand by local investors supporting elevated valuations which can often put the market at risk of overvaluation. For such investors, by investing beyond the domestic market, the size of the investable market can be increased considerably. For example, in 2015, the value of UK real estate held by investors is estimated to have been USD

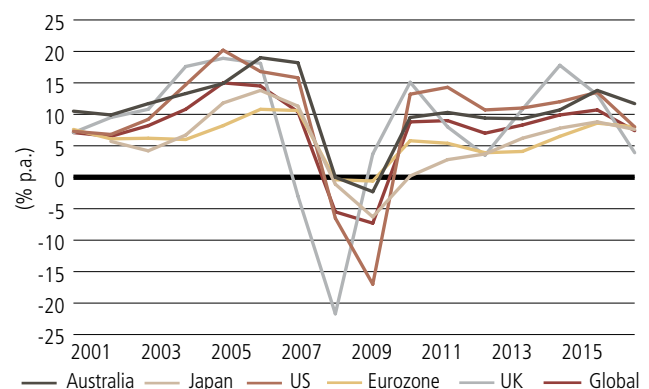
0.8 trillion, whereas the value of real estate held globally by investors is estimated at USD 13.7 trillion, with USD 10.6 trillion in developed markets and USD 3.1 trillion in developing markets. Non-domestic opportunities with similar risk and return profiles as domestic investments can usually be found elsewhere across the globe.

Broadening the investment horizon for real estate can open up a wide set of opportunities, including access to different sectors. For example, the residential sector is available in a number of markets via institutional grade vehicles and can form a significant part of a country's institutional stock. Other sector opportunities include hotels, retirement homes, medical offices, leisure facilities or student accommodation. Styles of investment can also differ across the globe; e.g. developed market investors can be attracted to the higher growth rates available in emerging markets and are willing to accept the accompanying volatility. Increasingly, these investors are complementing their core investments in developed markets with higher growth strategies in emerging markets to boost overall performance.

Diversification

Beyond widening the opportunity set, global investment can provide powerful diversification benefits. This is shown in *Figures 5.5 and 5.6 (overleaf)*, where the correlation between the key markets is relatively low. In contrast, the correlation between sectors within a single country is relatively high. This implies that the diversification benefits within a single market are limited compared to cross country exposure. For example, over the past 15 years the correlation between the UK and US market has been 0.61, whereas the correlation between sectors within these markets has ranged from 0.82—0.97. Although it is possible that the relatively low levels of inter-regional correlations are flattered by the use of domestic valuation indices, the correlations remain relatively low even after using adjusted data, suggesting that global exposure can reduce an investor's portfolio volatility and boost risk-adjusted returns.

Figure 5.5 Real estate returns by region, 2001-2016*, (% p.a. local currency)



*Japan from 2002. Source: MSCI, NCREIF, UBS Asset Management, Real Estate & Private Markets, Research and Strategy.

Figure 5.6 Correlations between key real estate markets, (2001-2016*, local currency)

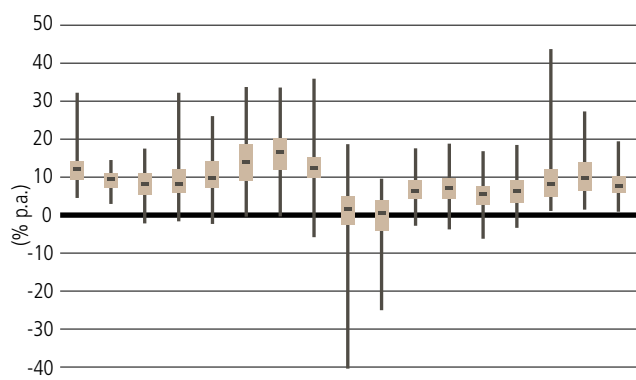
	Australia	Japan	US	Eurozone	UK
Australia	1.00	0.92	0.91	0.96	0.54
Japan		1.00	0.82	0.90	0.45
US			1.00	0.81	0.59
Eurozone				1.00	0.51
UK					1.00

*Japan since 2002. Source: MSCI, NCREIF, UBS Asset Management, Real Estate & Private Markets, Research and Strategy.

Greater opportunities to enhance returns

For investors seeking to enhance returns beyond those available in a single market, there is a wide range of possibilities when returns are reviewed in a global context. *Figure 5.7* shows the historical range of returns from the set of 25 markets across the three main sectors (office, retail and industrial). The range between top and bottom performers was close to 60 percentage points in 2008 before narrowing in the subsequent years as credit markets and global growth stabilised. It widened in 2014 as some markets — notably Ireland — experienced a sudden jump in capital values. Even over the past 15 years the range has averaged 30 percentage points, which provides opportunities for investors to implement active strategies. However, the limited liquidity of the asset class means it is not always possible to switch tactically between countries and sectors as quickly as might be desired. In such cases, the use of derivatives or a fund-of-funds approach may assist some investors.

Figure 5.7 Range of real estate returns at the country/sector levels, (2000-2016, % p.a., local currency)

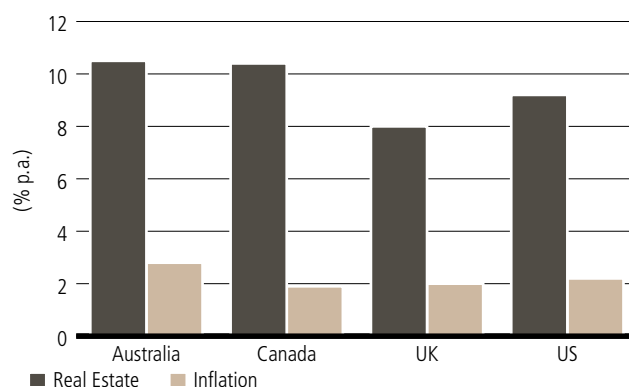


Source: MSCI, NCREIF, UBS Asset Management, Real Estate & Private Markets, Research and Strategy. Please note that past performance is no guarantee of future returns.

Inflation protection characteristics

For investors seeking protection from inflation, real estate has delivered strong historical real returns over medium to longer-term holding periods (*Figure 5.8*). In part, the strong performance is due to the relatively high and stable income returns generated from core investments.

Figure 5.8 Real estate returns and inflation, (2000-2016, % p.a., local currency)



Source: MSCI, NCREIF, UBS Asset Management, Real Estate & Private Markets, Research and Strategy.

Over shorter investment horizons, real estate’s inflation protection characteristics are mixed. Low and negative correlations between real estate performance and inflation suggest the asset class provides only a partial hedge against inflation, where a ‘hedge’ is defined as moving at the same time and in the same direction as inflation, rather than just keeping pace with it over long periods. That correlation can change over time, as other factors drive real estate, which are not influenced by inflation, e.g. supply.

Real estate performance can be negatively correlated with rising inflation, particularly where higher inflation is driven by higher costs such as rising commodity prices. In the absence of increased sales, higher costs tend to reduce profit margins thereby limiting the ability of occupiers to pay higher rents. For example, global real estate returns turned negative in many markets during the financial crisis; however, headline inflation rates continued to rise due to increasing oil prices.

Overall, while the academic literature in this area is inconclusive, income and valuations do not generally adjust quickly enough to protect investors against unexpected shocks to inflation, at least in the short run. Nonetheless, as returns have outstripped inflation on an ex-post basis — in other words, based on actual results rather than forecasts — real estate is generally accepted to provide some protection against inflationary pressures. Using data from MSCI, the retail sector has provided the strongest real income growth over the past 30 years, suggesting it offers more protection against inflationary pressures than the office and industrial sectors.

Risks of global real estate investment

As with any investment, there are risks as well as opportunities in going global. These are listed below, as are some partial mitigation strategies.

Currency risk

This relates to all asset classes when investment is made non-domestically, outside a currency zone, or outside a fixed exchange rate regime. Achieving a pure real estate return is more complicated when capital raised in one currency is invested in markets denominated in another.

There are numerous mitigation strategies. Borrowing in local currency is a partial hedge, while long term direct investors have flexibility in their exit timing. Formal hedging is also feasible, and is most likely for a fund-of-funds approach or in a private equity regional or global fund. In real estate, the tendency to hedge appears greater than for equities, but less than for bonds. This relates to the proportion of total risk that is attributable to currency risk, which for real estate is relatively high given its longer holding period and limited liquidity.

Any international investment must consider currency risk, and the cost of managing that risk explicitly. High expected returns in the foreign market may be eroded by adverse exchange rate movements. The cost of hedging this currency risk drives a wedge between the gross and net return to the investors over and above the transaction fees, management fees, and taxes.

Tax

It is important to look at returns delivered net of tax when thinking about allocating globally to real estate. Some countries will have less onerous taxation than others, while others employ punitive taxes directed at foreign investors. So, while overall tax leakage of some kind will be experienced, the selection of particular styles of investment (income vs. capital growth), sectors, or countries may help to lessen any potential leakages. In addition, investment vehicle structuring can be used to mitigate tax leakage, though this should be done with appropriate detailed tax advice.

Valuation/appraisal

Valuation and appraisal processes vary significantly across the globe and can have a major impact on the accuracy of a fund's published net asset value (NAV). While the goal of appraisers across the globe may be similar, some major differences exist depending upon the valuation regime, especially in domestically-dominated markets with few transactions. It is important to understand how different valuation practices can impact performance and liquidity. Notably international standard valuations are increasingly available in many jurisdictions. Those carried out in accordance with Royal Institution of Chartered Surveyors (RICS) standards are dubbed 'red book valuations'.

Benchmarking performance

Benchmarking performance in some markets has a long history (particularly in the US, UK, and Australia), but there are still issues with regional and global real estate indices. Most of the benchmark indices rely on valuations to estimate capital growth. However, differences in valuation procedures may mean that indices are not comparable across countries.

Furthermore, there are compatibility problems that relate to differences in terminology, ownership, lease contract terms, and taxation. Such differences need to be accounted for in order to make a direct comparison of returns meaningful. Even in those markets where there is a long history of benchmarking, underlying fund performance can diverge significantly from the benchmark because of the lumpiness or specific risk associated with individual assets. This tracking error can be an additional risk factor for investors.

To some extent, these challenges are being overcome by the growth and development of the asset class. Gradual improvement is being driven by MSCI, its partners and alliances with other national benchmark providers, and by NCREIF in the US. The MSCI Global Annual Property Index measures the combined performance of real estate in the 25 most mature markets worldwide. Fund-level benchmarking (performance after management fees, running costs and leverage) is also more common, e.g. MSCI's Pan-European Property Funds Index (pEPFI) which tracks the performance of pan-European open-ended funds. At the global level, two fund indices have been developed independently. One by the Asian Association for Investors in Non-listed Real Estate Vehicles (ANREV), INREV and NCREIF (the Global Real Estate Fund Index, GREFI). The other by MSCI — the IPD Global Quarterly Property Fund Index.

Despite the infancy of these regional and global benchmarks, investors need to measure performance in some manner. It is important to pick a benchmark suitable for the investor's risk tolerance and investment goals. Some other commonly used indicators for benchmarking include cash-on-cash returns and internal rates of return. These returns are typically benchmarked against cash returns plus inflation or against a risk-free rate. Some investors have also adopted absolute return targets for unlisted real estate funds.

The UK and continental European real estate markets

Market performance

Although Europe faces political risks, the economy continues to recover, mainly through the domestic economy. Encouragingly the labour market in most European markets is starting to show signs of recovery, with annual full time EU employment expected to rise by 1.2% in 2016. Overall unemployment generally remains quite high and in undersupplied sectors of the workforce, a tightening of the labour market is starting to place upward pressure on wages. This, combined with an inflation rate of around 0% is translating directly into rising disposable incomes, which consumers are feeding back into the economy in the form of very strong retail sales. This domestically-driven recovery is starting to have positive implications for European occupier markets, and we expect occupier demand to continue to improve across the main European markets. At this stage, the recovery has been primarily focused in the central business and dominant retail locations, and targeted towards better quality commercial real estate.

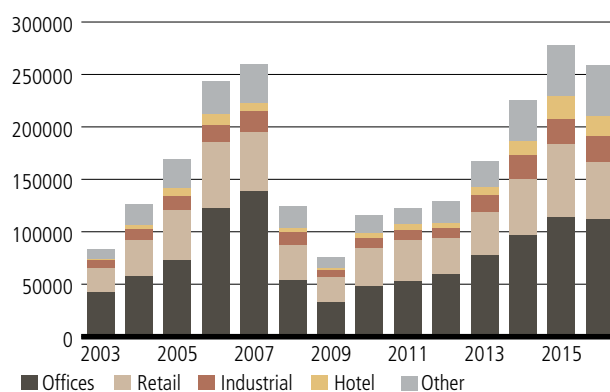
Reflecting the improvement in occupier demand, vacancy levels across Europe are generally on a downward trend, however there continues to be significant polarisation based on quality and location of stock. In the office markets, the aggregate European markets vacancy continued on downward trend and fell by 0.3 percentage points in the fourth quarter of 2016, and is now at the lowest level since the financial crisis.

While absorption of space has started to be positive in most central sub-markets, many markets across Europe continue to suffer from an oversupply of office space in peripheral sub-markets, particularly those which have poor public transport connections to the central sub-markets and surrounding areas. On the flip side, vacancy, particularly of better quality space, in central submarkets has been coming down rapidly, reflective of the preference for occupiers to locate in central submarkets and also the absence of significant speculative development across most markets since the global financial crisis.

In 2016, investment volumes stabilised at EUR 259 billion which is a decline of around 7% compared to the previous year. This is mainly driven by a slowdown in the UK, but also because investors remain cautious in moving up the risk curve and continue to focus mainly on core investment.

Monetary policy by the European Central Bank (ECB) is encouraging eurozone investors to look for alternative investments to government bonds. The introduction of negative deposit rates increased the pressure on investors but also on banks. As a consequence, there has been an increase in lending activity to real estate. An influx of capital from outside Europe has been an additional driver of this record level of investment turnover, with foreign investors seeking diversification outside of their domestic market. Furthermore, attractive returns when compared to fixed income much of domestic and global capital have focused on core eurozone real estate assets.

Figure 5.9 European commercial real estate investment (EUR million)



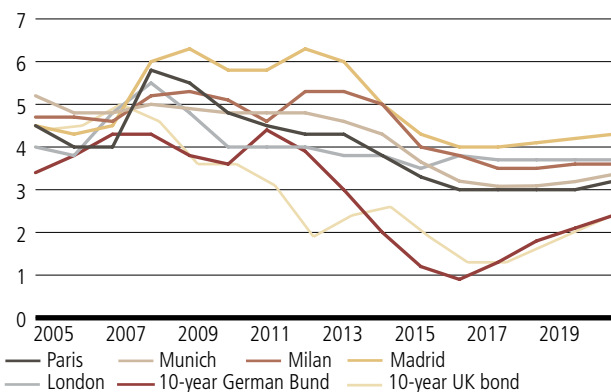
Source: CBRE Erix, Q4 2016.

In most European markets prime yields have now fallen to below, or are very close to record low levels. Political uncertainties in the UK but also somewhat weakening real estate market fundamentals pushed prime yields in the UK out by 25bps in 2016. Since then these have partially come in. A potential change ECB's monetary policy by the end of 2017 is likely to bring prime real estate yields to a floor but not an immediate risk for pushing out.

While the economic outlook for 2017 points towards a steady, if somewhat unspectacular, continuing recovery in Europe, there are a number of headwinds facing the region

both domestically and globally. The primary challenges on the domestic front come from geopolitical uncertainties, with negotiations between the UK and the EU on Brexit, the reformation of the EU in general but also general elections across Europe which covers up to 70% of EU's population in 2017.

Figure 5.10 Prime office yields and 10-year government bonds



Source: CBRE March 2017, Oxford Economics, February 2017.

Differences in market practices

Europe is an aggregate of individually defined real estate markets with varying market practices. Most notably, lease structures vary widely across Europe. Leases are typically shorter in continental Europe than the UK and although since the financial crisis the average length of UK leases has come down slightly, it remains above typical European levels.

The upward-only lease review (meaning the rent paid by the tenant cannot fall below the actual amount paid at the time of the rent review), which is prevalent in the UK, is only compulsory in Ireland. In other countries, income is indexed, typically to inflation. At review, there is limited opportunity to achieve full open market rent levels.

In the UK, the tenant is typically liable for the majority of building costs (repairs, insurance, heating, lighting, etc) but in continental Europe, there is a range of varied relationships whereby the income paid to the landlord can be eroded by liabilities for these costs.

The UK is the most transparent market in Europe and, based on the 2016 Global Real Estate Transparency Index published by Jones Lang LaSalle, ranked first globally ahead of the US. MSCI (formally known as IPD) provides detailed information about the UK market, with the performance history dating back to the beginning of the 1980s.

The UK is the only European market to provide a monthly index, allowing investors to make more timely and informed decisions. Outside the UK, MSCI and its partners provide limited performance data in Europe. This is limited in terms of the number of countries covered, the representativeness of the assets included in the sample, the data collected, the period of measurement, and the delay between year-end and the publication of results.

Commercial real estate sectors

The European commercial real estate market has traditionally been split into three different sectors: offices, retail and industrial. Increasingly, investors are also looking at debt opportunities to gain exposure to real estate.

Offices

Of the main real estate sectors, offices — particularly those with an occupier base tied to the financial services sector — tend to be the most cyclical. Offices represent 40% of the European real estate market as estimated by MSCI at the end of 2015. Major European markets include Amsterdam, Frankfurt, London, Milan, Madrid and Paris. As part of highly centralised countries, global centres such as London and Paris dominate their national markets and are by some distance the largest markets in Europe. Madrid and Milan are both key national markets but with the presence of a very important second city, whereas Amsterdam forms part of decentralised national economies. Germany is by far the most decentralised country, with five main centres sharing key functions including Frankfurt which dominates the German financial industry.

Despite the uncertainty surrounding the UK's decision to leave the EU, the London office market remains the most liquid market in Europe with investment volumes representing just over 30% of total European city office transactions over the past two years (as at first quarter 2017).

The liquidity of the London market, along with its relatively attractive tax treatment and transparency, attracts significant interest from foreign investors, who have represented 56% of the market since 2000. However, the city's relatively large exposure to the cyclical financial services sector and responsive supply side means that its performance is more volatile than other European cities. For investors, London offices present a trade-off between greater liquidity and higher volatility. In the post-global financial crisis period, London benefited from the UK's relative economic outperformance and London's forward position in the cycle, in addition to the sector's liquidity and safe-haven status. This drove exceptional performance with returns averaging 15% p.a. between 2009 and 2015. However, with a supply response now coming through to the market, and weakened demand expected particularly

from the financial sector while the uncertainty of the Brexit negotiations hangs over the market, it is likely that the market will undergo some degree of correction from the current rental and capital value levels.

The major office markets across Europe are predominantly driven by employment in the finance and business service sectors. As a consequence, the major European office markets tend to be highly correlated and geographic diversification does not guarantee portfolio diversification. It is often appropriate to include regional cities in an office allocation as these markets tend to have more diversified employment bases and are less reliant on the fortunes of a single economic sector.

However, even during periods of weak performance, the wide dispersion of returns at the individual asset level means that selecting the right asset can prove to be a fruitful strategy, albeit one which relies upon stock selection and asset management skills.

Retail

The retail sector is broadly categorised into unit shops (or high street shops), shopping centres and retail warehouses. Unit shops typically offer little physical obsolescence but some locational risk, as town centres can shift with new development. Shopping centres carry greater depreciation but less locational risk, although they are still not immune from the development of new town centre schemes. Retail warehousing has been an expanding market that has reached maturity. The whole physical retail sector has been challenged in recent years by the growth in online retailing.

With the exception of Ireland and the UK, the European retail sector is less integrated than the office sector. In terms of the occupier market, there have been some major local players but cross-border investing has been less prevalent. There are fewer pan-European retailers than pan-European office occupiers.

Retail brands are often unknown outside their home country and so investing in the retail sector, on a cross-border basis, requires greater due diligence than locally. The biggest benefit of investing cross-border in the retail sector has not only been higher returns compared to offices, but also low correlation between countries. Retail sales are typically less influenced by global factors and more driven by domestic factors.

A key trend that has been characterising the European retail market over the last couple of years has been the rationalisation of the floor space occupied by retailers. Driven by the growth in e-commerce, retailers have focused on their most profitable store locations with the highest turnover and reducing their exposure to secondary locations where growth prospects are much weaker. This is clearly evident

in the UK where vacancy rates in secondary high streets have climbed in recent years, but declined in prime locations. This trend is expected to continue as occupiers and consumers focus on better locations.

An increasing number of retailers are also expanding their multi-channel strategies. To build a profitable online business, retailers must integrate it seamlessly with their bricks and mortar operations. Until recently many have kept them separate, increasing the risk that they fail to communicate or work together properly. As e-commerce continues to shape into a real strategy, we expect to see an increase of new store formats and other occupational adaptations from retailers looking to keep pace.

Industrial

The industrial sector represents a fairly small part of the total European real estate investment market, although this proportion varies between countries. In the UK for example, the industrial sector represents 17% of MSCI/IPD All Property by capital value and continental Europe represents just 6%¹. The UK industrial sector is split into two main types: multi-let industrial units and logistics, with logistics representing just 30% of the sector. The logistics sector in continental Europe represents a much larger proportion of industrial investment stock as most European manufacturers are owner occupiers. With the exception of France and the Netherlands, multi-let industrial parks are virtually non-existent in continental Europe.

The concentration of logistics asset exposure bears some risks, especially in relation to obsolescence. Furthermore, logistics companies require good transport access but they can be reasonably flexible with location. This flexibility provides distribution companies with some negotiation power when taking a leasing contract. Also, increased competition in the logistics business sector, as new entrants have entered the market, has reduced the typical lease contract. Ten years ago, a 10-year leasing contract was commonplace, whereas now occupiers tend to negotiate much shorter contracts of five years or less. This results in specific business risks in the European industrial sector. Exceptions to this are locations where logistics need to compete with other land uses, for example at airports, ports or last mile distribution points. In these locations, distributors are willing to take on longer leases to secure a scarce resource and land value is often underpinned by alternative uses.

In more general distribution locations, the next best use might be agricultural land. The attraction of investing in industrial/logistics assets in Europe has traditionally been the relatively high income return compared to other sectors and low correlation between European countries.

¹ As at December 2016 (latest available data)

Debt

Monetary easing from the ECB has started to improve lending conditions on the continent, however real estate financing remains largely risk averse and focused on the core income producing market, financing for any development or opportunistic acquisitions remains scarce.

Since the financial crisis, banks have been rebalancing their balance sheets and their capacity to open new lines of lending against real estate has been more limited. Regulatory changes are also playing a role by forcing banks to hold more capital against their risk assets. UK banks have been early movers in reducing their exposure to the sector and the deleveraging process is well ahead of most continental European banks. Unlike in the US market, real estate financing in Europe has been largely provided by the banking sector with limited alternative sources.

However, in the last few years, a number of pension funds, insurance companies and fund managers have opened property lending operations. The emergence of such new debt providers is unsurprising considering the often attractive risk-adjusted returns on offer. While most of the new debt products target senior debt positions (with long-dated terms, low long-to-values by historical standards and secured on real estate stock) there are some managers looking to provide junior debt and assume more risk.

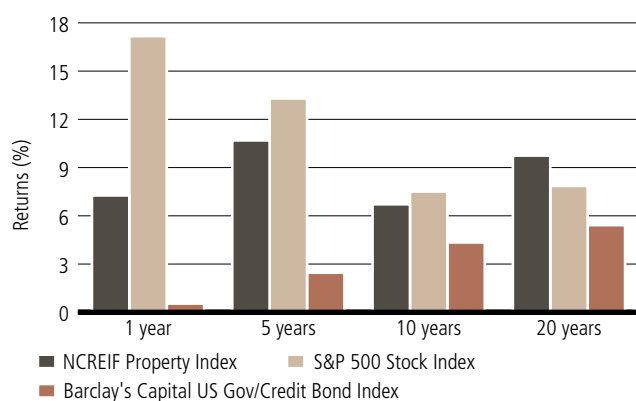
The US real estate market

Market performance

Over the past decade, the US real estate market has experienced a considerable degree of volatility. It saw strong performance leading up to the peak in 2007, followed by two negative years, then a strong rebound with total returns recovering recessionary losses by mid-2013.

The volatility of returns has been influenced by the shock to growth in the wider economy and distress in the credit markets. However, despite this volatility, stabilised property has still managed to average 6.7% p.a. over the past 10 years (Figure 5.11).

Figure 5.11: US real estate, equity, bonds and credit returns (% p.a., local currency)



Source: Morningstar, NCREIF as at March 2017.

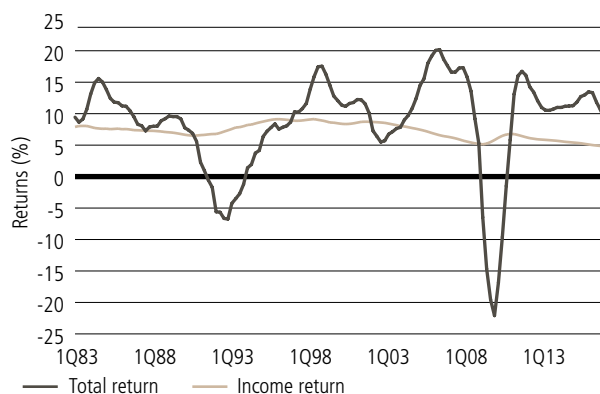
Looking at the sector's longer-term performance since the inception of the NCREIF Property Index (NPI) in late 1978, the total return for real estate has averaged 9.3% p.a. Figure 5.12 shows the historical annual income return and total return for the NPI, with capital return being the difference between the two lines.

The appraisal process typically establishes value in relation to the income component, which remains relatively stable, while market changes are embedded in the capital return. The rise and fall of the income return is an indication of relative pricing over time and can be crudely equated to a yield or cap rate.

During the peak of the market, real estate investors became increasingly aggressive, requiring very little yield premium to hold property over risk-free assets. Throughout 2009, the relationship shifted dramatically as investors and lenders

demanded elevated risk premiums, which brought equity and debt transactions to a virtual standstill. As the recovery progressed, risk premiums in commercial real estate trended toward historical averages, which still placed the sector in an attractive position relative to other investable asset classes. Desirable risk premiums continue to bring institutional capital into the sector, pushing total transaction volume to new record highs in 2015 before easing off slightly last year and into 2017. Nevertheless, an ongoing search for yield in a low interest rate environment means the asset class remains relatively attractive.

Figure 5.12: NCREIF national property total return and income, (1983-2016, % p.a.)



Source: NCREIF Property Index

Core pricing has recovered on the back of weak alternatives in the form of low available yields on other assets such as cash, government bonds and investment-grade corporate debt. In markets with strong competition, pricing is at or above peak levels, suggesting investors are reasonably confident about future rental growth.

Fundamental performance is improving across all sectors with rents growing from their post-recession lows. Occupancy rates are at or approaching stabilised levels. Rent and occupancy rates are the building blocks of revenue, when these rates are growing, income is expected to increase.

Commercial real estate sectors

The US commercial real estate market can be split into four different sectors: offices, retail, industrial and multi-family apartments. We also take a look at recent developments in the US real estate debt market.

Offices

As measured by NCREIF, the office sector comprises the majority of institutionally-held US real estate investment, with a 37% share at the end of 2016. The office sector is highly cyclical and is recovering from the low point of the current cycle. Gross rents are rising at rates in excess of inflation; however, concessions for periods of free rent and tenant improvement allowances remain elevated. The market for downtown office space is tighter than the market for suburban office space with vacancy in central business district (CBD) locations below long-term rates. Downtown office rents typically outperform suburban office rents during expansionary periods, but rents in the suburbs typically exhibit less volatility.

Through most of the recovery, tenants have been able to use high sector vacancy to their advantage in lease negotiations. Demand for office space recovered faster than office employment as firms took advantage of lower rents and locked in cheaper overhead costs. Construction of new office buildings remains modest outside of a few markets.

Retail

Retail is the most highly segmented of the four major US commercial real estate sectors. Most of the data available covers community and neighbourhood shopping centres, including grocery-anchored strip centres. Investors also compete to acquire regional malls, lifestyle centres and power centres. Within a typical power centre, individual sites may be sold to occupiers, and big box retailers may construct freestanding stores. Strong demand from owner occupiers means that high-street retail units are difficult for institutional investors to add to their portfolios.

Given the headwinds facing the US consumer over recent years, it is not surprising that the retail sector remains under pressure. Historically, consumer spending has represented two thirds of US GDP and retail sales have accounted for approximately half of all consumption. While the liabilities of the average American household have decreased since the depths of the financial crisis, wage growth remains sluggish. With declining department store concepts and growing online purchases adding stress, demand for retail goods will likely remain uneven and cautious, thereby limiting the pace of recovery for retail rental levels. However, as is the case in many other markets globally, the supply-side story is more favourable than the demand and is supportive of potential rental growth.

Industrial

In the US, investors in the industrial sector primarily focus on distribution or warehouse space, and there is limited investment in light manufacturing properties and research and development labs (R&D). Coastal cities with strong port

activity and gateway markets proximate to Canada and Mexico tend to attract the bulk of institutional investment.

Following the 2008 to 2009 recession, US industrial properties suffered historically high rates of availability. With a slow but positive economic recovery underway, industrial fundamentals are improving as many of the leading indicators return to more normal levels. Improvements in the economy, especially in the residential housing market, should lead to new orders and increased production with positive knock-on effects for real estate demand. Availability rates have returned to long-term averages. Development of new warehouse space is approaching long-term average levels and is concentrated among large buildings.

Multi-family apartments

Institutional-grade apartments comprise 24% of the value of the NCREIF Property Index (as at December 2016), the second largest concentration after the office sector. Generally, multi-family refers to large apartment complexes with a minimum of 40 market rate units, clubhouses, amenities, and on-site leasing offices. In practice, it is common for an institutional-grade apartment development to have several hundred units.

There are three primary types of multi-family developments: garden, mid-rise and high-rise. Niche investments include properties marketed as senior or student housing. With dozens, or possibly hundreds, of leases per property, the majority of which renew annually, landlords can take advantage of frequent expirations to capture market improvements.

Despite increasing supply growth, multi-family demand-side fundamentals continue to position the sector as a strong performer. Following a recovery that began in 2009, multi-family is firmly in the growth phase of the cycle. A structural shift away from home ownership in the US continues to be a driving force behind the sector's above-average rental growth. The US home ownership rate fell from 69% in 2005 to just below 63.5% in 2016, according to the US Census Bureau.

Strong interest from investors has driven apartment yields lower than other sectors as prices have increased. New construction is elevated, reversal of the dramatic drop-off in new supply that began in 2010. Individual markets are at varying stages of the development cycle. Overall, apartment rent growth is at or above inflation. Vacancy is low and facing some upward pressure. New development of institutional-grade apartments is not expected to reverse the sector's entire positive revenue trend.

Debt

In the US, loans may be originated by a variety of lenders including but not limited to traditional commercial banks, insurance companies, mortgage securitisers, and debt funds.

Government-sponsored enterprises provide debt to the multi-family sector. Following the recession in 2008 and 2009, a much-anticipated distressed debt market created some opportunities for early movers, though the feared epidemic of fire sales never materialised. The level of distressed debt in the US peaked in mid-2010, as did the portion of outstanding loans that were troubled. By the start of 2012, the volume of problem loans restructured, extended or resolved exceeded those that were bank-owned or remained troubled.

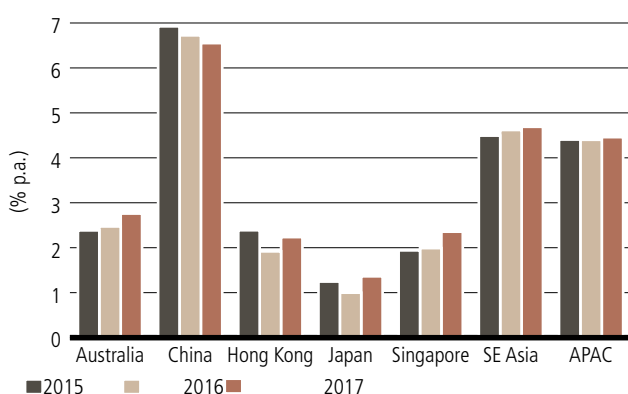
A fairly rapid improvement in core real estate pricing helped reverse the rise in the tide of distressed debt, as rising capital values led to a natural deleveraging. Having gone through a difficult period since the financial crisis, the US banking system appears to be gradually recovering on the back of the actions of policymakers. With healthier balance sheets, more stable funding profiles and improving profitability, some confidence has returned to the sector. Although external shocks could derail the recovery, potentially revealing that the banking sector remains undercapitalised, the credit mechanism appears to be slowly gaining traction in the US market, which is supporting real estate liquidity and pricing.

The Asia Pacific real estate market

Market performance

The heterogeneous nature of the Asia Pacific (APAC) region supports investment strategies across the risk spectrum, including core strategies in the key global cities and higher return opportunities in the region's emerging markets. Overall, the APAC region continues to see stronger GDP growth relative to Europe and North America on account of higher savings and investment rates. Clearly, developed Asia, which includes the likes of Japan, Australia, South Korea, Hong Kong, and Singapore, is unlikely to see the same levels of marginal gains in growth that developing Asian economies are experiencing (*Figure 5.13*). However, monetary conditions in developed Asia remain accommodative, supported by still relatively benign inflationary conditions, and tight labor markets. That in turn, and importantly, feeds into the vitality of the region's smaller economies. Most of APAC is also well placed to sustain expansionary fiscal policies over the next couple of years, as governments ramp up on infrastructure spending and social programs that will foster longer term inclusive growth.

Figure 5.13: Growth (real, annual, percentage)



Source: Oxford Economics, as at 19 April 2017.

Urbanisation trends, the rising middle class consumer and gradual shifts in output towards the services sector, continue to reinforce the attraction of the region, particularly in an environment of subdued global growth. As an asset class, the real estate sector will continue to be boosted by ongoing improvements in transparency and legal systems on the back of the growing presence from global and domestic

institutional investors such as pension funds, insurances companies and sovereign wealth funds.

From an institutional investor perspective, a consistent analysis of APAC's real estate markets is not readily available. This difficulty is compounded by the varying stages of development of individual markets with limited performance data existing for the region's emerging markets and those markets with limited transparency. Many of the markets in the region lack time series of comparative market information, which limits the relevance of standard statistical techniques in understanding relative performance.

The main constraint for new capital will be sourcing suitable assets to purchase across the region at the appropriate risk-adjusted returns. It is almost certain that investors have to orientate their capital appreciation expectations downwards considerably. Broadly, the increase in pricing has run ahead of income growth although fundamentals are now improving in key markets, albeit at a moderate pace, supported by an improving balance between demand and supply.

With property spreads close to historical averages in most gateway markets and 10-year government bond yields moving higher, driven by expectations of further US monetary tightening this year, income and value creation will be taking over as the key drivers of performance. In an environment of slowing capital growth, stock selection and asset management will be key to generating outperformance of individual assets and portfolios within the region. Despite property yields across the region tightening to near historical lows, investors continue to focus on good quality income producing assets in gateway markets with office assets seeing the majority of capital flows, followed by retail and industrial assets.

Looking beyond the core space, the APAC region offers significant opportunities for value added and opportunistic investors, supported by limited availability of core product and stronger growth prospects. Limited core opportunities mean that investors wishing to gain exposure to a particular market may be only able to do so through higher risk strategies including development. The lack of core product that is available for investment purposes reflects either the high percentage of owner-occupiers in a given market or the prevalence of large estates which are controlled by single owners.

In China, corporates have often preferred owning to renting, reflecting the history of state-owned enterprises owning their premises. In other markets, we are starting to see greater interest in the industrial sector of major southeast Asian countries such as Indonesia, Vietnam and Philippines. Almost a decade ago, the first wave of foreign investment focused on the gap in private residential markets in emerging Asia, and the next wave is now capitalising on the potential of the young population and cheap labour through investments into 'build to core' industrial and logistics real estate. As emerging markets mature and new growth opportunities emerge, owner-occupiers will gradually realise the potential to sell down their asset base, providing sale and lease back deals and increasing opportunities in the core space.

Across APAC in general, healthy jobs growth should support office occupier demand, and demand for retail and logistics properties will see further net gains arising from structural changes in consumption mediums and habits. In terms of fundamentals, demand for commercial real estate space across the three sectors (office, retail and logistics) continues to be supported by healthy levels of activity in the services sector. The services sector employs the largest share of the labour force in developed markets and a growing share in emerging markets is being supported by low interest rates, growing demand for e-commerce and technology related services (from both other corporates and the household sector), and structural shifts taking place in China's economy.

Recentralisation themes on the back of increasing demand from employees to be located near good transport links and growing urban populations are supporting demand for CBD office space in key cities. In the retail sector, prime high street pitches and dominant shopping centres should continue to outperform as households focus their spending on assets that can utilise technology and deliver new experiences for consumers.

Commercial real estate sectors

Offices

We are starting to see the emergence of a new group of core tenants from the telecommunication, media and technology (TMT) sector, which are steadily increasing headcount and business operations in the region, and easily accounted for over a quarter of major leases across APAC in the past year. Also, the rise of co-working in this new sharing economy is fast becoming a force to be reckoned with, as co-working operators start to take up prime office space in most major markets in APAC. Whether this is a theme or a fad remains to be seen, but we believe that office absorption will continue to find support from this segment in the near term.

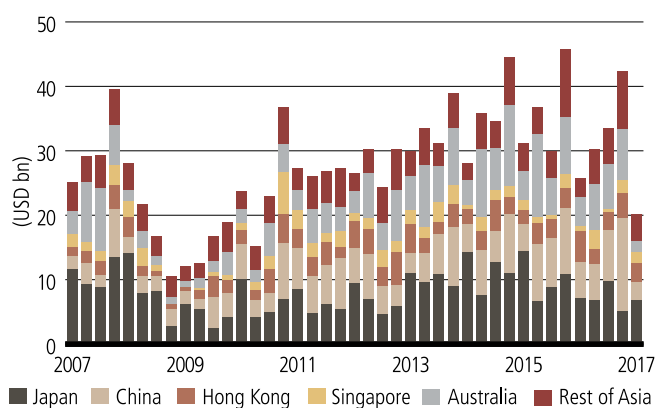
In Asia, commercial lease terms are typically shorter in duration and not linked to an index, reflecting the stage of

development of the region's real estate markets. The volatile nature of growth in region and the ongoing development of new submarkets in the region's emerging cities also play a role with occupiers demanding flexibility in their lease terms.

Even in developed markets such as Japan, traditional leases are typically for two years and these can be renewed by the tenant for a further two years into perpetuity. During the lease term, the tenant can terminate by giving six months' notice and, although rental uplifts are theoretically possible, they are rarely exercised, reflecting the nature of business relationships in Japan. Traditional leases are common within the small multi-let buildings in the Tokyo office market, and comprise the majority of office leases.

In the Australian market, office leases tend to be longer in duration at five to 10 years, though rent-free periods and tenant incentives tend to be much higher as well. For smaller markets, the lease would typically be for three plus three years, or five plus five years. Rent increases would normally be annual, based on inflation or fixed percentage rises, with market reviews at the beginning of each lease extension.

Figure 5.14 APAC commercial property investment volume



Source: Oxford Economics (as at 19 April 2017)

Retail

The consumer play remains one of the key themes for domestic and foreign investors in the APAC region, driven by shifting growth drivers from investment and credit towards consumer based spending and services sector employment. Rising wages and the accompanying growth of middle class households across the region is adding weight to this theme. In the retail sector, there is strong evidence that an increasing proportion of physical retail spending is being diverted to the online space, and this continues to limit demand for space from certain retailer types, such as electronics, fashion and department stores. The priority for many operators in Asia is to ensure that occupancy and footfall remains solid in their malls, while they enhance their operational ability to create omni-channel modes of retailing and a greater focus on

'experiential' shopping. Despite this, the increasing presence of global retail brands continues to drive demand for space and rents, particularly in the stronger growth cities.

Logistics

Across the APAC region, there remains significant pent up demand for modern industrial real estate, on the back of structural trends such as increasing e-commerce penetration, supply chain efficiency and labour shortages in most of developed Asia. In the logistics space, third-party logistics providers and chain retailers continue to seek well located distribution units near major ports, railways and roads to facilitate the efficient delivery of goods. There is a growing trend towards smaller in-fill space in markets where there is a high and rising percentage of online sales from businesses to consumers, and an increased focus on same-day delivery as a unique competitive edge in the crowded e-commerce segment. In markets such as Singapore and China, the drive towards innovation and emphasis on high-value added manufacturing including bio-medical, pharmaceuticals, aerospace and transport engineering, have created renewed demand for well-built and flexible industrial space with heavier loading, higher height clearances and greater electrical power requirements. Rising speculative supply levels driven by strong investor demand for exposure to the industrial sector in recent years are likely to constrain overall rent growth, but occupancy levels in the high quality segment will remain robust.

Debt

The relative immaturity of APAC debt capital markets means that the banking sector's exposure to real estate tends to be disproportionately higher than regions with more mature financial markets, particularly the US. In general, lending conditions in core markets of Australia and Japan mean the real estate yield remains higher than the cost of debt. There is however, some evidence that credit conditions have tightened in the Australian market on the back of increasing capital charges and regulatory scrutiny.

The availability of low cost finance in Japan has stood out in recent years as an attractive opportunity for global investors looking to benefit from the available 'carry yield' although this presents downside risks for leveraged investors if yields soften.

Negative interest rates imposed on banking sector deposits held at the central bank are incentivising financial institutions to minimise their reserve requirements and provide loans to consumers and businesses. Credit growth to the real estate sector has clearly benefited and J-REITs have been able to gain access to cheap funding, thus boosting their competitiveness in the investment market. On the other hand, refinancing has effectively become less costly and many asset owners and landlords are able to extend their holding power even if the occupier markets soften.

This has resulted in many investors being priced out of key commercial markets such as Tokyo, and the corollary of that is a diminished investment market where ticket sizes are clearly getting smaller and transaction numbers are declining.

In contrast, credit conditions remain tight in the region's emerging markets or are tightening in markets where interest rates are directly linked to US monetary setting through the exchange rate.

Transparency

Investors continue to be attracted by the region's stronger growth prospects, but transparency varies markedly across the region. Institutional investors continue to demand greater transparency and policymakers and industry bodies are increasingly aware that the limited performance data alongside poor quality market information and inconsistent application of property law are hindering inward investment. In terms of transparency, the APAC region can be split into three different groups:

- Developed markets such as Australia, Singapore and Hong Kong with high levels of transparency which rank on a par with the mature real estate markets in Europe and North America.
- Markets that show low levels of transparency relative to their developed markets status including Japan and South Korea. Although transparency is improving in this group, poor quality market information, particularly in the retail and logistics sectors, limits foreign exposure. The lack of data availability tends to be related to the concentrated ownership base and high percentage of owner-occupiers in these markets.
- Emerging markets with low but improving levels of transparency, such as China and India. Limited transparency means that foreign investors remain cautious about these markets and any exposure tends to be included in the investor's high risk budgets. Improving transparency will eventually lead to higher levels of transactions and market liquidity and an increasing presence of foreign investors and longer-term institutional capital.

The extension of MSCI's coverage represents an early step towards improving transparency across the region. The first markets to be covered by MSCI were Japan in 2003 followed by South Korea in 2006. MSCI also introduced a pan-Asia index that is now providing, in many cases for the first time, aggregate property return data for China, Indonesia, Malaysia, Thailand, Singapore and Hong Kong using a combination of private and public real estate data.

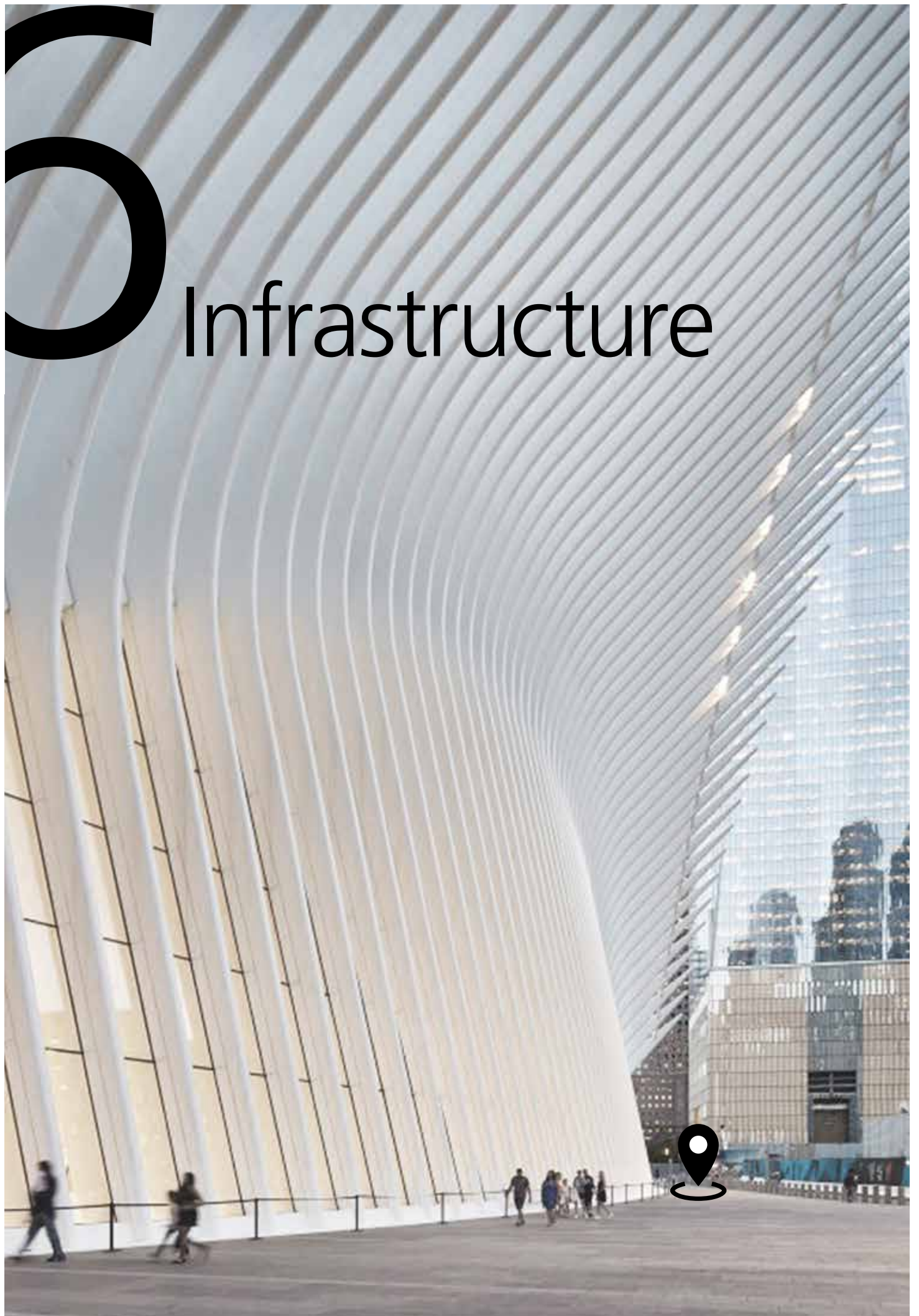
Although data and coverage are limited for the latter group of countries and not comparable with other MSCI indices, ongoing efforts like this and others, such as ANREV, will help boost transparency in the region's emerging markets.

Conclusion

The period of low growth, low inflation, and ultra-low interest rates following the global financial crisis has been a positive one for real assets, including real estate. Investors, some new to the asset class, continue to seek risk reduction through diversification, and this implies a reduction of exposure to the traditional asset classes. Investors also continue to look for yield in a low interest rate environment.

Yields on sovereign bond markets are rising in many cases, albeit slowly. They remain near historic lows, however, and in some cases are still negative. Nevertheless, the outlook for further capital growth is likely to be limited. Income return is expected to be the key driver of investment returns.

Next para: please replace: "Real estate continues to benefit from a tilt in global portfolios towards yield-based asset class. As a result, transaction volumes and pricing remain near historic highs. The enhanced allocation to real estate will continue to drive the advancement of the asset class.



C

Infrastructure

A defensive component in portfolios can enhance long-term overall returns

Infrastructure investment is the construction and operation of facilities and structures that allow and promote orderly economic activity. It has received increasing attention among the investment community in both the UK and overseas and at the end of 2016, the UK government published a National Infrastructure and Construction Pipeline, setting out GBP 500 million worth of planned private and public investment up to 2020 and beyond.

The government also formalised its commitment to future infrastructure planning and investment by setting investment targets of GBP 100 billion in projects to 2020–21.

Pension funds and insurers are also attracted to infrastructure's long-term nature, it generally has defensive characteristics and low correlation with other asset classes.

There is a broad range of funds in the market and in 2016, 65 infrastructure funds raised USD 63 billion (Preqin, 2016).

Figure 6.1 Annual Infrastructure fundraising 2000 to 2017

Year	Number of Funds	Aggregate Capital Raised (USD bn)
2000	7	1.1
2001	1	0.2
2002	4	1.4
2003	4	1.1
2004	10	4.4
2005	24	9.8
2006	37	23.5
2007	45	45.4
2008	63	41.0
2009	33	11.0
2010	59	35.4
2011	59	26.2
2012	74	36.9
2013	84	51.5
2014	64	46.3
2015	73	44.6
2016	65	63.0
2017 YTD	16	29.4

Source: Preqin, as at April 2017

Defining infrastructure assets

Infrastructure is defined as the permanent facilities and structures that a society requires to facilitate the orderly operation of its economy. Examples include:

- Transportation such as toll roads, airports, ports, bridges, tunnels and rail
- Utility and energy infrastructure such as water and wastewater services, power generation, electricity and gas networks and fuel storage facilities
- Communications infrastructure such as transmission towers
- Social infrastructure such as education, recreation, waste management and healthcare facilities.

Similarly to real estate, infrastructure is not homogeneous. It spans the risk-return spectrum from lower risk public private partnerships (PPP) in developed countries with availability-based revenue streams, up to more private equity-like — and therefore higher risk — assets such as merchant power plants.

The high barriers to entry and the monopoly-like characteristics of typical infrastructure assets mean financial performance should not be as sensitive to the economic cycle as many other asset classes.

Investments are generally lower risk, given the stable and growing demand for the essential services provided, together with regulation of the businesses, long-term contractual protection of revenues, or both.

However, the structure of the revenue side of the business is very important to achieving the lower risk aspect of the investment. For example, a power generation business with long-term power purchase agreements has a very different risk profile to the same generation business with full merchant (wholesale power market) risk.

Globally, only a small fraction of infrastructure assets are listed or under private ownership. Notable examples include the water sector in the UK and the power generation sector in North America. There is substantial potential for increased private ownership. Drivers of future investment in the sector include demographic trends, the increasing role of private capital and increasing turnover of already privately held infrastructure.

In general, investors who focus on yield and managing long-term liabilities, such as pension funds, should find core infrastructure attractive. In addition to offering enhanced diversification, investors can use infrastructure to help match their liability profile with a reasonably predictable — and partly inflation-linked — distribution stream.

Given its relatively low correlation with traditional asset classes, infrastructure can also play a valuable role in the risk-return optimisation of a portfolio and should be considered in strategic asset allocation decisions.

Infrastructure as an asset class

The increase of infrastructure funds in the market offers investors multiple options from 'core' to development and private equity investment opportunities. A portfolio of defensive or 'core' infrastructure assets is characterised by the following investment characteristics: low correlation with other asset classes, cash yield and a degree of inflation protection:

- **Low correlation:** each infrastructure asset typically has unique revenue drivers and risks. This characteristic generally causes a lower correlation between the performance of infrastructure as an asset class and the performance of other asset classes. Some business drivers are more closely related to GDP growth (for example, ports) while others are more closely related to population growth (for example, water utilities). Consequently, there are differing correlations with traditional equities within the infrastructure asset class.
- **Cash yield:** infrastructure assets typically require significant initial capital expenditure and have long operational lives, often spanning between 30 and 100 years, or more. Such assets are usually regulated or underpinned by long-term contracts which typically provide a reasonably predictable yield. Development assets generally provide no yield during construction and lower yields during initial operations. However, cash yields usually increase over time as the asset matures and utilisation increases.
- **Inflation protection:** revenues associated with infrastructure assets are often hedged, or partly hedged,

against the impact of inflation either through an inflation element incorporated in the price or revenue formula of the relevant regulatory or contractual arrangements, or through the pricing power of the business based on the essential nature of the services provided. The extent to which this provides effective inflation protection depends on management decisions in respect of operational costs and capital structure.

It is this combination of characteristics that supports the argument that infrastructure warrants its own allocation within an investment portfolio. These funds are well-suited to pension funds or clients seeking steady, reliable returns.

The infrastructure fund manager is responsible for the sourcing of deal flow, the execution of transactions on behalf of the fund (both acquisitions, and later in the life of the fund, divestments), and the ongoing management of those assets held by the fund.

Infrastructure managers employ execution and asset management executives that are comparable to private equity investment teams, albeit with specific skills and experience in relation to the regulatory and market considerations that apply to infrastructure assets.

How does infrastructure compare with other asset classes?

Infrastructure investment shares some of the characteristics of fixed income (long-term predictable cash yield), real estate (investing in physical assets) and private equity (geared investment, albeit with substantial differences in the underlying risk).

The similarities and differences between infrastructure and other asset classes are summarised in *Figure 6.2*.

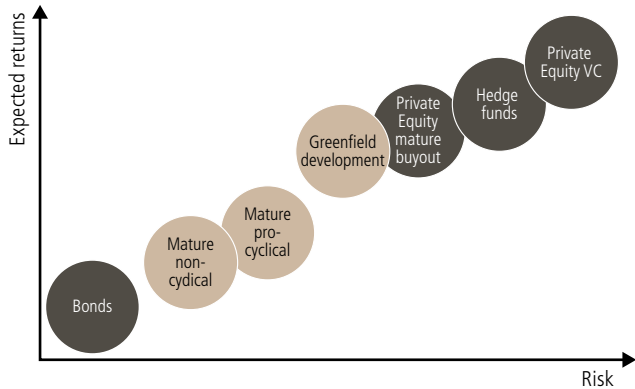
Figure 6.2 Infrastructure compared with other asset classes

	Similarities	Differences
Private equity	<ul style="list-style-type: none"> • Management control over investments • Converging investment techniques 	<ul style="list-style-type: none"> • Different risk-return objective; lower exposure to economic cycle • Longer investment horizon, return less driven by exit strategy • Strong cash yield/lower capital growth
Real estate	<ul style="list-style-type: none"> • Cash yield is significant part of return • Absolute return objective focus • Importance of location 	<ul style="list-style-type: none"> • Control over operating companies • Barriers to entry; less exposure to valuation cycles • Longer cashflow predictability, higher gearing • Normally larger individual asset size
Equities	<ul style="list-style-type: none"> • Equity ownership • Upside return potential 	<ul style="list-style-type: none"> • Lower level of securitisation/liquidity • Lower correlation with business cycle • Relatively predictable and high cash yield
Fixed income	<ul style="list-style-type: none"> • Long-term, predictable cash yield • Long duration asset • Low market risk 	<ul style="list-style-type: none"> • Asset ownership • Growth/upside potential • Inflation hedge features • Indirect exposure to interest risk

Source: UBS Asset Management, Real Estate and Private Markets (REPM)

In terms of return expectations for infrastructure compared to other asset classes, *Figure 6.3* generically depicts the risk/return spectrum across various asset classes and within infrastructure sub-sectors.

Figure 6.3 Infrastructure risk-return expectations compared to other asset classes and within infrastructure



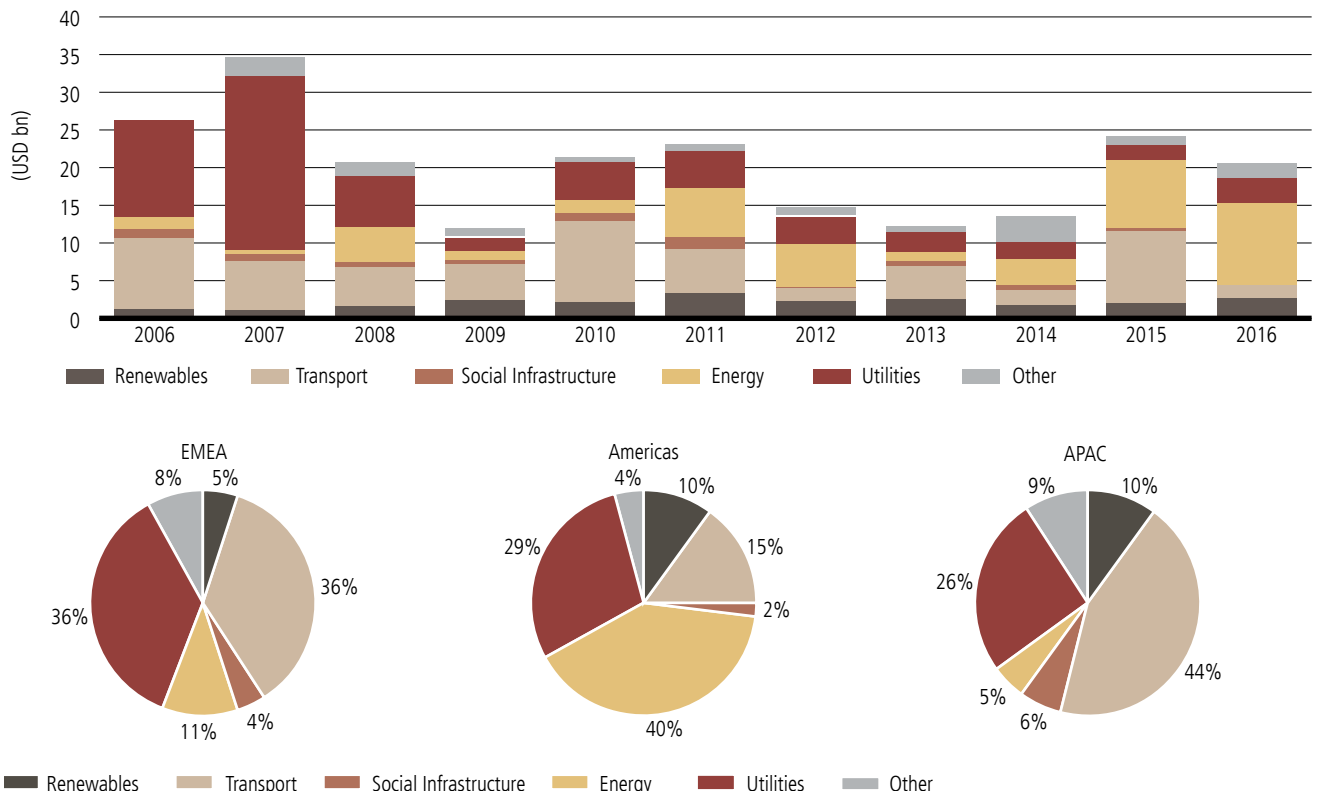
Source: UBS Asset Management. For illustrative purposes only

Each investment opportunity must be assessed on its own merits to determine the minimum required return. Some sub-sectors, such as transport, are exposed to higher risks given their pro-cyclical exposure to the economy, than, for example, a regulated utility. This is why investors require higher returns from such sectors.

Mature assets in contracted and regulated sectors usually generate mid to high single digit returns. Renewable energy infrastructure returns are also typically at that level. Additional risk premia are required for market exposure (e.g. patronage and commodity risks) and development and construction risks.

Figure 6.4 reveals the historical equity capital invested in the various sub sectors and splits on a regional basis for the annual periods 2006 through 2016.

Figure 6.4 Equity invested by sector and region, 2006-2016



Source: Preqin, as at April 2017

Risks

While infrastructure assets are generally viewed as being relatively low risk, they are exposed to a number of specific sector risks. Investors should never lose sight of the fact that risk always matters and there is no such thing as a risk-free infrastructure investment.

Patronage and demand risk

Some infrastructure, such as transportation — toll roads, ports or airports — is more exposed to patronage or demand risks than other infrastructure projects. Though such infrastructure is 'essential', patronage usually varies in response to economic conditions: business people make more international business trips in a buoyant economy and therefore, airport patronage increases. Transportation infrastructure therefore tends to be pro-cyclical and this was observed in response to the global financial crisis. Consequently, a portfolio which contains a substantial proportion of transportation infrastructure will often correlate more highly with equity markets than a portfolio which contains more utility infrastructure.

Regulatory and sovereign risk

As infrastructure is often a monopoly, it is commonly regulated by governments either through systems set by regulators or through long-term concessions. In such circumstances, regulatory independence and consistency, as well as government capacity to unilaterally amend concession terms, are key risk factors. This is closely aligned to broader sovereign risks which also need to be considered, e.g. whether to invest in distressed or emerging economies.

A more detailed discussion of regulatory and sovereign risk can be found later in this chapter.

Contractual and credit risk

Along with regulatory protections, contractual protections are key defensive characteristics of infrastructure. For example, a portfolio of electricity generation facilities takes on infrastructure characteristics if its power output is pre-sold under long-term contracts. Without such contracts, the portfolio would be exposed to the often substantial fluctuations of commodity and spot-market power prices. Such contracts, therefore, provide fundamental protections but the contractual compliance and creditworthiness of the counterparties becomes a key risk to assess and manage before – and throughout – the life of an investment.

Operational risk

Infrastructure has operational risks. A regulated water and sewage company, for example, may incur sewer flooding during prolonged heavy rainfall where sewage systems reach

their hydraulic capacity. While the company can do some forward planning, the full cost of these measures may not be taken into account at the relevant periodic review and the incident could adversely affect the company's results.

Construction risk

Greenfield projects involve construction risks, though such risks can be mitigated through proper structuring, including back-to-back pass down of key construction risks to the contractor; contracting with a credit-worthy contractor, monitoring and managing against a timetable and budget during construction and contingency planning.

Financing and inflation risk

Leverage used in financing infrastructure transactions may expose investors to debt costs and refinancing risks. In most cases, to mitigate the risk, managers will use derivatives to hedge interest rate risks and to better match debt service with the profile of the revenues. Where cost-effective and sufficiently flexible, managers will also use longer dated debt to reduce refinancing risk. Cashflow values may also be eroded by inflation where the regulated, or contracted cashflows, do not move in whole or part with inflation, or where the monopolistic market position of the infrastructure does not allow the owner to recoup inflation costs from the asset user.

These risks will have varying degrees of influence on whether an infrastructure investment is appropriate in any risk-return assessment. They highlight the importance of conducting extensive due diligence before making an investment and the need for the investment team to be broadly skilled.

A toll road and hospital, for example, have unique characteristics that will influence their distinctive risk profile. Consequently — as is the case with most investing — it is important to ensure that risks are fully understood at the outset and that the portfolio is appropriately diversified and balanced. The above risks are not exhaustive and should be read in conjunction with the detailed risk factors set out in the private placement memorandum relating to a fund.

Investing in infrastructure

With a recent increase in funds in the infrastructure sector, a growing number of pension funds and other institutional investors across the world are looking to include infrastructure in their investment portfolios. Investment in infrastructure can generally be made in five broad forms, which, in approximate order of ascending sophistication and difficulty of execution for a prospective infrastructure investor, are:

- **Listed funds** — listed funds invest in direct infrastructure, listed infrastructure or both, and are usually externally managed

- **Listed stocks** — there is a large universe of listed stocks in the infrastructure sector including utilities
- **Fund of funds** — a fund of infrastructure funds invests in a diverse portfolio of infrastructure funds
- **Unlisted funds** — unlisted funds invest directly in infrastructure on behalf of their limited partners
- **Direct** infrastructure investment

Key attributes of best-in-class infrastructure managers

In the case of unlisted investment funds, the investor must first decide on a fund manager. This is what we believe you should look for in an infrastructure fund manager:

Investment team experience and regional presence

Investment team quality is paramount to the success of an infrastructure fund. The team needs to demonstrate in-depth sector know-how, strong transactional capabilities — including principal investing, advisory work and capital markets experience — and deep asset-level operational experience. In addition, regional 'on-the-ground' presence is important to understanding the environment in which a company or fund operates. As the asset class matures, fund managers' performance becomes more visible, allowing an investor to assess performance against their stated fund mandate.

Opportunity sourcing and investment process

With many managers seeking infrastructure investments, access to quality opportunities and a disciplined investment process are crucial. Successful fund managers have a good reputation as transaction counterparties; a broad and deep network to source investment opportunities, a record of remaining within their mandate — in other words, no style drift — and the experience and skill to select the most attractive opportunities.

Asset management capabilities

Ongoing asset management of infrastructure may be either passive – in the case of smaller stakes in listed investments — or active — in the case of significant stakes in either listed or private investments, including direct investments. In the case of active management, a quality manager will seek to add value by pursuing a hands-on asset management approach with a particular focus on areas such as strategic planning, enhancement of operational performance and optimisation of capital management.

Conflicts of interest

Close alignment of interest between the fund manager and investors is essential; put simply, fund managers should profit if investors profit. Investors increasingly focus on strict governance, transparent conflicts management and transparent fee structures.

Key issues in 2017 and beyond

Even the best infrastructure fund managers are facing new challenges in the changing macroeconomic environment. There are many country, sub-sector specific or short-term issues that go beyond the scope of this document. Here, we have highlighted some of the globally relevant, medium to long-term key issues.

Regulatory and sovereign risk

Recent developments underline the regulatory risks faced by infrastructure investors. In Europe in particular, retrospective legislative or regulatory change has increased in the wake of the financial crisis. Even countries with hard earned reputations for stability have succumbed to regulatory opportunism. The decision by the Norwegian government to unilaterally reduce capital tariffs on new bookings for future Gassled capacity contracts by 90% is an example of such changes.

In our view, it is important to recognise that the risk is not limited to regulated assets in a narrow sense of the word, but is part of the broader category of political risk. In Canada, Spain and the Czech Republic, we have seen tax changes adversely impact income trust tax treatment, power generation and renewables. In Portugal, public-private partnerships have been "renegotiated". The retrospective changes to Spanish feed-in tariffs for renewable energy are well-publicised. Non-payment by public entities can also affect contracted or volume driven assets similar to adverse regulatory developments.

Higher regulatory risk coupled with the need for large amounts of private investment in infrastructure will likely lead to stronger protection mechanisms and new approaches to allocate risks in the long run. As a result, the cost of capital would rise making it an unattractive option for governments trying to attract efficiently priced private funding. However, this possible scenario does not mitigate risk for existing investments.

In the meantime, investors need to recognise the exposure of assets to political and regulatory risk and factor this into investment decisions.

Climate change

Climate change risks should be considered at all stages of infrastructure investment. Climate change subsidies and other support to the renewable energy sector also provide a good example of the potential impact of policy and associated regulations on investment activity.

Over the past decade, the experience of investors in Germany, Spain and some of the North American region, demonstrated the extent to which subsidies can accelerate the development of the renewable energy sector. Conversely, these experiences also demonstrate a slowdown in development once economic support is reduced. Such changes can generate substantial losses for those investors excessively reliant upon subsidies.

Government finances

Weak government finances, especially in many developed countries, represent another important issue for infrastructure investors. Fiscal stress suggests that private capital will increasingly be needed for financing infrastructure.

Concern around public finance sustainability will require governments to reduce spending and find alternative infrastructure financing. These drivers should create investment opportunities. Furthermore, the way governments deal with their financial balances will be an important driver of economic growth. Indirectly, this will affect infrastructure projects exposed to demand volatility.

Inflation

Investors often seek inflation hedging through infrastructure investment. This makes the outlook for inflation an important consideration. Uncertainty around future inflation was limited for the decade preceding the global financial crisis. However, the current outlook is far more uncertain. For the infrastructure sector, this uncertainty could mean an increasing demand for assets that are structured to provide an inflation hedge. It could also increase focus on differentiating between assets with explicit inflation links, and those that do not.

Investment returns

There has been a significant increase in recent years in the number of infrastructure funds and the size of assets under management. However, this does not necessarily reflect a disproportionate supply of capital chasing infrastructure assets. The market expansion reflects the rapid development of the asset class from a low base rather than an oversupply of capital. Expected returns have declined across a number of markets and asset classes partly due to the expansionary monetary policy response to the global financial crisis and also reflecting a post crisis shift in credit standards (that is, tolerance for leverage). Yet on a risk-return basis, infrastructure remains a compelling asset class.

Debt markets

The availability and terms of debt remain major drivers for overall infrastructure investment activity, given the importance of debt within the capital structure and the on-going refinancing needs. The current low interest rate environment is conducive to structured and project financing given the yield premium over corporate issuances. Lenders are open to the sector and floating rate-based products have regained attractiveness against fixed-rate issuances, given the retained exposure to the yield curve. In addition, since the financial crisis, the sector has witnessed the entry of institutional investors and debt funds, providing alternative sources of debt financing from high grade to high yield with fixed or floating rates, which should help reducing the volatility of debt financing availability.

An overview of infrastructure debt

Investing in infrastructure debt offers institutional investors exposure to assets with expected long-term stable cash flows at attractive yields while offering borrowers access to much needed liquidity.

The global financial crisis has impacted the infrastructure finance market, while regulatory changes have limited the ability of traditional lenders to fully meet demand from borrowers. This is particularly evident in Europe where new solutions, such as infrastructure debt funds, have been developed to promote an institutional debt capital market for the infrastructure sector.

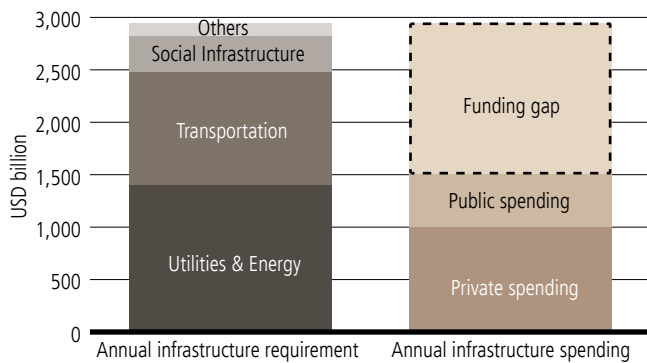
As infrastructure debt investing remains a complex area and easily accessible assets hard to find, asset managers should help bring institutional investors closer to this attractive asset class.

Global trends

The Organisation for Economic Co-operation and Development (OECD) has outlined a significant requirement for infrastructure finance over the next two decades in the region of USD 50 trillion to 2030. This would represent an investment requirement in the OECD of around USD 3 trillion per annum, with as much as USD 2.5 trillion required for transportation, utilities and energy.

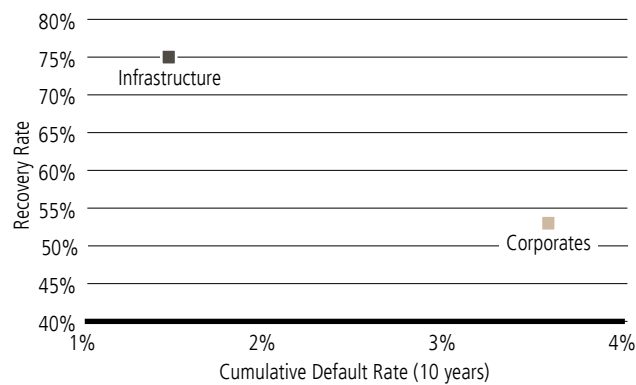
Compared to the current infrastructure spending in the OECD, this implies a funding gap of USD 1.5 trillion per annum (*Figure 6.5, overleaf*). The majority of this capital will need to be funded through debt. In addition, a significant amount of debt raised pre-crisis for existing assets will need to be refinanced.

Figure 6.5 Infrastructure Requirements to 2030



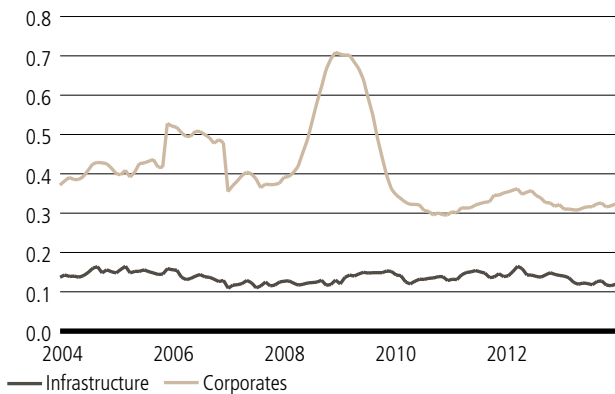
Sources: OECD. Note: 2013 to 2030, USD 50 trillion in 2010 prices
 OECD, McKinsey, Infrastructure Journal, UBS Asset Management, Real Estate & Private Markets (REPM).

Figure 6.6 Cumulative default and average recovery rates for BBB credit



Source: Moody's Infrastructure Default and Recovery Rates, 1983-2013.

Figure 6.7 Rating volatility of Moody's rated universe



Source: Moody's Infrastructure Default and Recovery Rates, 1983-2013.

Liquidity provided by banks to the infrastructure sector has reduced as part of a shift away from higher risk-weighted assets and to comply with Basel III capital adequacy rules. We believe that this offers institutional investors the opportunity to step into this attractive asset class and benefit from long duration stable debt assets.

Credit performance

In the infrastructure sector default rates have been relatively low and recovery rates relatively high (Figure 6.6) versus equivalent rated corporate debt. Infrastructure debt also shows lower rating volatility (Figure 6.7).

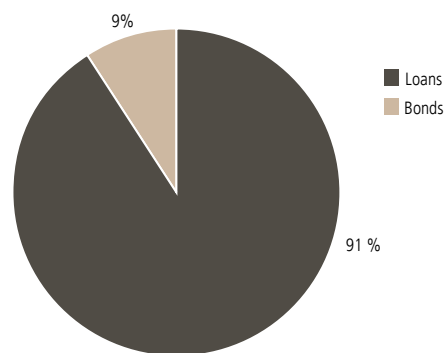
The opportunity in Europe

We view the OECD as the area with the most opportunity for institutional capital given the significant requirement to finance new, and to help replace, ageing infrastructure. These markets also benefit from a more developed regulatory framework and legal system compared to other jurisdictions. In particular, Europe is highlighted as a very attractive investment opportunity due to it having the highest market dislocation.

Deleveraging among banks and budgetary constraints for governments have reduced the availability of debt capital, creating the need for alternative sources of capital, such as insurance companies and pension funds. North America has traditionally relied less heavily on bank debt due to more developed capital markets while Australia has experienced less drastic deleveraging compared to Europe.

In Europe, bonds remain a small portion of total infrastructure financing, leaving the large majority of investment opportunities being executed in the private market (Figure 6.8).

Figure 6.8 Split of European infrastructure debt finance



Source: IJGlobal European Infrastructure Outlook 2013

The restricted capacity of banks to provide long-term debt for infrastructure deals has come at a time when the need for infrastructure spending is soaring.

A natural development in Europe could be for the debt capital markets to replace the lending market as the source of long-term funding for the sector. It will take time for this transformation to occur.

Borrowers and sponsors will have to get used to the different investment terms, financial disclosure and documentation. Institutional investors should get to know better the specific characteristics of the infrastructure sector, historically complex and private. In the meantime, traditional long-term lending will have to be replaced by a combination of bond markets, private institutional loans, US private placements and debt funds. Bank loans will continue to be a relevant source of capital for infrastructure but will be more focused on key clients, short-term lending or temporary financing.

Why infrastructure debt funds?

In the continuing search for financing solutions which match the nature of infrastructure assets, a key development for capital investments has been the recent move by many asset managers to establish funds or platforms for institutional investors which raise specialist debt vehicles to invest in infrastructure debt.

The investment strategy of such debt vehicles varies between the infrastructure sub-sectors, target geographies, senior to subordinated, primary and secondary market. The vehicle structures tend to be either pooled funds or separate managed accounts. There are funds focused only on mezzanine debt or senior debt, or on the broader debt capital structure.

The merits of investing in an infrastructure debt fund are the access to private complex debt transactions, the expertise in capturing potential attractive risk-adjusted returns in dislocated debt market segments, and the ability to tailor the investment to the specific objectives and regulatory requirements of the clients (such as Solvency II).

The proposed risk-return opportunity offered by investing in an infrastructure debt fund is more attractive than that traditionally available to fixed income institutional investors buying investment grade bonds in the capital markets. Access to these deals requires experience, expertise and a strong network. Some large investors have decided to build experienced teams and invest directly but this requires an investment of both time and resources.

The key benefit of investing in an infrastructure fund is the expected alpha over a traditional investment grade fixed income portfolio.

A 200 basis point pick up may be achieved by:

- Identifying and investing in dislocated market segments affected by a lack of capital supply
- Being proactive in sourcing and accessing private/proprietary debt financings in the primary market
- Ensuring direct involvement in structuring to identify and mitigate risks as well as avoid intermediation costs



Alternative sources of return



7. Alternative sources of return

For many years, the bulk of UK pension fund assets were allocated to either equities or bonds (see Appendix B). In some cases, there would also be a small allocation to cash. However, more recently, pension funds have been allocating a larger portion of their assets to new investments.

These include both new asset classes and capabilities that rely on gaining exposure to existing asset classes in different ways. Collectively, these investments are sometimes referred to as 'alternatives', in the sense that they are alternatives to equities and bonds.

However, a clear definition is needed. So for a pension fund trying to define a list of alternative investments, what characteristics should they consider? We would propose that any new class of investments could usefully combine some or all of the following characteristics:

- Preserve the real value of the pension funds' assets
- Provide a claim on future cashflows. This makes it easier to model the assets' fundamental risk and return characteristics, and their ability to hedge liabilities that often take the form of cash outflows
- Improve the efficiency of the portfolio. This means the portfolio can obtain a higher risk-return ratio
- Cost effective. It should be possible to hold and manage the assets without incurring punitive costs

This can be illustrated with reference to the two largest traditional pension fund investments — equities and government bonds. Both of these asset classes have claims over future cashflows.

In the case of equities, these cashflows are related to corporate profits and in the case of government bonds, they are related to a coupon guaranteed by the governments' ability to raise taxes. The different nature of these cashflows means that equities and bonds have fundamentally different characteristics and therefore, the correlation between the returns from equities and bonds is relatively low.

This implies that their risks are well diversified when they are held in combination, leading to a more efficient portfolio. Profits generally grow in line with economic growth; therefore equities should help preserve the real value of assets. Conventional bonds do this less well because their value is fixed in nominal terms. However, investing in both equities and bonds is relatively cheap. This combination of attributes helps to explain why these two assets have historically been so popular.

Some of the alternative asset classes that pension funds have been considering would also appear to have many of the same attributes as equities and bonds. Private equity, for example, is also a claim on future cashflows derived from corporate profits. The difference is that, unlike traditional equity investments, these companies are not publicly listed and so the investment is relatively illiquid.

Historically, investment in private equity has also been considered a good risk diversifier because the companies differ in nature from publicly-quoted ones. However, there is some concern that this distinction may recently have become blurred as large public companies have reverted to private ownership.

Pension funds have not restricted themselves to investing only in financial assets. For example, many pension funds have made significant allocations to real estate. Real estate is another asset class that derives a significant part of its value from cashflows. In this case, the relevant cashflow is the rent at which it can be let. Rents tend to grow in line with inflation, which has meant that real estate has been seen as a useful inflation hedge. In addition, the distinct nature of these cashflows means that real estate can help to diversify a portfolio although, in practice, rents are likely to be influenced by some of the same factors as the profits that underpin equities.

However, unlike equities and bonds, real estate is a physical rather than financial asset, and this has important implications. In particular, it is subject to depreciation in the form of both wear and tear, and obsolescence. It therefore requires capital expenditure to maintain its real value and this makes it quite a costly investment. The physical nature of real estate also means that it is relatively illiquid and makes it difficult to obtain passive exposure to it. Further details on real estate investment can be found in Chapter 5.

High cost is the main reason other physical assets that could be rented out to generate a cashflow are not normally included in pension funds. For example, cars, planes and tuxedos are all physical assets that are commonly leased to generate a cashflow. It is easier to gain diversified exposure to these cashflows indirectly through the financial assets of companies that are already engaged in these operations.

There are a number of physical assets that are becoming of increased interest to pension funds which do not have any obvious claim over a cashflow. For example, commodities have increasingly been seen as a useful addition to a pension fund's armoury. However, they do not necessarily entitle the owner to any future cashflow beyond a risk-free rate of return. Commodities are relatively cheap investments

via derivative markets and have a relatively low correlation with equities and bonds, which implies they should be good portfolio diversifiers. However, this lack of correlation also explains why commodities are unlikely to deliver a return above cash in equilibrium if they are managed on a passive basis. Also, historically, they have been a poor hedge against inflation.

Other physical assets that are sometimes considered as alternatives include works of art, wine and other collectables. However, they too are not generally underpinned by a cashflow. It may be possible to earn a yield on a piece of artwork, for example, by lending it to a museum, but that would not be possible with wine, since nobody would want to borrow it without consuming it.

Nevertheless, their value should generally rise through time as wealth increases. This should help to preserve the real value of the investment but may also imply that they are exposed to some of the same risks as equities, thus reducing their ability to diversify a portfolio. They may also be expensive to store and maintain.

An alternative asset class which is gaining increased attention in the UK pensions market is infrastructure. Infrastructure assets are used to facilitate the orderly operations of an economy. Of course, some of these assets are not new and it has always been possible to gain exposure to many of them through equity and bond markets, such as utilities and transport stocks. However, investing in physical assets such as toll roads and healthcare facilities, has been more difficult and, like real estate, requires the management of contracts and capital reinvestment, which can be expensive.

By packaging different forms of infrastructure investments together, investors may be able to gain diversified exposure to

assets that share certain desirable characteristics. In particular, the cashflows should be relatively stable and may provide a good hedge against inflation. Further information on infrastructure investment can be found in Chapter 6.

Another set of investments that have been considered as alternatives are strategies that are used to gain exposure to existing asset classes. These investments include hedge funds, currency funds and global tactical asset allocation (GTAA) funds. These funds cover a wide range of different investment strategies which makes it difficult to generalise their characteristics. What links them is their ability to use leverage and to take both long and short positions. Whilst they are not asset classes, such investments may benefit portfolios because the strategies they employ mean they are not highly correlated with the existing assets.

Pension funds are casting their nets even wider in an attempt to improve their asset mix. In doing so, they are considering assets both financial and physical, liquid and illiquid and those with or without an underlying cashflow. They are also investing in new strategies that are not really separate asset classes at all.

What matters most is that pension funds should consider the underlying characteristics of each potential investment, both in isolation and as part of a portfolio of assets, to ensure that the fund will benefit from an allocation to alternatives. *Figure 7.1* summarises the key characteristics of a range of alternatives.

In the rest of this chapter we examine in more detail some of the alternatives outlined above. For more details on pension funds' allocations to alternatives, see Appendix B.

Figure 7.1 Comparison of alternative investments

	Potential returns	Liquidity	Diversification benefit	Risk	Holding/ Management costs
Private equity – venture capital	Very high	Low	Moderate	Very high	High
Private equity – buy-ins/buy-outs	High	Low	Moderate	High	High
Hedge funds	Various	Low/Medium	Various	Various	High
Infrastructure	Medium	Low	Moderate	Low/Medium	High
Gold	Low	High	High	Medium	Low
Commodities	Volatile	High	High	High	Low
Art & collectables	Medium	Low	High	Medium	High

Source: UBS Asset Management assessment of consensus views

Hedge funds

A hedge fund is typically an investment vehicle in which an investor or group of investors may employ various strategies in an effort to generate absolute returns (alpha). Unlike mutual funds, hedge fund managers typically hold both long and short positions and may use leverage. A large variety of hedge fund investment strategies exist, each with varying levels of associated risk. Certain investors seeking diversified exposure to hedge funds frequently opt for investment in a fund of hedge funds, which is a fund with underlying investments in several hedge funds that often provides exposure to various strategies and geographies.

Hedge fund strategies

The hedge fund universe can be examined through the strategies and sub-strategies employed by managers. It should be noted that strategy classification definitions may vary and many fund managers employ multi-strategy approaches.

'Equity Hedged' managers primarily use fundamental analysis to invest in publicly traded equities and seek to generate alpha through superior security selection. Through fundamental analysis, managers evaluate factors that may affect a security's value, such as macroeconomic trends, industry specific metrics, and other qualitative and quantitative factors. Equity Hedged managers may take both long and short positions to capture the perceived mispricing of a given security. Portfolio construction is generally driven by bottom-up fundamental research, although top-down analysis may also be applied. The sub-strategies that comprise Equity Hedged include Fundamental, Equity Event, and Opportunistic Trading. 'Equity Event' managers typically focus on hard and soft catalysts to attempt to realize profits, such as corporate events including spin-offs, restructurings, stock buy-backs, tender offers, material asset sales, security issuance/repurchases, or other events.

Equity Hedged strategies can be further classified by market exposure (short bias, neutral, conservative, aggressive), sector (technology, energy, financials, healthcare, etc.), market capitalisation, geography, or investment style, among others.

'Credit / Income' managers generally target either carry or security selection alpha or a combination of both. Within Credit / Income, corporate and structured credit-oriented managers generally utilise credit analysis to evaluate potential investments, use debt or debt-linked instruments to execute their investment theses, or seek to create carry-oriented return

streams in other asset classes that behave similarly to income-generating debt instruments (e.g. reinsurance). Managers' approaches can be either fundamental, tactical, quantitative, or a combination of all three. A common thread for corporate and structured credit managers is the application of in-depth fundamental credit, capital structure, and event analysis to individual credit opportunities. Along with that, a successful manager should remain more cognisant than ever of the potential impact from macro shocks and the technical environment when constructing a portfolio. A similar set of skills, supplemented by deep fundamental analysis of weather patterns and probability analysis, is generally applicable for reinsurance managers. There are also several other types of income-generating, carry-based strategies that do not fit into one of the above sub-strategy categories. Sub-strategies within the Credit / Income classification may include distressed debt, corporate long / short, asset backed, CLO / corporate lending, reinsurance / ILS, and other various income-generating, carry-based niche approaches.

'Relative Value' strategies are generally non-directional and are often quantitatively-driven. Managers typically use arbitrage to exploit mispricing and other opportunities in various asset classes, geographies and time horizons. Managers frequently focus on capturing the spread between two assets while seeking to maintain neutrality to other factors such as geography, interest rate changes, equity market movements, and currencies. Relative Value sub-strategies include convertible bond arbitrage (buying the convertible bond and selling short the underlying stock), fixed income and mortgage-backed security arbitrage (involving spread plays between instruments of different credit quality, maturity or other features), statistical arbitrage (using mathematical / statistical models to buy and sell baskets of securities simultaneously) and merger arbitrage (seeking to capture the price spread between current market prices and the value of securities upon successful completion of a merger). The width of the spreads typically reflects the market's willingness to take on transaction risk.

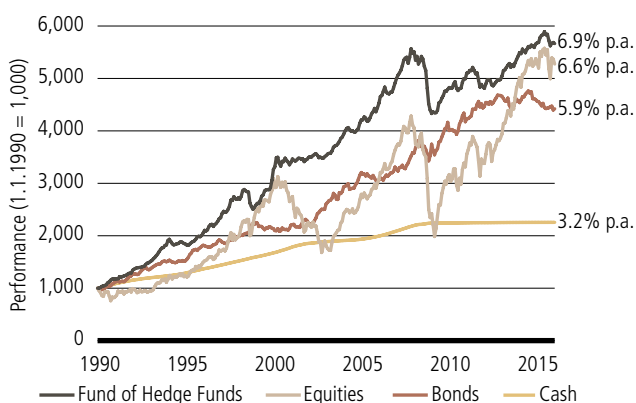
'Trading' strategies are generally more top-down in nature and are often driven by views derived from monetary policy, fiscal dynamics, and macroeconomic research. These strategies typically utilise financial instruments such as foreign exchange, equities, interest rates, sovereign debt, corporate credit, and commodities to express a manager's view. In executing different approaches, managers may use either fundamental or quantitative models, or a combination of both. Sub-strategies include discretionary, systematic Commodity Trading Advisors (CTA), and commodities.

'Other' strategies include niche or esoteric approaches not classified above. Hedge funds that specialise in closed-end fund arbitrage, derivatives arbitrage, index arbitrage, emissions trading, and weather derivatives, among others, fall into this category.

Performance

The year 2016 was, in our opinion, a modestly challenging period for hedge funds. According to indices compiled by Hedge Fund Research, Inc. (HFR), overall performance was positive, though results were quite varied across different sub-strategies. Hedge funds (as measured by the HFRI Fund Weighted Composite Index) and funds of hedge funds (per the HFRI Fund of Funds Composite Index) generated returns of approximately 5.5% and 0.5% (in USD terms), respectively. The seemingly large discrepancy between the fund of funds index and the single-manager hedge fund index is unusual; this may be the result of certain reporting biases in the construction of these benchmarks. While unimpressive over many years, 2016 returns are considered to compare favorably with several major asset classes on an absolute basis and many other asset classes on a risk-adjusted basis. *Figure 7.2* shows the HFRI Fund of Funds Composite Index, net of two layers of fees, compared to equities, bonds and cash (gross of fees). Some consider the Index to be one of the most frequently used proxies for hedge fund portfolios. The solid multi-year performance of hedge fund portfolios, relative to more traditional investment alternatives, is important as investors seek compensation for the lower transparency and liquidity, higher complexity and headline risk.

Figure 7.2 Cumulative fund of hedge funds performance (Jan 1990 to Dec 2016)



Source: HFS Industry Research, Bloomberg. Based on USD total returns of HFRI Fund of Funds Composite Index, MSCI World Total Return Index, Bloomberg Barclays Global-Aggregate Total Return Index, and BofA Merrill Lynch US T-Bill 3M Index respectively. Figures on the right show CARR (compound annual rate of return). Indices are used for illustrative purposes only. Past performance is not indicative of future results.

From January 1990 through December 2016, the HFRI Fund of Funds Composite Index generated a Compound Annual Rate of Return (CARR) of +6.7%, while the HFRI Fund Weighted Composite Index compounded at +10.0% (both in USD terms; the latter net of fees). Over the same period, global equities and bonds compounded at approximately +6.7% and +5.7% (in USD terms), respectively. As such, long-term hedge fund absolute performance and relative performance appears to remain attractive.

Based on the data in *Figure 7.2*, a balanced portfolio (defined as 60% equities, 40% bonds, monthly rebalanced) compounded at a rate of 6.6% per year, gross of fees (in USD terms). One interpretation is that the decision to allocate away from equities and bonds into hedge funds would have added value in the long-term, even after accepting the additional fees from a fund of funds. Equity markets have incurred drawdowns in excess of -45% twice since 2000, which may have resulted in the performance of many balanced portfolios failing to keep up with inflation.

While the overall HFRI Fund Weighted Composite Index produced a mildly positive total return in 2016, there appeared to be considerable dispersion of returns across different sub-strategies during the year. *Figure 7.3* shows the five best and worst performing HFRI indices based on 2016 performance, sorted by Sharpe Ratio. With certain approaches producing double-digit gains in 2016 (and others experiencing zero or slightly negative returns), it is reasonable to assume that opportunities are available to investors who may be able to utilize superior decision-making to allocate toward the strategies perceived to have the most compelling opportunity sets. Moreover, *Figure 7.3* supports the notion that many hedge fund strategies offer attractive risk-adjusted performance.

The performance of hedge funds in 2016 was slightly inferior to that of various equity markets but with only a fraction of the volatility. With the lessons of 2008 still in mind, many hedge fund managers have been cautious about leverage, liquidity, and risk management in an attempt to mitigate the effects of tail risk induced by financial markets. We believe this dedication to active risk management is a major product differentiator between hedge funds and long-only programs, as the latter, in general, is more dependent upon market forces in the determination of overall portfolio risk and the severity of drawdowns. *Figure 7.4* illustrates this point, showing the monthly returns of both the MSCI World Total Return Index as a proxy for a long-only strategy and the HFRI Fund of Funds Composite Index as a proxy for a hedge fund portfolio, net of two layers of fees. The performance of world equities is nearly three times as volatile as that of hedge funds, with a maximum historic drawdown nearly two and a half times that experienced by hedge funds.

Figure 7.4 also reveals another key attribute of hedge funds: these vehicles tend to offer asymmetric or 'option-like' performance. During bull markets, the average hedge fund would be expected to underperform long-only funds. However, during bear markets, well-positioned hedge funds are expected to outperform, meaning they may lose less, produce flat or even positive returns. From 1990 through 2016, the mean returns for the MSCI World Total Return Index and HFRI Fund of Funds Composite Index were 0.63% and 0.55%, respectively. However, when considering just months where the market was negative, the mean return for equities was -3.47%, as compared to -0.41% for the HFRI Fund of

Funds Composite Index. As 128 out of the past 324 months resulted in negative performance for the MSCI World Total Return Index (versus 99 for HFRI Fund of Funds Composite Index), one may reasonably conclude that hedge funds may offer attractive risk / reward characteristics for the more risk-averse investor.

According to HFR, the hedge fund industry grew in size in 2016 mainly due to performance, despite investor outflows. As of December 2016, hedge fund assets were just over USD 3 trillion, an increase of USD 122 billion from December 2015. During the same period, investors withdrew USD 70.1 billion, which was the first outflow from the industry since 2009. Investor flows to funds of funds have been negative since 2008, according to HFR, and the trend has fluctuated from year to year. In 2016, outflows from funds of funds totalled USD 26.4 billion, versus only USD 14.8 billion in 2015 and an average redemption of just under USD 30 billion annually over the past nine years. The cumulative effect of fund of funds disintermediation since 2008 has been a staggering USD 266.8 billion. We believe the fund of funds industry is undergoing a consolidation, with a few large firms surviving, while mid-sized and smaller participants as well as those unwilling to adapt are losing market share.

We believe another notable trend in the industry over the past several years has been the compression of fees charged by hedge funds. *Figure 7.5* shows the average management and performance fees by single-manager hedge funds that reported to the HFR database, as of each year-end from 2011 to 2016. Management fees have dropped steadily from 1.59 to 1.43 over the time period, while performance fees were pared down from 18.26 to 15.06 on average. A similar result is obtained by focusing solely on managers with a minimum size of USD 100 million. Such "institutional" funds likewise have reduced management fees from 1.60% to 1.44% over the past six years, while incentive fees were slashed from 18.67% to 14.93% on average. As hedge funds struggle to achieve competitive rates of return, their need to reduce fees to attract investors will likely continue, particularly for smaller managers.

In our opinion, investment programmes that included a modest allocation to hedge funds in addition to equities and bonds seem to have been rewarding for long-term investors. *Figure 7.6* shows performance of both traditional assets and alternatives from 2012 through 2016. The average hedge fund outscored global bonds in 2016, though commodities, global equities, and real estate led with higher overall gains.

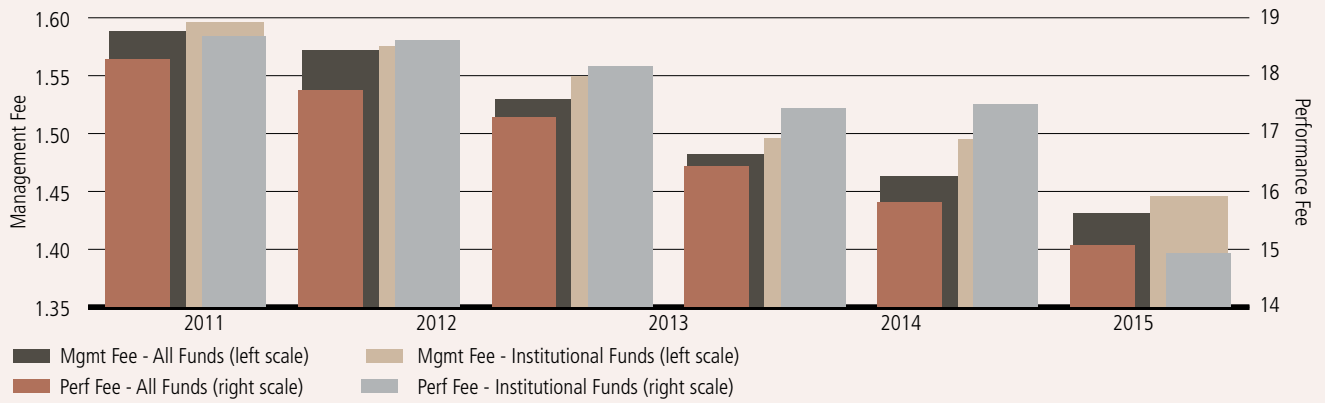
At the beginning of 2017 in its Quarterly Outlook, the UBS Hedge Fund Solutions team (HFS) forecasted a market defined by unprecedented uncertainty in both the US and abroad. Investors, grappling with anti-globalization sentiment, face a year of major geopolitical events including European elections and Brexit Article 50 negotiations. In the US, if early GOP-defined objectives come to fruition, HFS expects investor

sentiment to shift from the "lower for longer" regime to an "inflationary" theme. Our outlook by strategy is as follows:

- **Equity Hedged:** After a difficult 2016 for Equity Hedged, our view is more constructive on the strategy in 2017. We expect increased dispersion, intra- and cross-sector opportunities, and short-term earnings plays. Post-US election sector rotation and coming policy shifts will favor certain sectors over others; HFS may choose to diversify away from generalists and into sector specialists if it believes the manager can navigate factor risk
- **Credit / Income:** While we are not bullish on credit-related sub-strategies, we are most interested in co-investment opportunities and overlooked market segments. We maintain a low allocation to reinsurance due to the strategy's low correlation.
- **Relative Value:** Fixed Income Relative Value is our highest conviction sub-strategy in relative value, especially from a Sharpe Ratio perspective. New flows and volatility in rates markets should provide a fertile backdrop. Merger arbitrage may see an increase in investor-friendly corporate activity as overseas corporate cash is potentially repatriated; however cross-border deal activity may suffer from increased protectionism. Our view on quant equity remains lukewarm; favoring short-term statistical arbitrage over longer-term quant equity strategies.
- **Trading:** In such an environment, we believe the greatest beneficiary of renewed volatility will be tactical Trading strategies. In terms of asset allocation, this would include addition to thematic developed market macro and emerging market managers focused on bottom-up opportunities. We also anticipate increasing our exposure to systematic CTAs on account of favourable, emerging trends across several markets.

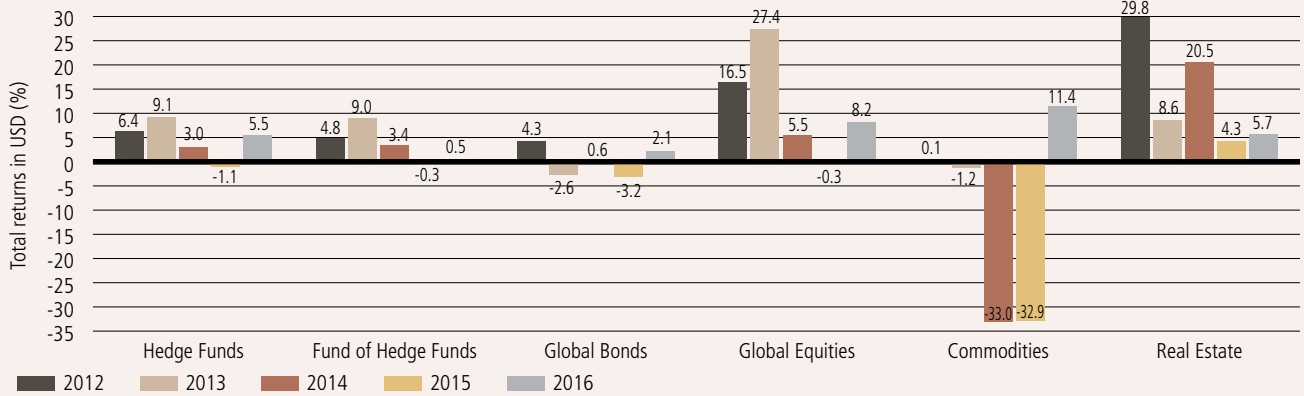
The hedge fund industry has experienced cycles of great prosperity over the years, particularly as we have seen the industry re-engineer itself as it adds new sources of alpha. Combined with increasing investor interest in terms of flows, greater market dislocations and global opportunities, as well as continual improvements in fee compression, liquidity and risk management by funds, we believe the potential for outperformance by hedge funds to be attractive.

Figure 7.5 Average Management and Performance Fees of Hedge Funds (Year-end 2011 to 2016)



Source: HFS Industry Research, Hedge Fund Research, Inc. All Funds refers to all single-manager funds (excludes funds-of-funds) that reported to the HFR database as of the end of each year from 2011 to 2016. Institutional funds are a subset of All Funds including only those with assets denominated in USD and total fund assets of USD 100 million or more. Indices are used for illustrative purposes only. Past performance is not indicative of future results.

Figure 7.6 Performance of various asset classes yearly from 2012 to 2016



Source: HFS Industry Research, Bloomberg, Hedge Fund Research, Inc., Barclays Capital. Based on USD total returns of HFRI Fund Weighted Composite Index, HFRI Fund of Funds Composite Index, Bloomberg Barclays Global-Aggregate Total Return Index, MSCI World Total Return Index, S&P GSCI Total Return Index, and GPR 250 Property Shares Index World Local Currency. Indices are used for illustrative purposes only. Past performance is not indicative of future results.

Private equity

Private equity is a broad term that refers to any type of equity investment in an asset in which the equity is not freely tradable on a public stock exchange. Private equity investments are generally less interchangeable than publicly traded shares and are usually considered a long-term investment. The private equity market is an important source of capital for start-up and young companies, for firms in financial distress and those seeking growth or buyout financing.

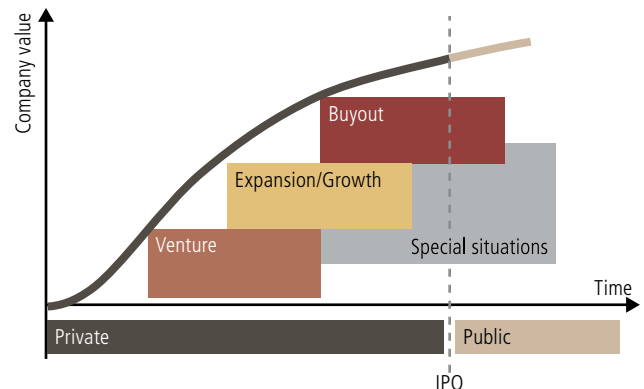
Private equity as an asset class

Private equity investing usually refers to an activity of investing in privately owned companies, which are typically acquired, in whole or in part, through privately negotiated transactions. Private equity funds pool capital from investors into strategy specific funds. These are often organised as limited partnerships, which are the most common legal structures for making private equity investments. Investors in such funds usually commit a certain amount of capital upfront to the private equity fund and, when requested by the fund's manager or general partner, pay in the amount (or percentage of the amount) over a period of time, usually over the first three to five years of the fund's life. The general partner, i.e. the fund, then makes private equity investments on the basis of a pre-defined investment strategy and in accordance with the terms of the offering memorandum. A fund's investments are usually realised, or 'exited' after a five to seven year holding period through a private sale, an initial public offering (IPO) or a recapitalisation, and the proceeds are distributed to the fund and the fund's investors. The funds themselves are typically wound up after a period of ten to twelve years.

Private equity investments are usually categorised according to financing stage, which refers to the stage of development of a company at the time the fund makes its investment. Each investment strategy (i.e. financing stage) carries distinct risk and return characteristics. Accordingly, each financing stage (as shown in *Figure 7.7*) potentially has a different value proposition within a diversified private equity portfolio.

Depending on the point of the company's life cycle, the following are the principal financing stages:

Figure 7.7 Private equity investment activity



Source: UBS Asset Management

Venture capital (VC)

Venture capital investing generally refers to investments in new and emerging companies. Companies financed by venture capital are generally not cash flow positive at the time of investment and may require several rounds of financing before the company can be sold privately or floated. Venture capital investments can be made into companies at the pre-product and/or pre-revenues stage, or it can be into companies which have just started to generate revenues. Venture capital investors typically acquire a minority ownership position in the company.

Expansion/growth

Expansion or growth financing are investments which often follow the venture capitalists and comprise investments whereby the company needs capital to grow and expand the business, usually as quickly as possible. Depending on the nature of the business, companies receiving expansion or growth financing are already generating sustainable revenues but might still not yet be profitable.

Buyout

Buyout generally refers to investments seeking to acquire significant or often controlling interests in established, typically cash flow positive, or profitable companies. The use of debt financing, or leverage, is often prevalent in buyout transactions and debt components of an acquisition financing structure can reach up to 75% of the purchase price. Within the buyout strategy, there are mega, large, medium, small and micro-sized buyouts.

Special situations

Special situations refer to a broad range of private equity investment strategies outside the scope of venture capital, expansion and growth, and buyout investments. Typically, special situations include investment strategies such as turnaround investments, distressed investments, mezzanine capital and lately, a growing segment called 'secondaries'.

Private equity investment characteristics

- Attractive performance over the long-term. Typically, private equity investors expect a minimum net return between 3% and 5% above publicly quoted indices. Top-quartile private equity fund managers have historically considerably outperformed public equity markets, even amid global economic uncertainty.
- Private equity investments earn money for investors primarily from capital gains and to a much lesser degree from dividends. In general, returns to investors are driven by growth in cash flows, multiple expansion and repayment of debt, whereby these elements do vary across private equity strategies.
- Sophisticated private equity investors have proven processes and tools to proactively increase business value and thereby investor's return. Within the ongoing sophistication of the industry, many private equity investors have accumulated significant sector and operational expertise.
- Private businesses have a considerably lower volatility than public equities and show lower correlation. Private equity investors generally invest in less efficient markets where informational advantages can occur as a result of preferential status or extensive due diligence.
- Private equity investments usually align the interests of the investor and the company, because management of the target company is motivated by ownership in the business.
- Long duration private equity investments provide a good match for long-dated liabilities. The global demographic trend of ageing populations has resulted in the need for longer-term capital returns to fund retirement incomes.
- A considerable amount of risk lies in the inherently illiquid nature of private equity investing. Once the fund commits to a private company, the investment is usually not liquid.

2016 private equity industry review¹

What a year 2016 turned out to be – full of surprises: The UK voted to leave the European Union, The USD strengthened significantly against most other currencies, Equity markets reached new highs, the US elected Donald Trump, and for the first time in several years the Fed increased the Fed Funds Rate. Managers must to varying degrees account for the remainder. In turn, we, as investors, must ensure our managers ability to do so. For the most part PE will take these things in its stride and good managers will continue to deliver

¹ Source: UBS Asset Management, PitchBook, Preqin, Financial Times

outperformance. Most metrics for PE have been pointing in the wrong direction for 2016. This should however be taken in the context that 2015 was an exceptionally positive year for PE and when comparing to the longer-term averages 2016 was still a very good year.

North America

Following the trend we had observed through 2016 overall buyout activity declined YoY, by deal value (-12%) and by deal count (-14%). Notably though, 2015 represented an all-time high since 2007, and the "downturn" in activity is potentially more of a healthy gradual normalization and a natural reaction by GPs to a very expensive market where median EV / EBITDA multiples hit 10.9x, almost one full turn more than 10.0x in 2015. Further underscoring the normalisation is that 2016 was still quite a good year when compared to the long term averages. Also indicative of a more healthy market is the decline in leverage. Exits also slowed YoY in 2016. Compared to the long-term averages emphasizes again, that this is less of a concern than at first look.

VC activity declined both by count 22% from 10,468 to 8,136 and by value USD 79bn to 69bn. But again in our view this represents a healthier normalisation from a rather frothy 2015. VC furthermore remains well above its historic long-term averages. With only 39 IPOs for the year corporate acquisitions remained the predominant exit route in an otherwise challenging exit environment.

Europe

As expected the downward trend for buyouts in Europe continued in 2016 and the market metrics finished significantly below 2015. This precipitous fall however somewhat overstates the dire state of European buyouts. Firstly, 2015 was an all-time high for both deal value and number of deals. Secondly, 2016 is well above long term averages. Exits also declined YoY, but, as with deals done, exits remain well above their long-term averages.

European VC also declined YoY, 26% by deal value and 25% by deal count. 2016 was however the second best year in a decade, surpassed only by 2015, and VC also remains well above long-term averages. 2016 saw a generally strong exit environment in Europe. As in prior years corporate acquisitions are the main exit option.

Performance

Figure 7.8 shows the latest available returns for the US and European private equity industry. The data confirms the attractive performance characteristics of private equity in the long-run, which seems to compensate for the illiquidity aspect as well as the differing cycles for the individual sub-segments. In the US, the venture category outperformed the

S&P 500 over the last 10 and 20 year investment horizon, whereas buyout has more challenging times in comparison to the index. In Europe, both venture and buyout investment strategies, consistently outperformed the MSCI Europe.

Figure 7.8 Private equity returns in the US and Europe

European private equity returns to 30 September 2016 (% p.a.)					
	1 year	3 years	5 years	10 years	20 years
All Venture	4.85	12.33	11.93	6.36	6.58
All Buyout	13.85	9.06	10.92	9.26	15.21
All Private Equity	12.47	8.82	10.65	9.00	14.24
MSCI Europe	3.78	2.99	9.14	-0.03	5.32

US private equity returns to 30 September 2016 (% p.a.)					
	1 year	3 years	5 years	10 years	20 years
All Venture	2.18	16.78	14.24	10.31	26.43
All Buyout	10.04	13.89	15.80	11.17	12.26
All Private Equity	8.02	13.59	14.94	10.89	13.92
S&P 500	15.43	12.45	22.69	10.11	17.92

Source: Cambridge Associates (via ThompsonOne); data as at 30 September 2016 generated on 21 April 2017, S&P 500 and MSCI Europe Total return data from Bloomberg as of 21 April 2017. Please note that past performance is not a guide to future performance.

In the US we observe that the S&P 500 outperformed overall PE performance on a 20 year investment horizon. That said, the PE performance is a pooled IRR figure of all PE funds versus S&P 500 that reflects the performance of the top 500 US firms. Here it becomes clear how key the right strategy (see as evidence the performance of venture capital) and manager selection can drive performance and is likely to outperform the S&P 500.

In summary, this underpins the importance of proper fund selection across all various sub strategies. Indeed, accessing the top performing private equity managers is perhaps even more important than in other asset classes. As Figure 7.8 also demonstrates, private equity has generally outperformed public markets in the medium to long-term.

Global tactical asset allocation

The objective of tactical asset allocation (TAA) is to add value for the pension fund by making tactical moves away from the strategic asset allocation to take advantage of valuation anomalies across the different asset classes comprising the strategic benchmark.

Historically, a standard balanced pension fund would set its strategic asset allocation in line with a peer group benchmark that measured the average asset allocation of sometimes large groups of different pension funds. The manager of each fund would then use their discretion to alter the asset class weightings around this benchmark, within limits defined by the pension fund trustees.

Ignoring TAA completely removes a potentially valuable and important additional source of return as well as potential risk reduction. Typically, balanced funds that contain a mix of different asset classes would expect to achieve about a quarter of their expected long-term outperformance of the benchmark from TAA. TAA can thus be seen as another source of return with a low correlation to other elements of potential excess return in the portfolio. As explained in Appendix C, this helps to increase the portfolio's efficiency in terms of the balance between risk and return.

Over recent years, new techniques for implementing TAA have evolved which allow pension funds to obtain exposure to TAA, even if they employ specialist fund managers for each asset class. In addition, these new techniques remove many of the constraints that traditional methods imposed on TAA, thereby allowing for greater portfolio efficiency through either higher expected returns and/or lower expected risk than could previously be expected from this capability.

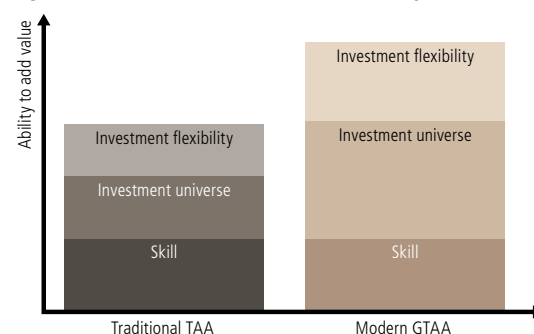
These new techniques have become more commonly referred to as global tactical asset allocation (GTAA) and often involve the creation of a self-contained GTAA fund that can be used to overlay TAA views onto existing portfolios, regardless of their benchmarks. Typically, the pension fund would make a small allocation (say 4%) to the GTAA fund.

The GTAA manager can then use derivative products, such as equity and bond market futures and currency forwards, to achieve an investment return from GTAA that aims to replicate the contribution typically expected from traditional TAA techniques, but with greater efficiency. While the fund manager will still be restricted by agreed limits on the level of risk that they can take within the GTAA product, there are a number of major advantages that stem from using this type of approach, meaning that it is more efficient in terms of risk and return than traditional TAA methods.

For example:

- Unlike traditional TAA, GTAA funds can take views on asset classes that lie outside the strategic asset allocation or investment universe of the underlying portfolio. This creates a much larger range of investment opportunities with which to add value.
- Using derivatives makes it possible to 'short' an asset class. This means that if the fund manager thinks an asset will fall in value, they can effectively sell that asset and make a gain if its price falls. This is impossible using traditional techniques, since the fund manager can only invest in a physical asset, in its entirety. This constraint often produces a major inefficiency within traditional portfolios.
- Investing in physical assets can make it difficult to express asset allocation views. For example, a fund manager may decide that bonds in a particular country are cheap but that the currency of that country is expensive. This creates a dilemma and the net result may be that no view is taken. By using derivatives, it is possible to separate these two decisions — buying the bonds and selling the currency — creating a much wider range of potential investments.
- Using derivatives allows the fund manager to respond more rapidly to valuation discrepancies and avoids any disruption to underlying portfolios of stocks or bonds. *Figure 7.9* summarises schematically how an expanded investment universe and increased flexibility enhance the manager's ability to add value.
- Utilising derivatives to express asset allocation views can reduce transaction costs that would otherwise be incurred by transacting physical securities. The common theme is that newer GTAA techniques tend to remove constraints on the TAA process that have, in the past, restricted the range of investment opportunities available. Removing such restrictions results in a more efficient portfolio and therefore, an improvement in the risk-return trade-off to the benefit of the pension fund.

Figure 7.9 Modern GTAA enhances ability to add value



Source: UBS Asset Management

Currency

How does currency affect returns?

An inescapable reality of investing internationally is that a foreign investor cannot earn the local rate of return that is available to domestic investors. For example, a UK investor buying US government bonds is not able to earn the same returns that a US investor would earn. This is because the UK investor is faced with the issue of exchange rate exposure, which the US investor is not.

Currency exposure does not have to be accepted; it can be hedged. If currency exposure is accepted (hereinafter this is referred to as being 'unhedged'), then the return to the UK investor, in our example from the US government bond, is provided by the combination of the bond's rate of return in the currency of its denomination — in this case USD — and the rate of return of the dollar against the sterling. The UK investor experiences both of these returns simultaneously.

Hedging currency exposure is sometimes thought of as completely removing the issue of currency from international portfolios, such that the UK investor earns the same rate of return as a domestic investor. In fact, hedging does two things — the first is to remove exposure to currency fluctuations, and the second, to replace this with a known gain, or cost, that is equal to the interest rate differential between the two currencies.

The latter is known as the 'impact of hedging', and it is not possible to hedge without incurring this. Hence the choice facing a UK investor buying US bonds is whether to earn unhedged or hedged returns. However, the investor cannot simply earn the local return in dollars that is experienced by domestic US investors.

Mechanics of hedged and unhedged returns

An unhedged investor buying an international asset first buys the foreign currency in which the asset is denominated — known as a 'spot purchase' — and then uses this to purchase the asset. Thus, the UK investor in the example initially sells sterling for dollars before using the dollars to pay for the US government bond. The dollar value the investor obtains from the sale of sterling depends on the spot sterling-dollar exchange rate at the time of the transaction. Upon realising this investment, the investor will sell the bond and receive dollars, and will then have to sell the dollars for

sterling. The dollar value that the investor receives on selling the bond is determined by the rate of return that the bond has delivered over the period it was held. The final sterling value the investor realises from the bond's proceeds is determined by the new spot sterling-dollar exchange rate at the time of the sale.

Thus, the investor's total unhedged return in sterling is the combination of the bond's return in dollars and the return of the dollar against the pound. We refer to these components of the investor's unhedged return as the local return and the 'currency return' respectively. Written as an equation it is:

$$\text{Unhedged return} = \text{local return} + \text{currency return}$$

A hedged investor undertakes a different sequence of transactions. In the same example, when buying dollars, the investor simultaneously sells the same amount of dollars, again, at an agreed date in the future (a forward sale). The exchange rates for buying and selling the dollars against sterling are known as the 'spot rate' and the 'forward rate' respectively. The forward rate is equal to the spot rate plus an adjustment, known as the 'forward premium' or 'discount', which reflects the interest rate differential between the two currencies.

The adjustment is not necessarily zero, but importantly, it is known in advance, hence the spot rate and the forward rate are both 'locked in' at the time the overseas investment is initiated. From this point in time until the agreed forward date, the investor has the use of the dollars to purchase and hold the bond.

If the investor then sells the bond again, receiving dollar proceeds on the forward date, these are then simply paid over in settlement of the forward sale, and sterling is received at the pre-agreed forward rate and no further transaction is necessary. In this way, irrespective of the movement of the dollar against sterling subsequent to the initial transaction, the investor's total hedged return in sterling is the combination of the local return of the bond and the return that is represented by the forward premium or discount. We refer to the latter component of the hedged return as the 'impact of hedging'. Written as an equation it is:

$$\text{Hedged return} = \text{local return} + \text{impact of hedging}$$

The difference between the return from an unhedged investment and the return from a hedged investment is referred to as the currency effect. With a bit of algebra, it can be shown that this is also equal to the currency return minus the impact of hedging.

Equilibrium risk and return

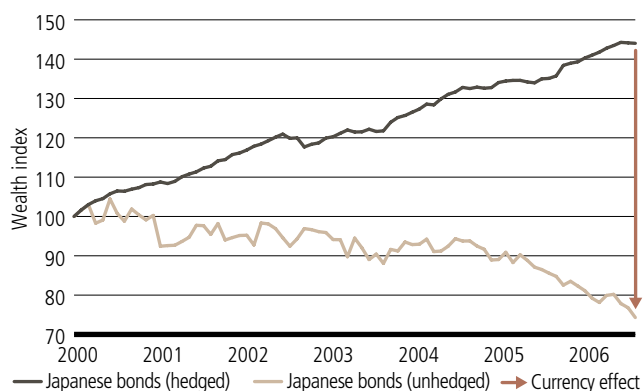
Currencies are generally not considered to be an asset class in their own right. Rather, currency exposure is a property possessed by all financial assets and represents a component of their risk and return. In the case of cash deposits, risk (from an international perspective) is almost 100% currency related since the interest rate is known with near certainty. It is frequently assumed that the currency exposure of an asset makes little difference to its long run return. In other words, currency exposures ‘wash-out’ over a long-time horizon or that currency exposures provide zero expected return.

Currency effects in non-equilibrium conditions

Whilst we may make the assumption that, in equilibrium, currency exposures provide zero expected return to investors by themselves, this is obviously not true over all time horizons. Indeed, it is apparent that substantial displacements from equilibrium do occur. Even though these shifts may have to be corrected, they can have profound differential effects on hedged portfolios compared to unhedged portfolios. Moreover, these effects can persist for a number of years. This observation significantly complicates the decision of whether or not to hedge international portfolios and leads directly to the consideration of dynamic currency management.

We can use examples from history to show that, notwithstanding our equilibrium assumptions of zero currency return, currency movements have indeed substantially affected returns to UK investors from non-UK portfolios in the past — both positively and negatively.

Figure 7.10 The currency effect: Japanese bonds in sterling terms, December 2000 to June 2007



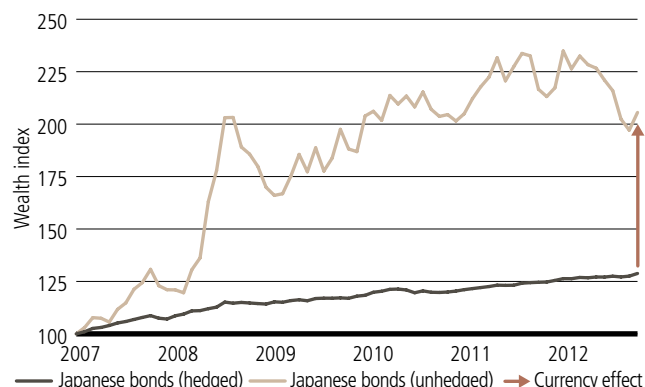
Source: Thomson Reuters Datastream, UBS Asset Management

Figure 7.10 shows two cumulative return indices (wealth indices) from a portfolio entirely invested in Japanese bonds. The returns are shown in sterling terms, for both fully hedged

and unhedged portfolios. The difference between the hedged and the unhedged performance is the currency effect. To better illustrate the difference, we have selected a period that measures data over six years, from end December 2000 to end June 2007. In this example, the currency effect is deeply negative. A UK investor holding a portfolio of Japanese bonds unhedged over this period would have earned a negative return, while the portfolio would have earned healthy positive returns had the portfolio been hedged. This is because of the sizeable and sustained depreciation of the yen against the sterling over the period and the large difference in interest rates. An investor observing or experiencing this performance would be likely to conclude that hedging international investments was surely preferable.

A second example of pronounced currency effects in practice, this time in the opposite direction, is shown in Figure 7.11 Here the wealth indices once again show the performance of a Japanese bond portfolio in sterling terms, hedged and unhedged. The period measured is end June 2007 to end February 2013.

Figure 7.11 The currency effect: Japanese bonds in sterling terms, June 2007 to February 2013



Source: Thomson Reuters Datastream, UBS Asset Management

In this example, the currency effect is highly positive. A hedged investment in Japanese bonds over this period would have produced cumulative returns of around 25% but had the UK investor accepted the exposure to the steeply climbing yen, the return would have been pushed up to well over 100%. This experience would surely have caused hedged investors to regret their decision to hedge the yen exposure

These two examples illustrate that the notion of zero currency returns in equilibrium is quite clearly a long-term proposition. Short and medium-term returns from currencies have been significantly far from zero and sometimes persistent.

The above examples serve to complicate an investor's thinking regarding whether or not it is a good idea to hedge international investments or not. Clearly the issue of currency exposure is highly important and cannot be ignored.

The long-term assumption of zero return from currency may well be too long-term for many investors to withstand the consequences — either of accepting currency exposure when currency effects are negative, or of hedging it, and suffering regret and underperformance of peers when currency effects are positive.

The case for dynamic management

One response to these difficulties is to undertake dynamic management of currency exposure. This is based on two premises.

First, that no passive choice about currency exposure will always be the ‘correct’ or best choice, and second, that the decision regarding how an international portfolio is hedged can, and should, change over time. Furthermore, it involves accepting that investors can respond to developments in the currency market — such as movements out of equilibrium — in such a way as to achieve better risk-adjusted returns than would be achieved by a passive approach.

There are several advantages to treating currencies as an additional source of return. Currency markets are the world’s most liquid markets, with some USD 5.1 trillion traded daily².

As a result, transaction costs are minimal. In addition, currency markets are not dominated by profit-maximisers; instead, commercial and central bank activity tend to dominate flows and consequently, they provide opportunities for alpha-seeking managers to generate incremental returns. Finally, currency returns can have a low correlation with other asset classes and therefore, can offer substantial diversification benefits.

Currency managers can seek to enhance the consistency of their returns and reduce the riskiness of their returns by using several strategies instead of relying on just one. For example, they can combine fundamental strategies based on investing in the currencies that look undervalued; ‘carry and curve’ strategies with systematic long and short positions based on yield differentials and yield curve shapes, and trend-following strategies based on momentum. They can also use judgement to generate returns and manage risk. This would, for example, avoid over-reliance on single strategies that can be prone to episodic return profiles, such as carry in 2008.

Separation of currency investment decision

In the arena of dynamic investing, the distinction between currency management and the management of underlying assets (bonds, equities etc.) disappears. Whilst in an absolute return sense, we have acknowledged that expected currency returns in equilibrium are zero, from the perspective of relative returns and while seeking to outperform a passive strategy, currency ranks on equal footing with all other investment decisions.

The potential to earn excess returns from dynamic currency management exists due to their volatility and the pronounced non-zero rates of return that currencies can deliver over short and medium-term horizons.

The ability to capture excess currency returns independently from the management of the underlying assets in a portfolio exists thanks to the depth, liquidity and flexibility of the forward currency market. Thus, the ability to manage currency separately and the potential to earn excess returns from this means that dynamic currency management is a valid activity in the same way as dynamic asset allocation, equity and fixed income management.

Furthermore, since we assume that the expected correlation of currencies with assets is zero over the long-term, it follows that the management of this separate source of risk and potential excess return should be undertaken by a manager with currency expertise.

Traditionally, managers have achieved the separation of currency decisions from the underlying asset strategy by use of the currency forward market. Pooled vehicles are now available to achieve the same aim. By committing a small proportion of the total portfolio to such a pooled vehicle, global bond, equity or multi-asset mandates can access a full range of currency alpha-generating opportunities.

² Data as at 2016. Source: Triennial Central Bank Survey 2016

Gold

Gold has been held as an investment for longer than any other type of asset. Indeed gold has been used as a means of money for over 5,000 years and for many periods in history, the two were interchangeable.

In many places, especially the developing world, gold continues to play an important part in savings as it is transportable and easily sold in times of trouble, and may hold its value better than the local currency.

Gold today forms a very modest proportion of the world's wealth in terms of global market capitalisation. Yet, as recently as 1979, the value of the gold held by the central banks around the world was more than the US stock market (as measured by the S&P 500 Index). Silver and other metals, such as platinum can be considered, in general terms, as commodities, which are covered in the next section, although the distinction is somewhat arbitrary.

There are several attractions of gold as an investment, not least the high liquidity of the market and gold's status as an asset, as perceived by central banks. Gold is often seen as a good diversifier for funds which means that the return on holding gold is very different from the returns on most other investments.

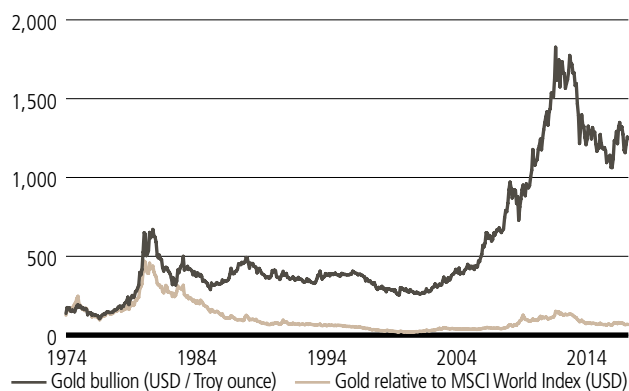
Data from the World Gold Council shows that, historically, gold has shown low to negative correlation with the major equity markets.

Over the very long-term — measured in centuries — the gold price has broadly matched inflation in the UK and gold is often referred to as an inflation hedge. However, this has not always been the case over shorter periods and need not be true in the future.

Gold often performs best in times of geopolitical instability, financial turbulence or high inflation as it is seen as a safe-haven. The strong rally in gold in the high inflation era of the late 1970s can be seen in *Figure 7.12*, along with the subsequent gradual decline in the gold price as the world witnessed lower inflation and a more settled economic outlook.

A renewed upward trend in gold prices began to emerge in early 2000 — its origins seeming to coincide with the start of an equity bear market. In late 2002 and early 2003, with geopolitical concerns adding to the continuing equity market weakness, gold prices gathered further momentum. Across 2002 and 2003, gold prices rose by over 20% p.a. in USD terms.

Figure 7.12 Gold bullion price



Source: Datastream

Gold price appreciation levelled off to a more modest 5% in 2004 but accelerated again until 2007, mainly driven by increased investor demand. 2008 saw turbulent markets with many equities and commodities losing half their value but gold maintained its safe-haven status and prices continued to rise, with investors buying gold due to increasing mistrust of financial institutions.

Global gold demand rose 2% in 2016 to reach 4,309 tonnes (t), the highest level since 2013, according to the World Gold Council's latest Gold Demand Trends report. This was largely driven by inflows into gold-backed Exchange Traded Funds (ETFs) of 532t, the second-highest year on record, as investors responded to concerns over future monetary policy, geopolitical uncertainty and negative interest rates.

Continued global economic and political uncertainty, most notably Brexit, the US election and currency weakness in China, helped to boost overall investment demand by 70%, to a four-year high of 1,561t. The price dip in November led to a strong recovery in the bar and coin market in the final quarter of 2016, although this didn't offset weak demand in the first three quarters; annual demand reached 1,029t, down 2% year-on-year³.

Among institutional investors, few UK pension funds have held gold in recent years but there is some evidence of resurgence of interest, in both gold and other commodities, as the search for diversifying assets continues. Investment in gold can be a strategic or tactical asset allocation decision.

³World Gold Council, Gold Demand Trends full year 2016.

The obvious way to invest is to buy physical gold. There are several alternatives to this; the most recent innovations being gold exchange traded funds (ETFs). These are securities that are traded on a stock exchange, are fully backed by physical gold and aim to track the spot gold price.

From 2004 to 2010 there was a dramatic increase in the market capitalisation of these securities from USD 0.4 billion at the start of 2004 to USD 33.1 billion at 30 September 2008, then rising significantly to USD 97.9 billion at 30 September 2010 (as stated by the World Gold Council) and continues to rise.

In contrast to the attractions of gold, there are some drawbacks. First, gold produces a limited income, although large holders may be able to lend their holdings to gold producers and other market participants, such as manufacturers. Secondly, there have been fears over the supply and demand balance, especially as central banks have been net sellers since 1989. Finally, there is an argument that the status of gold as an investment class is less important in current times given the huge diversity of other investments now available, such as derivatives, hedge funds, etc. Many of these can provide the 'insurance policy' that has been gold's traditional preserve.

Commodities

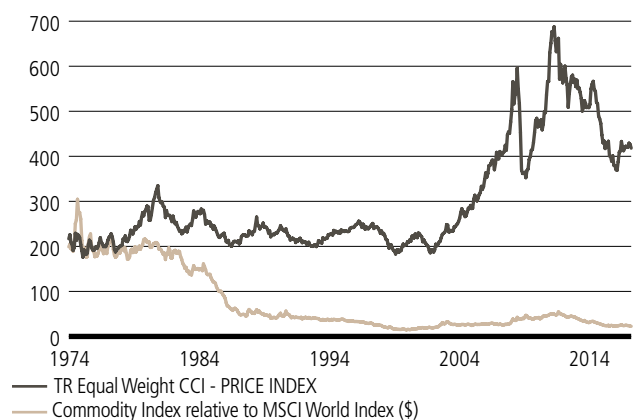
Gold is one commodity that is of particular interest to investors. Alternative commodities include other precious and base metals, energy and agricultural products. Commodities typically produce no direct income but they are liquid and are often perceived to provide a high level of diversification, and a hedge against inflation. These perceptions, coupled with rises in commodity prices up until mid-2008 and commodities' strong rebound from their post-Lehman lows, generated a flurry of interest in commodities among pension funds.

Active management of commodity futures exposure is necessary to take advantage of supply/demand imbalances. Returns from individual commodities can be highly volatile and investors may be attracted by the potential for making quick profits. However, this volatility also carries a high level of risk. Prices are driven by perceptions about the balance between supply and demand. A small change in demand can lead to a large change in the price of a commodity due to the time lag

before the amount of supply can be adjusted. For example, an increase in demand for copper cannot be easily matched by increased mine production in the short-term, as it can take years for a new mining project to be brought on stream.

After a long period of stagnation in the 1980s and 1990s, prices appeared to have started a powerful new cycle, driven in part by demand from emerging markets. Until a sharp correction in mid-2008, commodity prices had seen significant increases since the early 2000s, as shown in *Figure 7.13*. However, demand and prices fell during 2011 and were volatile in 2012 as sentiment worsened. Prices fell for a further year in 2015 and some now question whether the 20-year bull run, that had been predicted, is over.

Figure 7.13 Commodity returns



Source: Thomson Reuters Datastream. Please note that past performance is not a guide to future performance.

In general, commodity prices have considerably lagged equity markets over the long-term, as shown in Figure 7.13. Certain commodities, in limited supply, may see long-term price appreciation as supply diminishes. However, to date, substitute technologies and new resource finds have generally averted such problems. In the shorter term, prices are more closely related to changes in industrial production, as well as factors such as inflation and related commodity prices, particularly since some commodities are used as inputs to the production of others.

Commodities may be accessed through commodity funds or the commodity futures market. Investment via funds and futures provides a financial exposure without the need for physical delivery of the underlying commodity. It is possible to gain an indirect exposure to commodities through companies with profits linked to commodity prices, such as mining, energy or agricultural shares.

During its boom period, the rise in many commodity prices was very beneficial to commodity-based businesses and, until the correction, share prices had been very strong in these sectors. They even managed to record positive returns in the first half of 2008, despite the broader market weakness.

As concerns over growth began to dominate the economic landscape in the third quarter of 2008, commodity prices experienced sharp falls, dragging down shares in commodity-focused firms too. However, over the past four years, the recovery of economic growth, led in a large part by resource-hungry China, has helped commodities, commodity-linked shares and currencies rebound.



Art is not a mainstream asset for pension funds though, some funds have invested in art — notably in the 1970s — when high inflation eroded the value of equities and bonds, and inflation-linked bonds were not available.

Art is an unusual investment category as many valuable works of art are unique. The art market can, therefore, be illiquid as individual buyers must be matched with sellers for each trade, and transaction costs — such as auction house premiums — are very high. The low liquidity and high costs can be justified if the risk is very low or if the expected returns are exceptional.

The risk in holding art is quite high because art tends to perform poorly when economic conditions and stock markets are weak. Art is a discretionary good and usually tempts purchasers when they feel confident. These people may become 'forced' sellers when their personal circumstances deteriorate. In this way, the performance of the art market is broadly linked to the performance of other financial assets and therefore, does not provide as much diversification benefit as might first be imagined.

Art prices, and thus art returns, are quite difficult to measure. Few works of art come up for sale regularly and, given that the reasons for sale are often associated with very high confidence or distressed circumstances, the prices paid are not necessarily representative of the overall market.

A global art price index is produced by Artprice, which shows that prices steadily declined from historic highs in the early 1990s; remained flat for much of the mid to late 1990s and were then on the increase again from mid-2002, accelerating sharply in 2006 and 2007.

The financial crisis during 2008 and early 2009 caused prices to drop back to their 2004 levels down nearly 38% in 15 months — according to the Artprice Global Index (to end Q1 2009).

Prices began to level off in Q2 2009, rising again modestly in the second half of the year as the market regained confidence. 2011 was a robust year for art sales, though the split between developed and emerging economies, in particular the BRICS markets, was quite marked.

Despite a distinctly unfavourable economic environment, the World Art Market remained remarkably buoyant where total sales in 2016 were USD 45 billion dollars, up 1.7% on 2015⁴.

This resilience has been supported by the constitution of new museum collections around the world, particularly in the United States, Europe, the Middle East and Greater Asia.

Perhaps the greatest obstacle to art investment for pension funds is not strictly financial. Arguably, a large part of the return from art comes from the pleasure derived from viewing it during the period of ownership. This can be thought of as the 'income' generated although there is no financial income. As such, pension funds start at a disadvantage although this could possibly be mitigated by renting out works of art.

Given art's other drawbacks of low liquidity, high transaction costs and high risk, pension funds would need to be confident of earning very high returns to consider meaningful investments in this area.

⁴TEFAF Art Market Report 2017



UK pension assets

Types of pension

The UK pensions' system consists of several different types of provision:

- State pension — an unfunded pay-as-you-go (PAYG) arrangement with no accumulated assets. Current pensions are paid from today's revenues. The additional state second pension (S2P, formerly SERPS), provides an earnings-related pension for those employees who do not 'contract-out'¹. The government introduced reforms to the state pension system under the Pensions Bill 2013-2014 which received Royal Assent on 14 May 2014 and became the Pensions Act 2014. These changes mean that from April 2016, the current basic state pension and additional state pension will be replaced with a single-tier pension that is set above the basic level of means-tested support.
- Occupational pension schemes — funded arrangements provided by private companies and public sector employers. These may be funded on a defined benefit (DB) or defined contribution (DC) basis. They may be self-administered by the sponsoring entity or insurance companies. Nearly all DB schemes are self-administered. From October 2012, the government began phasing in automatic enrolment, which will ultimately see all employees placed in an occupational pension scheme unless they actively decide to opt out.
- Personal pensions, including group personal pensions and stakeholder pensions.

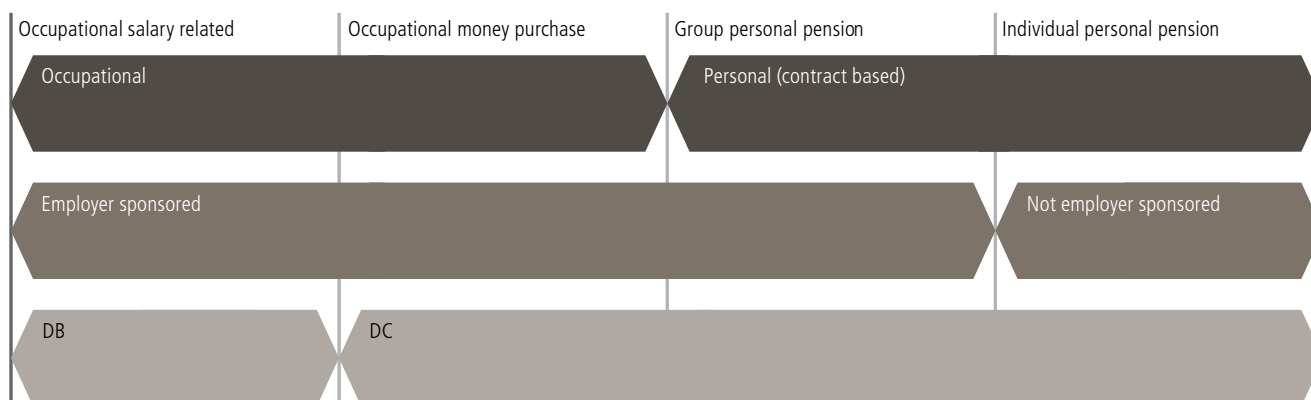
The Pensions Commission's first report contains a useful visual summary of private (i.e. occupational and personal) pension provision, reproduced in *Figure A.1*. The Pensions Commission delivered its final report in 2006, including detailed recommendations for pension reform. These recommendations have been largely taken-up by the government in the Pensions Act 2007 and Pensions Act 2008.

The Pensions Act 2008 contained a number of measures designed to encourage greater private pension saving. A key element was the introduction of automatic enrolment, mentioned above. In order to support this initiative, the National Employment Savings Trust (NEST) was established as an eligible pension scheme for employers to use as part of their new duties.

Total pension assets

Due to the complexity of pension provision, a figure for total pension assets in the UK is an elusive statistic and there is no single data source. Towers Watson's Global Pension Assets Study 2017 estimated UK pension fund assets stood at USD 2,868 billion, as at end 2016. This equates to around GBP 2,230 billion. The UK's pension scheme assets have grown by an average of 6.5 per cent during the last decade². In the UK, the top 10 pension funds represent 16.2 per cent of the total UK pension assets. Among them, 12.4 per cent are private pension funds and the remaining 3.7 per cent are state-sponsored pension funds³.

Figure A.1 Types of private pension provision



Occupational schemes can also be divided between self-administered and insurance managed. Most, although not quite all, DB schemes are self-administered. Note: an occupational scheme is one with scheme trustees and governed by trust law. A personal pension (whether or not sponsored by an employer) has the legal form of a contract between an individual and a pension provider (usually an insurance company). Individual personal pensions are most common among the self-employed and others who are not entitled to join occupational schemes, such as those in partnerships. Stakeholder pensions are a subset of personal pensions and can be either GPP or individual personal pension in form. Source: Pensions Commission

¹ From 6 April 2012, only members of final salary and career average schemes can opt to contract out. ^{2&3} Towers Watson's Global Pension Assets Study 2017

Occupational pensions

In the UK, occupational pensions became a common feature of the benefits offered to employees from 1950 onwards. Data from the Occupational Pension Schemes Survey 2015 (the latest covering both public and private sector schemes) put total scheme membership at about 33.5 million in 2015, an increase of 3.1 million members compared to 2014. This includes; active members, pensions in payment (pensioners) and preserved pension entitlements (deferred pensioners).

The survey shows that private sector active membership has seen an upwards movement from 2014 - 2015, whilst public sector scheme membership remains fairly static, although did increase too over that period. *Figure A.2* summarises the full membership data from the 2015 survey (the Office for National Statistics (ONS) took over this survey from the Government Actuary's Department (GAD) in 2005).

As anticipated active membership within the private sector to increase following the introduction of automatic enrolment in October 2012. Initial data collected in April 2013, from ONS's 2013

Annual Survey of Hours and Earnings pension report, confirms this is already the case and shows an increase in membership for the first time since 2006.

The 2016 survey, released March 2017, shows that the number of employees belonging to a workplace pension scheme stood at 68% in 2016, compared to 47% in 2012. This is the highest since 1997 when the series began. However, there still remains a significant split between sectors, with 88% of public sector employees in a workplace pension scheme in 2016, compared to 60% for the private sector, although this is a material increase on the 2013 figure of 36%. DB pension schemes continue to dominate the public sector (94.1% of public sector employees with workplace pensions have a DB scheme) whereas in the private sector, pension schemes are mostly DC.

The Pensions Regulator's latest Automatic Enrolment (Commentary and analysis: April 2015 – March 2016) shows that by the end of March 2016, more than 6.1 million workers had been successfully automatically enrolled since the reforms began in 2012 – an increase of nearly 1 million workers from 2015, and 3.1 million from 2014.

Figure A.2 Occupational pension scheme membership (millions)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Active members	9.2	8.8	9	8.7	8.3	8.2	7.8	8.1	10.2	11.1
• Private sector	4	3.6	3.6	3.3	3	2.9	2.7	2.8	4.9	5.5
• Public sector	5.1	5.2	5.4	5.4	5.3	5.3	5.1	5.3	5.4	5.6
Pensions in payment	8.2	8.5	8.8	9	9	9.2	9.5	9.6	9.6	10.6
Preserved pension entitlements	9.4	9.4	9.9	10.1	9.8	9.8	10.2	10.2	10.6	11.8
Total	26.7	26.7	27.7	27.7	27.2	27.2	27.6	27.9	30.4	33.5

Source: Occupational Pension Schemes Survey 2015, National Statistics (published September 2016)

Note: Figures rounded to 1 decimal place.

The self-administered schemes

Occupational schemes can be further divided into self and insurance administered schemes respectively. This publication is primarily concerned with the assets invested within a self-administered occupational pension scheme and the data and commentary throughout relate only to this scheme.

Figure A.3 shows the growth of occupational self-administered pension fund assets since 1963 in real and nominal terms. The data covers all private and public sector funded schemes but not certain public sector unfunded schemes, such as those for teachers and civil servants. Total assets were heavily depressed by three consecutive years of falling asset values from 2000 to the end of 2002. Total assets had been recovering following these falls, increasing to just over GBP 1 trillion by the end of 2006. However, due to the negative investment returns of most assets during 2008, total assets fell to GBP 870 billion by the end of 2008. The subsequent recovery in financial markets and rally in risk assets will undoubtedly have helped total assets to increase once again.

Figure A.3 Market value of occupational self-administered pension assets

Year end	Total value GBP billion	Year end	Total value GBP billion
1963	4.6	1990	302.7
1964	4.8	1991	343.6
1965	5.3	1992	382.0
1966	5.4	1993	480.5
1967	6.6	1994	443.5
1968	8.1	1995	508.6
1969	8.0	1996	543.9
1970	8.6	1997	656.9
1971	11.6	1998	699.2
1972	13.7	1999	812.2
1973	12.3	2000	765.9
1974	10.4	2001	713.9
1975	16.3	2002	611.2
1976	20.6	2003	694.1
1977	29.8	2004	763.3
1978	35.4	2005	920.2
1979	42.3	2006	1,016.9
1980	53.9	2007	1,025.0
1981	63.4	2008	871.8
1982	84.2	2009	1,006.0
1983	111.0	2010	1,144.1
1984	139.3	2011	1,230.8
1985	168.1	2012	1,360.5
1986	211.2	2013	1,430.6
1987	227.6	2014	1,449.2
1988	267.4	2015	1,476.7
1989	339.0		

Source: Office of National Statistics

The split between DB and DC occupational scheme assets is another elusive statistic. The clear perception in the market is that the number of DC schemes is growing while the number of DB schemes remaining open to new members is falling.

It is only very recently that DB schemes are being bought out with insurers in any volume and therefore, the number of DB schemes is yet to fall materially. Nevertheless, DC has historically been the choice for smaller scheme sponsors, and, the schemes of the increasing number of larger organisations now favouring DC have not had sufficient time to accumulate substantial assets. In addition, a number of hybrid arrangements exists which make it difficult to be precise about whether some schemes should be defined as DB or DC.

Towers Watson's latest Global Pension Asset Study 2017 states that globally, during the last 10 years, DC assets have grown at a rate of 5.6% p.a. while DB assets have grown at a slower rate of 2.6% p.a. The markets with a bigger proportion of DC assets relative to DB in 2016 are Australia with 87% and the US with 60%.

When comparing pensions assets as a % of GDP in local currency terms, Australia, The Netherlands, Switzerland, the UK and US are all greater than 100%, with the Netherlands at 168%, having increased from 114% in 2004.

The latest figures from the Pensions and Lifetime Savings association (PLSA) 2016 survey suggest the number of DB schemes open to new members in the UK continues to fall, with only 10% of private sector DB schemes open to new joiners in 2016, and the percentage of DB schemes that are closed altogether has risen to 40% (35% in 2014).

The gradual shift towards DC schemes has picked up pace and is likely to continue but the very long tail of DB assets is likely to remain significant for a number of years yet.

Asset allocation

The historical perspective

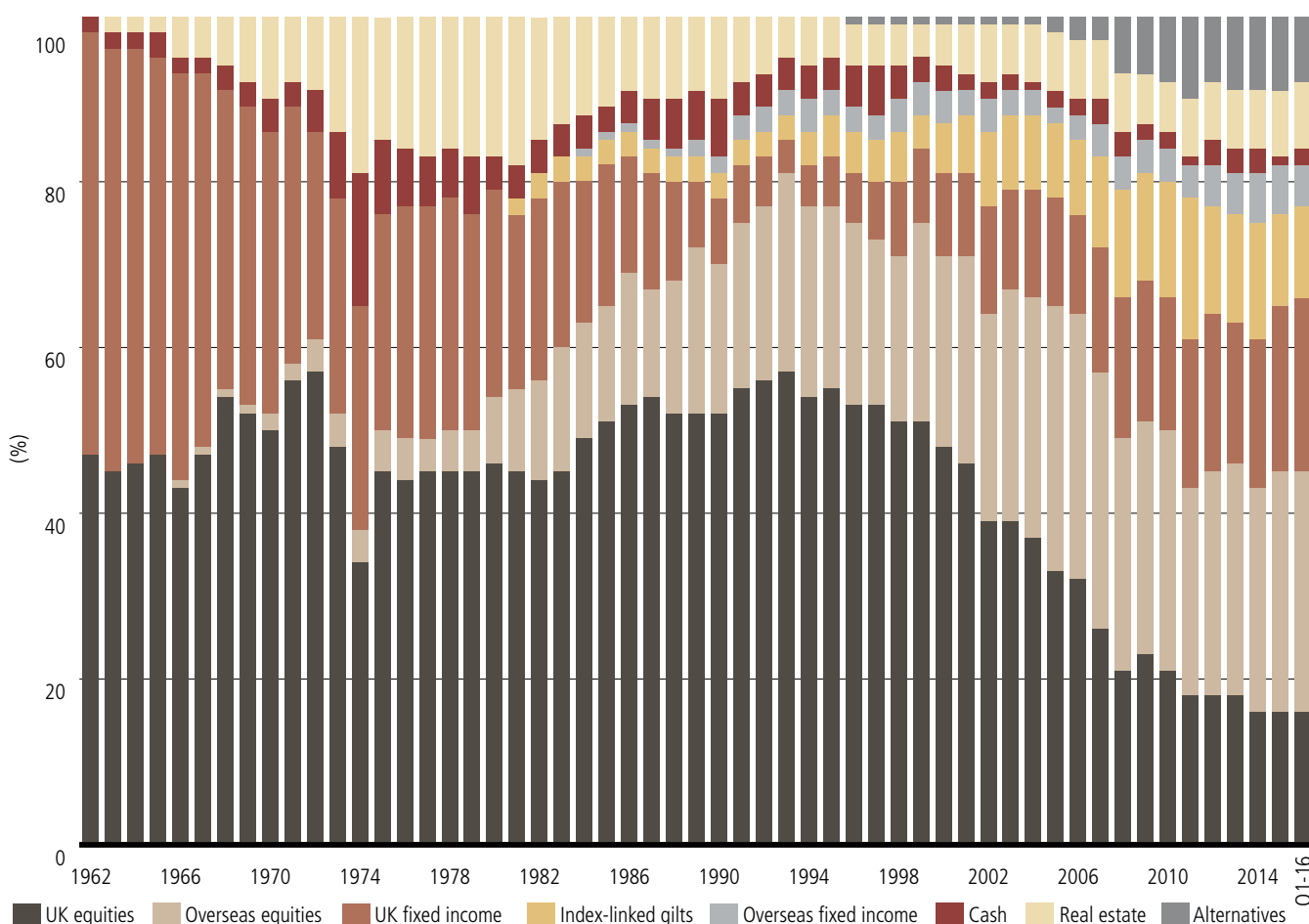
In this appendix, we review the historic asset distribution of pension funds and the returns they have achieved as a result. *Figure B.1* shows the pattern of asset allocation between the main asset classes from 1962 to 2016¹. The data behind this chart can be found in *Figure B.2* (overleaf).

The proportion of assets held in equities (UK and overseas) rose from under 50% in 1962 to a peak of over 80% in 1993, with a dip in the 1974 bear market to less than 40%. Subsequent market declines and diversification towards bonds and overseas equities reduced the weighting to UK equities in 2002, to its lowest level since 1974.

Since 2002 exposure to UK equities has continued to decline, whilst overseas equity exposure has trended upwards and then stabilised around the 30% mark. By the end of 2007, we had seen a sharp fall in UK equity exposure and, for the first time, an overseas equity weighting larger than that of UK equities. In 2008 the gap between the allocation to UK and overseas equity widened. By Q1 2016, exposure to overseas equities was 13% more than UK equities.

¹Data as at 31 March 2016.

Figure B.1 Asset allocation – average pension fund, 1962-2016 (Q1)



Source: Office for National Statistics (until 1995), WM (1996 onwards). Data as at 31 March 2016.

Figure B.2 Asset allocation – average pension fund, 1962-2016 (%)

End	UK Eq	OS Eq	UK FI	ILG	OS FI	Cash	RE	Alt
1962	47		51			2		
1963	45		51			2	2	
1964	46		50			2	2	
1965	47		48			3	2	
1966	43	1	49			2	5	
1967	47	1	45			2	5	
1968	54	1	36			3	6	
1969	52	1	36			3	8	
1970	50	2	34			4	10	
1971	56	2	31			3	8	
1972	57	4	25			5	9	
1973	48	4	26			8	14	
1974	34	4	27			16	19	
1975	45	5	26			9	15	
1976	44	5	28			7	16	
1977	45	4	28			6	17	
1978	45	5	28			6	16	
1979	45	5	26			7	17	
1980	46	8	25			4	17	
1981	45	10	21	2		4	18	
1982	44	12	22	3		4	15	
1983	45	15	20	3		4	13	
1984	49	14	17	3	1	4	12	
1985	51	14	17	3	1	3	11	
1986	53	16	14	3	1	4	9	
1987	54	13	14	3	1	5	10	
1988	52	16	12	3	1	6	10	
1989	52	20	8	3	2	6	9	
1990	52	18	8	3	2	7	10	
1991	55	20	7	3	3	4	8	
1992	56	21	6	3	3	4	7	
1993	57	24	4	3	3	4	5	
1994	54	23	5	4	4	4	6	
1995	55	22	6	5	3	4	5	
1996	53	22	6	5	3	5	5	1
1997	53	20	7	5	3	6	5	1
1998	51	20	9	6	4	4	5	1
1999	51	24	9	4	4	3	4	1
2000	48	23	10	6	4	3	5	1
2001	46	25	10	7	3	2	6	1
2002	39	25	13	9	4	2	7	1
2003	39	28	12	9	3	2	6	1
2004	37	29	13	9	3	1	7	1
2005	33	32	13	9	2	2	7	2
2006	32	32	12	9	3	2	7	3
2007	26	31	15	11	4	3	7	4
2008	21	28	17	13	4	3	7	7
2009	23	28	17	13	4	2	6	7
2010	21	29	16	14	4	2	6	8
2011	18	25	18	17	4	1	7	9
2012	18	27	19	13	5	3	7	9
2013	18	28	17	13	5	3	7	9
2014	16	27	18	14	6	3	7	9
2015	16	29	20	11	6	1	8	9
2016 Q1	16	29	21	11	5	2	8	9

UK Eq = UK Equities
OS Eq = Overseas Equities
UK FI = UK Fixed Income
ILG = Index-linked Gilts
OS FI = Overseas Fixed Income
Cash = Cash
RE = Real Estate
Alt = Alternatives

Source: Office for National Statistics (until 1995), WM (1996 onwards). Data as at 31 March 2016.

The weighting in UK fixed income fell gradually from 51% in 1962 to 4% in 1993. This was partly the result of a substitution towards index-linked gilts — first issued in 1981 — and overseas bonds. Another reason for the decline in the weighting was the fall in the size of the gilt market relative to the equity market. In 1970, the market capitalisations of the gilt and UK equity markets were both around GBP 20 billion. However, Q1 2017, the UK equity market was valued at GBP 2.1 trillion (as measured by the FTSE All-Share Index) versus the conventional gilt market at around GBP 1.0 trillion (according to the Treasury's Debt Management Office).

The dramatic decline in UK equity weightings since the mid-1990s has been offset, to some extent, by a significant resurgence of weightings towards both UK conventional and index-linked gilts. In fact, UK fixed income weightings have more than doubled since the mid 1990s. The relative performance of equities and bonds over this period accounts for some of this shift in weightings. Pension funds have also actively made these asset allocation shifts in recognition of the growing maturity of schemes and a desire for closer matching of assets and liabilities, partly as a result of the Minimum Funding Requirement (MFR — now replaced by the Pensions Act 2004 and the 'statutory funding objective') and subsequent legislation.

By Q1 2016 the overall weighting to bonds decreased slightly to 37%, compared to a weighting of 38% in 2014, however still remains high relative to previous periods. You have to look back to 1967 to witness the last time that bond exposure was in excess of these levels, when it stood at 45%. We anticipate this trend towards bonds will continue going forward (albeit very gradually) as the need to match liabilities grows in significance due to changes in funding philosophy and accounting standards.

The continued increase of allocation to alternative investments over the past eight years has seen exposure remain at 9% in the past few years, compared to only 1% in 1996, and prior to this there was no allocation to alternatives.

Real estate investment increased in popularity during the 1970s as pension funds moved into a sector that they saw as a hedge against inflation. The real estate proportion rose to a peak of 19% in 1974, compared with around 5% in the mid-1960s. Since the early 1980s, reduced net investment and patches of relatively disappointing performance reduced the real estate proportion to around 5% by 2000. At the end of Q1 2016, real estate stood at 8% of the average scheme's asset allocation, slightly increased from the previous five years.

In summary, the key features of the historical average asset allocations are:

- The rise in the equity proportion through the 1980s and early 1990s, reflecting the growth of equity markets relative to other asset classes

- The partial reversal of this trend from the mid-1990s due to rising scheme maturity, a reappraisal of the merits of bond investment, new regulations, the bursting of the equity market bubble between 2000 and 2002 and the global financial crisis, resulting in the so-called 'lost decade for equities'
- The move towards greater diversification across asset classes, including a larger proportion of overseas assets. The average figures do not show the increasing tendency for schemes to adopt allocations specific to their needs rather than being close to the average. This trend has been reinforced by growing scheme maturity, regulatory and accounting changes, and advances in asset-liability modelling techniques.

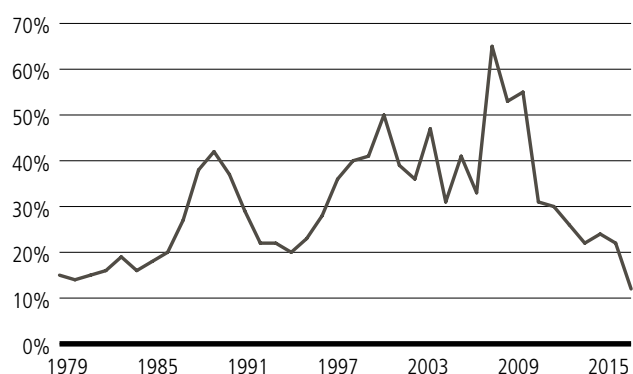
Activity and turnover in UK equities

Activity within an asset class or sector is defined as the lesser of purchases and sales, divided by the mean value of a fund's holdings in the sector. It therefore represents the proportion of the fund switched within the sector. Turnover in a sector is defined as the sum of purchases and sales divided by the mean value of the sector.

Turnover is thus twice the activity rate plus the net investment into (or disinvestment out of) the sector, expressed as a proportion of the mean value of the fund's holdings in the sector.

During most of the 1980s, activity rates in UK equities were on a generally rising trend, as shown in *Figure B.3*. The rise in equity activity rates was partly attributable to the reduction in transaction costs that occurred over the decade. The main reduction was in stamp duty on purchases. The abolition of fixed minimum commissions and the introduction of dual capacity for members of the London Stock Exchange in the so-called 'Big Bang' of 1986, also brought about a reduction in transaction costs.

Figure B.3 Activity rates – UK equities



Source: National Statistics, WM. Data as at 31 March 2016.

Throughout the period, stamp duty was the largest single expense in investing, so its reduction made it a less significant barrier to purchasing shares.

Since the 1986 changes, market-making conditions have been very competitive and brokers' commission rates have fallen sharply. The largest expense in re-arranging portfolios has, in many cases, been the 0.5% stamp duty. A rising market also encouraged a marked increase in the general level of market activity up to 1989. Activity fell back in the recession of the early 1990s. However bull market conditions saw it rising again to fresh peaks in 2000 before weaker equity markets witnessed activity rates fall back, once again, towards more normal levels. Activity rates have been at elevated levels in recent years although the downward trend has continued, with levels returning to figures not seen since 2004.

Ownership of UK equities

Pension funds' ownership of the UK equity market has been steadily declining since the late 1980s. *Figure B.4* shows pension funds' share peaking at just over 30% in 1989 and declining to around 3% at end 2014 (latest available data,

with new data expected to be published in September 2017). This decline has occurred mainly because pension funds have been net sellers of equities in recent years.

Activity and turnover in other markets

Figure B.5 highlights the relative activity rates and turnover for the four main markets in which UK pension funds invest.

Bond portfolios generally turn over more than equity portfolios due to the following reasons. The fact that a bond matures and that the proceeds will need to be reinvested (especially for shorter maturity portfolios) is one factor. The need to reinvest coupon proceeds will also have an impact.

Activity rates in overseas equity portfolios remain higher than those for UK equity portfolios. The fact that this has been the case for over 20 years might reflect a shorter-term approach to overseas stock selection compared to that of the UK. However, the dominant influence is probably asset allocation changes. These have had a greater effect on overseas equity activity because, until 2006, overseas equities had been a lower proportion of total assets than UK equities.

Figure B.4 Ownership of UK equities

End year	1998 %	1999 %	2000 %	2001 %	2002 %	2003 %	2004 %	2006 %	2008 %	2010 %	2012 %	2014 %
Pension Funds	21.7	19.6	17.7	16.1	15.6	16.0	15.7	12.7	12.8	5.6	4.7	3.0
Insurance Companies	21.6	21.6	21.0	20.0	19.9	17.3	17.2	14.7	13.4	8.8	6.2	5.9
Unit Trusts	2.0	1.6	1.1	1.3	1.2	1.5	1.4	1.6	1.8	8.8	9.6	9.0
Banks	0.6	1.1	1.4	1.3	2.1	2.2	2.7	3.4	3.5	2.5	1.9	1.4
Investment trusts and other FIs	4.0	4.3	4.1	8.8	9.0	10.0	10.7	12.0	11.9	14.4	8.4	8.9
Total Institutions	49.9	48.2	45.3	47.5	47.8	47.0	47.7	44.4	43.4	40.1	30.8	28.2
Individuals	16.7	15.3	16.0	14.8	14.3	14.9	14.1	12.8	10.2	10.2	10.7	11.9
Other personal sector	1.4	1.3	1.4	1.0	1.1	1.2	1.1	0.9	0.8	0.8	0.6	1.2
Public sector	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	1.1	3.1	2.5	2.9
Industrial & commercial companies	1.4	2.2	1.5	1.0	0.8	0.7	0.6	1.8	3.0	2.3	2.3	2.0
Overseas	30.7	33.0	35.7	35.7	35.9	36.1	36.3	40.0	41.5	43.4	53.2	53.8
Total	100.2	100.1	99.9	100.0	100.0	100.0	99.9	100.0	100.0	99.9	100.1	100.0
Value of FTSE All-Share index (GBP billion)	1,504	1,807	1,811	1,554	1,155	1,368	1,480	1,858	1,158	1,752	1,756	1,723

Source: Office of National Statistics, Thomson Reuters Datastream. Note the change in UT ownership in 1998 is due to classification change by National Statistics. Some occupational pension scheme assets run by insurance companies are included in the "insurance companies" rather than the "pension funds" category. Some occupational pension scheme assets run by insurance companies are included in the "insurance companies" rather than the "pension funds" category.

Figure B.5 Pension funds – activity and turnover (%)

Year to 31 December	UK equities ¹		Overseas equities		UK fixed income		Index-linked	
	Activity	Turnover	Activity	Turnover	Activity	Turnover	Activity	Turnover
1963	3	15			19	39		
1964	4	17			26	64		
1965	5	16			31	70		
1966	4	17			44	91		
1967	8	23			74	152		
1968	9	26			48	98		
1969	10	25			54	109		
1970	11	28			99	203		
1971	14	33			140	297		
1972	18	43			94	192		
1973	18	40			86	184		
1974	20	45			134	282		
1975	25	72	37	97	235	518		
1976	31	72	32	67	164	367		
1977	18	46	16	37	140	303		
1978	9	24	2	62	61	145		
1979	15	37	24	74	76	175		
1980	14	39	22	91	59	139		
1981	15	35	24	80	50	114		
1982	16	37	24	69	64	132		
1983	19	40	32	76	56	121		
1984	16	37	26	73	48	104	24	66
1985	18	41	41	91	53	115	39	97
1986	20	44	45	97	65	131	31	73
1987	27	61	78	159	103	210	45	98
1988	38	77	96	206	83	169	43	90
1989	42	84	52	128	67	145	17	35
1990	37	80	68	146	74	156	15	33
1991	29	62	59	132	87	180	18	40
1992	22	45	44	90	106	214	41	88
1993	22	45	52	108	99	209	35	91
1994	20	41	54	114	88	202	26	73
1995	23	48	55	111	102	222	21	52
1996	28	61	67	138	104	216	27	66
1997	36	78	71	145	107	241	30	73
1998	40	84	81	164	102	222	49	99
1999	41	83	77	155	87	189	38	78
2000	50	102	93	187	118	244	32	69
2001	39	80	77	164	119	239	64	131
2002	36	75	58	123	123	251	39	84
2003	47	97	68	138	105	219	36	78
2004	31	69	51	106	77	167	31	62
2005	41	86	54	109	87	181	30	66
2006	33	72	49	99	81	173	38	83
2007	65	145	76	155	114	246	37	87
2008	53	107	63	130	97	196	56	118
2009	55	116	76	158	86	174	35	70
2010	31	69	49	102	59	120	36	75
2011	30	65	44	92	57	119	35	72
2012	26	55	44	89	56	117	20	42
2013	22	50	36	76	49	100	16	35
2014	24	52	45	92	73	148	37	74
2015	22	46	35	74	51	104	22	48
2016 Q1	12	24	10	21	17	37	9	23

¹ Included overseas equities until 1975.

Source: Office for National Statistics (until 1995), WM (from 1996).

Data as at 31 March 2016.

Figure B.6 Annual returns, 1963-2016 (%)

Year	UK equities ¹	O'seas equities ²	Real estate ³	Index linked ⁴	Gilts ⁵	Corporate bonds ⁶	O'seas bonds ⁷	Cash ⁸	Return on best	Return on worst
									Best return	Worst return
1963	19.7				2.5			4.2	19.7	2.5
1964	-6.1				-2.6			5.4	5.4	-6.1
1965	11.4				2.9			7.0	11.4	2.9
1966	-4.4				4.5			6.9	6.9	-4.4
1967	35.0				2.6			6.4	35.0	2.6
1968	48.4				-4.4			8.2	48.4	-4.4
1969	-12.0				-1.8			9.1	9.1	-12.0
1970	-3.6				4.2			8.1	8.1	-3.6
1971	47.1		16.1		27.5			6.3	47.1	6.3
1972	15.8		29.3		-6.8			6.4	29.3	-6.8
1973	-28.7		28.4		-10.7			11.5	28.4	-28.7
1974	-51.7	-6.4	-15.9		-17.9			13.4	13.4	-51.7
1975	150.9	46.0	11.4		41.8			10.9	150.9	10.9
1976	1.8	26.5	9.4		12.3			12.0	26.5	1.8
1977	48.6	-19.1	26.4		50.1			8.4	50.1	-19.1
1978	8.2	11.1	25.6		-3.3			9.1	25.6	-3.3
1979	11.1	-27.4	22.8		4.3			14.7	22.8	-27.4
1980	35.0	16.3	17.5		21.1			18.6	35.0	16.3
1981	13.5	21.1	15.0		1.4			14.5	21.1	1.4
1982	28.9	30.7	7.5	16.2	53.9			12.9	53.9	7.5
1983	28.8	37.2	7.6	-0.1	16.2			10.5	37.2	-0.1
1984	31.6	31.7	8.8	6.1	7.3			10.2	31.7	6.1
1985	20.6	12.3	8.3	-1.2	11.3		0.7	13.0	20.6	-1.2
1986	27.5	40.2	11.3	5.8	11.7		18.4	11.0	40.2	5.8
1987	8.0	-9.0	26.0	5.6	16.3		-11.5	10.0	26.0	-11.5
1988	11.5	30.6	29.5	13.5	9.4		9.5	10.1	30.6	9.4
1989	36.1	31.1	15.4	15.2	5.7		20.4	14.1	36.1	5.7
1990	-9.7	-33.1	-8.4	3.5	4.2		-7.6	15.5	15.5	-33.1
1991	20.8	23.2	-3.1	4.4	18.6		19.6	12.2	23.2	-3.1
1992	20.5	16.3	-1.7	17.5	17.0		30.0	9.8	30.0	-1.7
1993	28.4	24.9	20.2	23.0	34.4		14.2	5.9	34.4	5.9
1994	-5.8	0.6	11.9	-9.1	-12.2		-4.0	5.1	11.9	-12.2
1995	23.9	19.7	3.6	12.9	17.4		20.5	6.4	23.9	3.6
1996	16.7	1.1	10.0	6.4	9.0		-6.1	6.0	16.7	-6.1
1997	23.6	19.0	16.8	13.7	22.9		4.8	6.6	23.6	4.8
1998	13.8	22.0	11.8	19.9	29.6	14.8	13.6	7.2	29.6	7.2
1999	24.2	31.0	14.5	4.4	-0.4	-0.2	-2.1	5.2	31.0	-2.1
2000	-5.9	-4.1	10.5	4.2	8.0	10.2	10.5	5.7	10.5	-5.9
2001	-13.3	-14.2	6.8	-0.5	-0.9	6.9	1.8	4.8	6.9	-14.2
2002	-22.7	-27.5	9.6	8.2	9.9	9.5	7.9	3.7	9.9	-27.5
2003	20.9	20.3	10.9	6.6	1.2	5.7	3.0	3.5	20.9	1.2
2004	12.8	7.5	18.3	8.5	8.4	6.7	2.4	4.3	18.3	2.4
2005	22.0	24.6	19.1	9.0	11.0	9.0	4.3	4.6	24.6	4.3
2006	16.8	5.5	18.1	2.9	0.0	0.8	-7.5	4.6	18.1	-7.5
2007	5.3	9.6	-5.5	8.5	2.7	1.8	9.2	5.6	9.6	-5.5
2008	-29.9	-17.3	-22.5	3.7	13.6	-4.1	58.1	4.7	58.1	-29.9
2009	30.1	18.6	2.2	6.4	-4.8	10.8	-9.7	0.5	30.1	-9.7
2010	14.5	16.5	14.5	8.9	8.8	8.4	9.9	0.4	16.5	0.4
2011	-3.5	-6.3	8.1	19.9	26.3	6.9	7.4	0.5	26.3	-6.3
2012	12.3	11.9	2.4	0.6	2.9	13.1	-3.6	0.4	13.1	-3.6
2013	20.8	22.7	10.9	0.5	-5.9	0.9	-6.4	0.4	22.7	-6.4
2014	1.2	12.3	19.3	19.0	26.1	12.2	6.4	0.3	26.1	0.3
2015	1.0	4.8	13.8	-1.0	0.1	0.5	3.2	0.4	13.8	-1.0
2016	16.8	30.4	2.6	24.3	18.5	10.6	22.0	0.3	30.4	0.3
Average										
54 yrs % p.a. 1963-2016	11.7				8.9			7.3	25.9	-5.5
10 yrs % p.a. 2007-2016	5.6	9.5	3.9	8.8	8.2	6.0	8.3	1.3	24.0	-6.6

Source: Relevant market indices as follows: ¹FTSE All-Share Index sourced from BNY Mellon (until 2012), Thomson Reuters Datastream (from 2013) ²FTSE World ex-UK Index sourced from BNY Mellon, (net of non recoverable withholding tax between 2000 and 2012), (until 2012), Thomson Reuters Datastream (from 2013) ³IPD Annual Index, sourced from IPD (until 2012), MSCI (from 2013) ⁴FT All-Stock Index-linked Index sourced from BNY Mellon (until 2012), Thomson Reuters Datastream (from 2013) ⁵FT Over 15-year Gilt Index sourced from BNY Mellon (until 2012), Thomson Reuters Datastream (from 2013) ⁶Iboxx Sterling non-Gilt All Stocks Index sourced from BNY Mellon (until 2012), Thomson Reuters Datastream (from 2013) ⁷JP Morgan Global ex-UK Bond Index sourced from BNY Mellon (until 2012), Thomson Reuters Datastream (from 2013) ⁸7-day LIBID sourced from BNY Mellon (until 2012), Thomson Reuters Datastream (from 2013).

Total returns

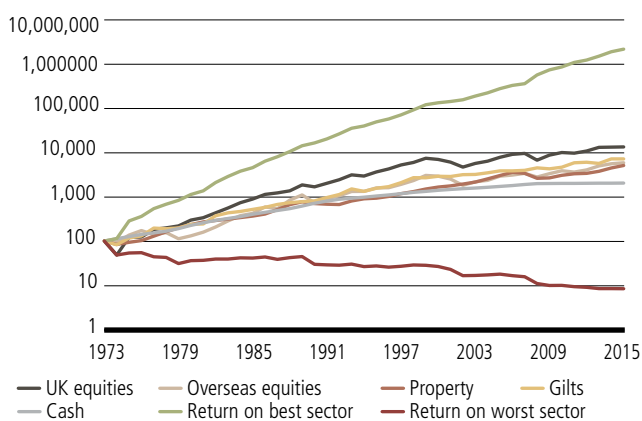
The universally accepted measure for the performance of a fund is the total return: the sum of capital appreciation and investment income, expressed as a proportion of the value of the fund. Total returns are often expressed as annual rates, whether or not they refer to a calendar year, it is common to talk of rates of return.

The returns on gilts, UK equities and cash for the last 54 calendar years are shown in *Figure B.6*. Real estate and overseas equities are shown from 1971 and 1974 respectively, which is when our data begins. Returns for index-linked gilts and overseas bonds are shown from the early 1980s. Corporate bonds are shown from 1998 when pension funds began to make meaningful investments in non-government bonds. To illustrate the scope that exists for making gains by switching between asset classes, the best asset class in each calendar year is shown, together with its return. Worst asset class returns are also shown.

The average returns over the last 54 years and over the last 10 years support the conventional view that equities do better than bonds over the long term. What is most notable is the scope for adding value by shifting between markets at the right time, since the average return on the best asset class is much higher than the returns for UK or overseas equities alone.

The returns over the last 40 years on five major asset classes and also on the best and worst asset classes are illustrated in *Figure B.7*. In each case, the lines show the total return of a unit held in the market index that relates to that asset class.

Figure B.7 Total returns index, 1973-2016



Source: As per Figure B.6

Average fund return

In *Figure B.8*, average pension fund total returns are compared to increases in retail prices, wages and salaries. The average figures represent 53 years till 2015, as data for 2016 is only available till March 2016. However, it should be noted that the average pension fund return figure of the 53-year period was 10.1% p.a. which is 2.9% p.a. ahead of retail price inflation and 4.4% p.a. above wage inflation. UK equities have produced a long-term return of 11.7% p.a. which is 4.5% p.a. ahead of retail prices and 6% p.a. ahead of wages and salaries over the period 1963 to 2015.

Funding assumptions

Past data on returns and inflation comprise one of the major pieces of supporting evidence used in assessing prudent contribution rates for defined benefit pension schemes. Some key data, taken from earlier tables, are shown in *Figures B.9 and B.10*. *Figure B.11* shows the total returns to UK equities compared to inflation, over the last 54 years, taking the beginning of the FTSE All-Share Index in 1963 as a starting point.

One of the key features of these charts is the 54-year real return against wage inflation for the average pension of 1.5% p.a. However, long periods can occur when markets under or over-shoot the assumed returns, resulting in adjustments to contribution rates and discretionary benefits.

The combination of falling inflation and rapidly rising asset prices in the period 1981 to 1999 was clearly beneficial to UK schemes. The average pension fund return during this period was 15.4% p.a. while wage inflation was 6.6% p.a.

The traditional British actuarial and accounting approaches to pension funding have now been superseded by market value approaches. Most assets can easily be valued at market prices and liabilities by using market rates of interest. These methods have the advantage of simplicity and avoid the complications of deriving actuarial values of assets that are different from market values. They also highlight the mismatching risks run by many pension funds heavily invested in equities – they are vulnerable to a combination of falling equity prices and falling interest rates. Equity investment is still sensible in order to pursue higher returns but will result in more volatile funding levels.

Figure B.8 Annual rates of return and inflation (%)

Year	Average pension fund index	Wages	Prices
1963	11.5	6.9	1.8
1964	-3.2	4.9	4.8
1965	7.0	7.0	4.5
1966	-0.2	4.3	3.6
1967	18.8	6.3	2.5
1968	25.3	7.8	5.9
1969	-8.4	9.1	4.7
1970	0.5	13.3	7.9
1971	38.4	8.8	9.0
1972	9.3	16.2	7.7
1973	-17.1	12.8	10.6
1974	-31.0	28.9	19.1
1975	63.8	20.0	24.9
1976	6.8	12.7	15.1
1977	38.9	8.9	12.1
1978	6.6	13.6	8.4
1979	8.6	19.6	17.2
1980	26.4	19.2	15.1
1981	11.1	10.1	12.1
1982	30.0	7.9	5.4
1983	22.3	8.2	5.3
1984	21.9	6.5	4.6
1985	15.2	8.8	5.7
1986	22.7	7.2	3.7
1987	6.7	9.0	3.7
1988	15.4	10.2	6.8
1989	28.0	7.3	7.7
1990	-11.4	10.3	9.3
1991	17.7	6.1	4.5
1992	17.5	4.9	2.6
1993	25.5	2.8	1.9
1994	-3.0	4.0	2.9
1995	19.6	2.7	3.2
1996	10.4	4.4	2.5
1997	16.8	5.0	3.6
1998	14.9	4.3	2.8
1999	20.4	6.2	1.8
2000	-2.7	5.2	2.9
2001	-8.8	2.1	0.7
2002	-13.9	3.2	2.9
2003	17.0	3.1	2.8
2004	11.2	4.2	3.5
2005	20.1	4.3	2.2
2006	10.5	3.9	4.4
2007	7.0	3.9	4.0
2008	-17.2	3.1	0.9
2009	15.1	1.0	2.4
2010	12.7	1.3	4.8
2011	3.6	2.0	4.8
2012	8.4	1.3	3.1
2013	11.0	1.8	2.7
2014	11.7	2.7	1.6
2015	2.9	1.7	1.2
2016 Q1	2.8	1.5	1.0
Average			
53 yrs 1963-2015 (% p.a.)	10.1	7.2	5.7
10 yrs 2005-2015 (% p.a.)	6.2	2.2	3.0

Source: WM, Thomson Reuters Datastream, UBS Asset Management
Data as at 31 March 2016

Figure B.9 Long-term nominal and real returns

	Nominal	Price Inflation	Real
54-year returns (1963-2016) % p.a.			
UK Equities	11.7	5.7	6.0
Gilts	8.9	5.7	3.2
Cash	7.3	5.7	1.6
10-year returns (2007-2016) % p.a.			
UK Equities	5.6	2.8	2.8
Overseas Equities	9.5	2.8	6.7
Property	3.9	2.8	1.1
Index-Linked	8.8	2.8	6.0
Gilts	8.2	2.8	5.4
Corporate Bonds	6.0	2.8	3.2
Overseas Bonds	8.3	2.8	5.5
Cash	1.3	2.8	-1.5

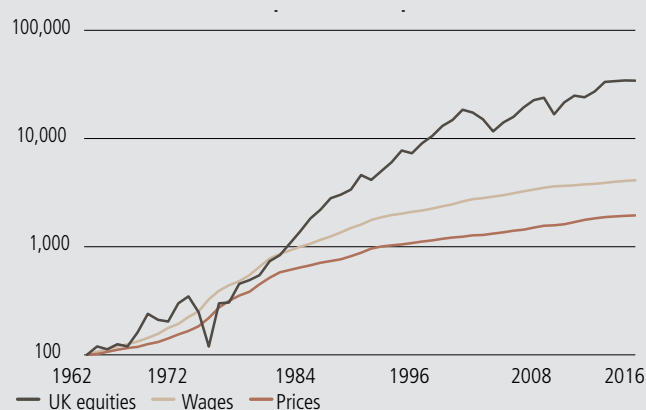
Source: WM, Thomson Reuters Datastream, IPD. Rounding may occur.

Figure B.10 Distinct periods in real returns

% p.a.	2014	2015	Q1 2016	2007-2016*	1963-2016*
Average pension fund	11.7	2.9	2.8	5.1	9.9
Wage inflation	2.7	1.7	1.5	2.0	7.1
Difference	9.0	1.2	1.3	3.1	2.7
UK equities	1.8	1.5	-0.4	4.3	11.4
Retail price inflation	1.6	1.2	1.0	2.8	5.7
Difference	0.2	0.3	-1.4	1.5	5.7

Source: FT, National Statistics, UBS Asset Management, WM (from 2010 onwards)
* Includes only Q1 of 2016.

Figure B.11 UK equities – total return vs. inflation



Source: WM, Thomson Reuters Datastream, UBS Asset Management

Allocations to alternatives

An allocation to alternatives can be beneficial to a wider portfolio because their risk/return profiles generally differ from those of equities and fixed income. Furthermore, depending on the particular type of alternative, they are versatile and diverse, potentially allowing pension funds to better match their liabilities and requirements.

Some pension funds have set aside dedicated pools of money for investment in alternatives. Ultimately, deciding the type of alternative and the size of the allocation that should be made to each will be a multifaceted and complex question, the answer to which will vary for each pension scheme.

To help build a picture of UK pension funds' actual allocation to alternatives, it is necessary to look at a number of sources. Data from WM shows that the average UK pension scheme allocated just 0.7% to alternatives in 1999, increasing to 9.0% by 2016².

A further breakdown of pension schemes' allocation to alternatives is shown in *Figure B.12*. Hedge funds and private equity dominate the allocations to alternatives, followed by infrastructure for corporate schemes and pooled multi-asset solutions for local authorities. It is interesting to see that the allocations within alternatives have mostly increased for both corporate and local authority schemes during the period 2009-2013, although there has been a fall across both sectors from 2013-15. Both private equity and hedge funds have seen some volatility in their allocations over the years, which could partly be attributed to the movement in value of this asset class pre and post the financial crisis, as well as investors' changing appetite for risk. Infrastructure is gaining increased prominence within the corporate sector, with exposure reaching 15% in 2015. There is no doubt that in the shadow of the global financial crisis, the importance of risk management, specifically the systematic risk of global equities, has been brought to the forefront of institutional investors' agendas. This, in part, was stimulated by asset classes, which showed little or no correlations during normal market volatility, actually becoming highly correlated during the crisis. Subsequently, investors are now increasingly looking to exploit alternatives in order to further diversify and reduce risk at an aggregate portfolio level.

Figure B.13 shows the rolling 36 month correlations of UK equities (represented by the FTSE All-Share Index) with global equities and some alternative asset classes, thereby illustrating the potential diversification benefits of incorporating alternatives into a portfolio. Unsurprisingly, global equities have been highly correlated to UK equities with an average correlation coefficient of 0.77 (as at end December 2016).

On the other hand, the average correlation coefficient of a bundled commodities index is only 0.26 (as at end December 2016), highlighting the potential advantage of exploiting alternatives when constructing a portfolio.

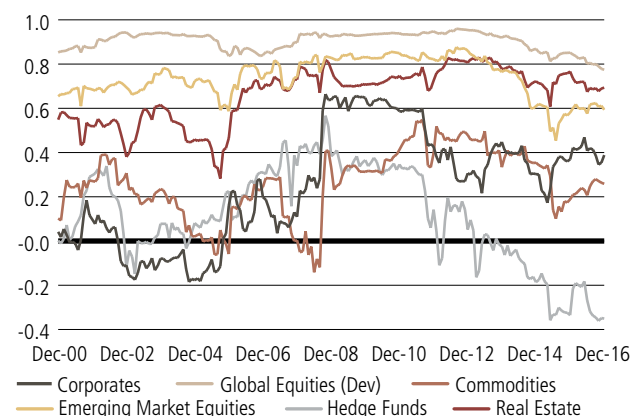
Figure B.12 Allocation to alternatives – corporate vs. local authority schemes

Average corporate pension scheme ¹	2012	2013	2014	2015	Q1 2016
Allocation to alternatives (average %)	9.3	9.8	9.3	9.8	9.9
<i>Alternatives exposure (%)</i>					
Hedge funds	31.8	30.8	28.8	26.5	26.7
Private equity	49.2	46.7	46.5	49.5	49.9
GTAA	3.4	3.9	4.7	5.3	5.4
Commodities	4.0	3.2	1.0	0.9	0.9
Active currency	1.2	1.6	0.4	0.4	0.4
Infrastructure	8.5	11.1	15.1	14.6	13.6
Pooled multi-asset	1.8	2.6	3.5	2.9	3.1

Average local authority pension scheme ²	2012	2013	2014	2015	Q1 2016
Allocation to alternatives (average %)	9.9	10.5	10.9	11.2	11.5
<i>Alternatives exposure (%)</i>					
Hedge funds	25.1	22.0	20.7	20.5	19.1
Private equity	41.8	39.5	41.4	40.1	40.9
GTAA	1.5	1.9	3.6	3.0	3.0
Commodities	2.4	1.5	1.2	0.6	0.6
Active currency	0.6	0.1	0.1	0.1	0.1
Infrastructure	7.8	7.4	8.7	10.5	12.3
Pooled multi-asset	20.8	27.5	24.3	25.3	24.0

¹ WM Pensions Corporate Universe. ² WM Local Authority average
Source: WM. Data periods to 31 March 2016.

Figure B.13 36 month correlations of UK equities with alternatives



Source: Thomson Reuters Datastream

² Data till 31 March 2016

Looking ahead, it seems likely that the appetite for alternatives could vary significantly across pension funds of different sizes. Large funds are currently showing the greatest inclination towards alternatives as they continue their search for uncorrelated asset classes. If this trend continues, some capacity constraints could begin to emerge, particularly if investment opportunities remain limited. For example, such constraints started to become apparent in the UK commercial real estate market in 2006. Conversely, small pension funds may take the view that the amount of trustee time needed to research, understand and select alternative investments is unjustifiable. Within this spectrum, medium-sized funds will need to take a fund-specific view on the suitability of, and thus commitment to, alternatives.

Further insight into UK defined benefit schemes' allocation to alternatives (private sector schemes only) can be found in

the PLSA Annual Survey 2016, part of which is summarised in *Figure B.14*. Their data shows that, compared to 2007, more schemes are investing in the various alternatives. The number of schemes investing in infrastructure/PFI/PPP has more than doubled during this time.

The emergence of multi-asset funds, which include allocations to alternative asset classes, could be the solution for smaller and medium sized pension schemes. Such funds typically include a broad range of traditional and alternative asset classes, and are commonly employed as an equity replacement within a pension scheme's overall structure. These multi-asset funds can allow smaller pension schemes to capitalise on the diversification benefits provided by an allocation to alternative asset class, while simplifying the governance and asset allocation decisions that it would usually entail.

Figure B.14 UK pension funds' appetite for alternatives

% of schemes which invest in asset class

Asset class	2008	2009	2010	2011	2012	2013	2014	2015	2016
Private equity/venture capital	24	21	24	21	24	23	20	30	27
Hedge funds	24	26	27	31	33	34	29	39	39
Infrastructure/PFI/PPP	14	12	14	13	16	17	18	21	21

Source: PLSA Annual Survey report 2016, defined benefit schemes' strategic asset allocation (private sector only).

Risk measurement

Types of risk

An investor is exposed to a variety of risks. Market risk is the risk that the investments in a portfolio do not provide the returns expected of them due to underperformance of the chosen assets and markets. Liquidity risk is the risk that cash is not available when the investor needs it. Other types include credit risk (losses from the default of a debtor) and operational risk (losses due to errors, fraud, legal problems and generally everything not included in credit or market risk). The overall purpose of this appendix is to provide an explanation of market risk and liquidity risk.

Market risk

Market risk is a measure of the deviation of investment returns from expectations. To define market risk, the expected return needs to be defined and the means of measuring the deviations of returns from it. Risk measurement can be applied by looking back in time to analyse how a portfolio performed. In addition, the current positions and strategies can be analysed to forecast what range of outcomes could be expected in the future.

Ex-post and ex-ante analysis

Looking back in time, known as 'ex-post analysis', a historical series of returns is used to analyse what actually happened. For example, you could look at monthly returns of a portfolio over the last three years. The most common measure of risk in this case is the standard deviation of returns (also called volatility). The standard deviation looks at deviations from the average return realised over the period.

In forecasting risk, known as 'ex-ante analysis', the current positions in the fund can be used to forecast the standard deviation of returns over a period, for example one year. The forecast is based on historical volatility and correlation of the returns of the various assets held in the portfolio.

While there should be reasonable comparability between the ex-ante and ex-post risk over the longer term, there can be greater differences if looked at over very short periods. This is because of the impact of random factors, including

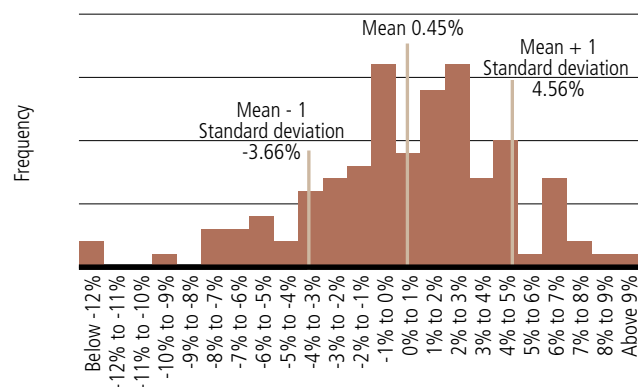
fluctuations in volatility and changes to relationships, which may not be fully reflected in the risk model used. To illustrate this, *Figure C.1* shows the FTSE All-Share Total Return Index from the end of December 2006 to the end of December 2016. It is clear that the level of the index fluctuates up and down. The histogram, *Figure C.2*, shows how often, in this period, the monthly return was in a particular range. The mean (0.45%) and standard deviation (4.11%) of monthly returns are shown. The mean is the average. The standard deviation is a measure of the variability of the returns. In this period, which has 120 monthly returns, there were 16 months with a return more than 1 standard deviation below the mean, 17 months with a return more than one standard deviation above the mean and 87 months with a return within 1 standard deviation of the mean.

Figure C.1 FTSE All-Share Total Return Index



Source: Bloomberg

Figure C.2 FTSE All-Share Total Return Index, monthly returns, 2007-2016



Source: Bloomberg

Normally, annualised rather than monthly returns are used when talking about the performance of a portfolio. Therefore, it makes sense to state risk as an annualised figure too. For a ten year period, there are 120 monthly return figures; enough to draw a histogram, calculate standard deviation with a reasonable degree of estimation error and get an idea of the

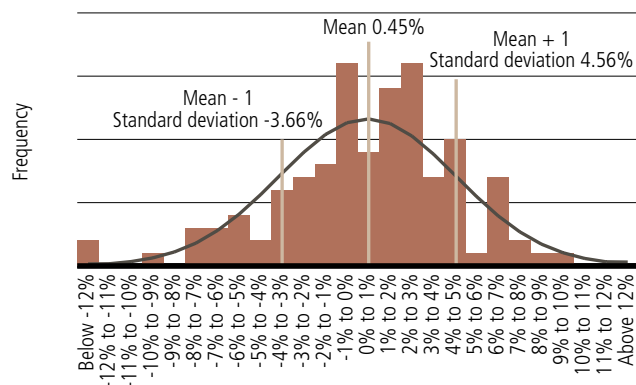
risk of monthly returns. If annual returns are used instead, there would be only ten observations, too few to make a meaningful risk calculation. It would be possible to use a much longer history but then there would be questions about the relevance of very old data to today's markets.

It is possible to overcome this problem if you assume that the return in each month is independent of the return in earlier months. Then a simple mathematical formula applies: to transform from monthly to annualised volatility, just multiply the standard deviation by the square root of the number of months in a year. The annualised risk figure is then $\sqrt{12} \times 4.11\% = 14.25\%$. The continuously compounded annualised return is $12 \times 0.45\% = 5.4\%$. This assumption of independent monthly returns is consistent with the efficient market hypothesis which says that you cannot beat the market by just looking at the past history of returns.

Normal distributions

You may be interested in asking questions like "what is the chance I will lose more than 5% this year?" or "what is the probability my return will be within 5% of the expected return?". These questions could be answered using the histogram of actual monthly returns shown in Figure C.2, or at least such questions about monthly rather than annual returns could be answered. However, you might come to some odd conclusions: with only 120 observations of monthly returns, the histogram seems to suggest that a return between -8% and -9% is less likely than a return between -9% and -10%. This seems intuitively unlikely. To smooth out anomalies like this, a normal distribution is often assumed to approximate the actual return distribution. The normal distribution just requires the mean and standard deviation to specify its shape. Figure C.3 overlays a normal distribution with the same mean and standard deviation as the FTSE All-Share Total Return Index monthly returns in Figure C.2.

Figure C.3 FTSE All Share Total Return Index Monthly Returns 2005-2014

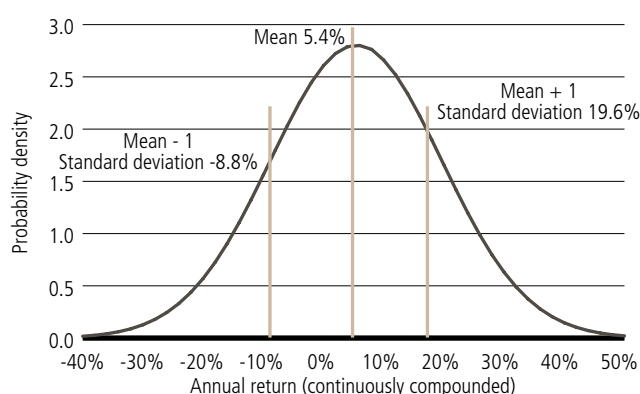


Source: Bloomberg

Using the square root of 12 scaling mentioned above, we can transform this normal distribution into a probability distribution relating to annual returns. This is shown in Figure C.4. Relative probabilities are shown by the area under the curve.

For approximately two-thirds of the time, the return will be between $\pm 14\%$ of the expected return. For roughly one-sixth of the time, the return will be worse than 14% below the expected return, and for the other one-sixth of the time, better than 14% above the expected return.

Figure C.4 Annualised return distribution



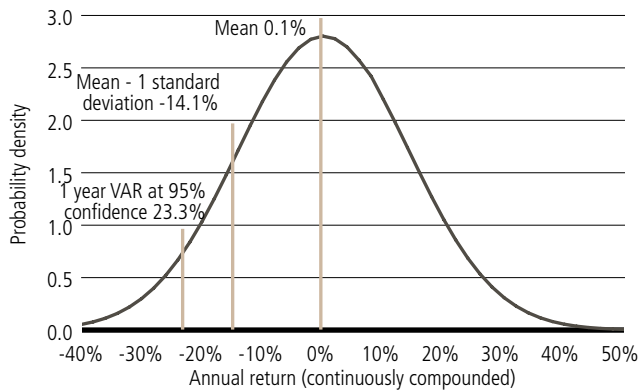
Source: UBS Asset Management calculations

Expected returns

We keep talking about returns being within a certain amount of the expected return, so what exactly is this expected return? If you held a risk-less asset, such as a UK Treasury bill (a short-term government bond), you would be certain what the return to maturity would be when you bought it (about 0.1% at today's market prices). Equity markets generally, over a long period of time, deliver higher returns than the risk-free interest rate. This extra return is often called the 'equity risk premium'. It exists because investors require higher returns from a higher risk asset than from a risk-less asset. However, measuring the equity risk premium is itself prone to uncertainty. For example, if you measured the average annual return of the FTSE All-Share Total Return Index from 1997 to 2016 and 2007 to 2016 you would get a different result for each period.

When asking questions such as "what is the chance I will lose more than 5% this year?", it may be considered prudent to set the equity risk premium to zero. This may give a rather pessimistic result but it has the advantage of not relying on an uncertain part of the expected return. This can also be applied with a certain degree of confidence, when calculating the Value at Risk (VaR), which is a measure of the potential losses on the portfolio over a particular period. Setting the equity risk premium to zero (so that the expected return is the 1 year gilt bond yield) would give the distribution shown in Figure C.5.

Figure C.5 Annualised return distribution rebased to risk-free interest rate



Source: UBS Asset Management calculations

In this example, the one-year value at risk, at the 95% confidence level, is 23.3%. This means that, one year in 20, you could expect to lose more than 23.3%. Value at risk is usually expressed as a positive number as it refers to an actual 'value' that may be lost (i.e. is 'at risk').

Portfolio risk

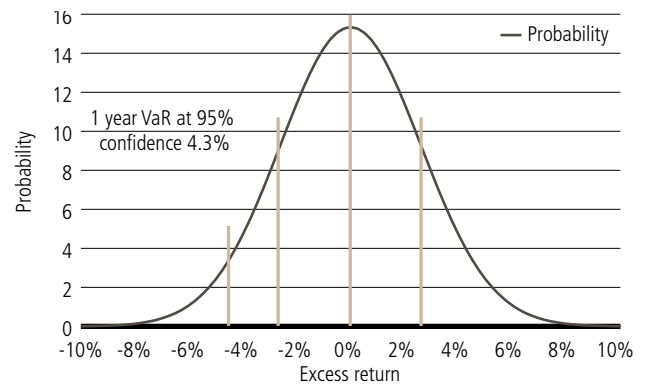
The previous section showed data for an index rather than for a particular portfolio. All the statistical methods described could be applied to actual historical portfolio returns. To forecast future volatility of portfolio returns, the stocks in the portfolio would be analysed to determine their volatility and correlation of returns. The portfolio ex-ante risk could then be forecast on the basis of current stock positions.

Active risk

For many portfolios, the objective is to outperform a benchmark. In those cases, it is also relevant to measure risk relative to the benchmark. The most widely used measure is 'active risk'. This is an ex-ante measure of the estimated volatility of performance against the benchmark and is also known as 'forecast tracking error'. It is defined as the forecast standard deviation of annual returns versus the benchmark. If you are looking back at actual returns in the past, then the relevant measure is 'realised tracking error', which is the standard deviation of portfolio returns relative to the benchmark.

The fund may have a target outperformance level, which could be considered as the expected level of outperformance. However, for prudence, the expected outperformance is often considered to be zero for the purposes of risk measurement. The forecast excess return distribution for a portfolio with 2.6% active risk is shown in Figure C.6.

Figure C.6 Probability of fund excess return (active risk = 3.4%)



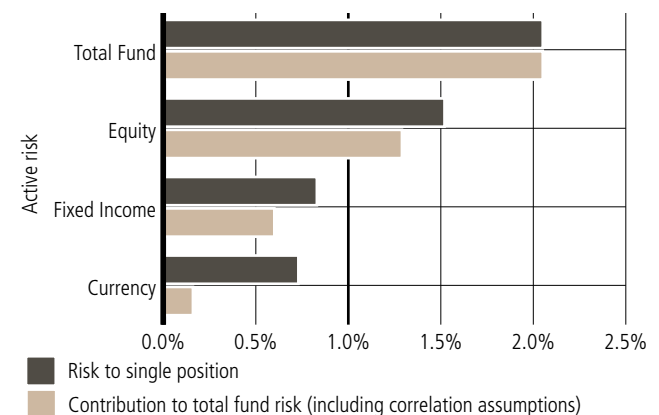
Source: UBS Asset Management calculations

Measuring active risk allows an understanding of the risk/return trade-off that a portfolio is undertaking, thereby creating a defined framework within which the investment manager can work. The process of risk budgeting involves deciding how much active risk to take and where to allocate it, depending on the market opportunities observed and performance targets.

Total fund active risk

Figure C.7 shows the contribution to the total fund active risk of the major asset classes for a sample multi-asset fund. This demonstrates the relative importance of the asset classes to the risk profile of the fund and the dilution of risk that stems from a well-diversified portfolio of assets. The contributions to risk will depend on how both the fund and the benchmark are structured. For example, the impact of the fixed income asset class will generally increase if bonds form a larger proportion of the benchmark.

Figure C.7 Active risk breakdown of a sample fund



Source: UBS Asset Management

In general terms, portfolios that are very close to the benchmark will have low active risk and there will be limited scope either to outperform or underperform the benchmark. On the other hand, portfolios that are significantly different from the benchmark will have higher active risk, giving the potential for returns well above the benchmark but with a corresponding possibility of substantially underperforming the benchmark. An advantage of the active risk approach is that it can be adapted to any benchmark. This has become increasingly important as more funds move to specific benchmarks tailored to their particular requirements. Furthermore, some funds have aggressive performance targets that require greater active risk to be taken.

Visualising risk

Imagine a portfolio with the MSCI World Index as the benchmark and with an active risk of 2.6%. *Figure C.8* represents the relationship between the portfolio, benchmark and active risks.

The length of the lines are proportional to the risks. The narrow angle between the benchmark and portfolio lines shows that there is a high correlation between portfolio returns and benchmark returns. The active risk line is almost at right angles to the benchmark risk line. This means that active risk is almost independent of benchmark risk. This would be typical for active positions based on a bottom-up stock selection process.

Risk relative to liabilities

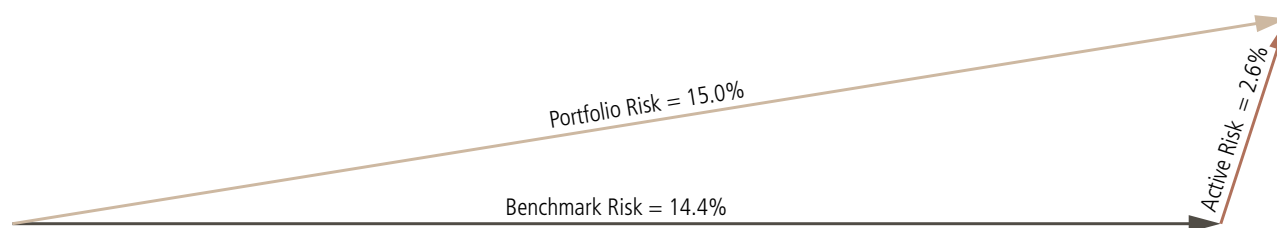
If, in a given year, the benchmark declined 20% and the portfolio outperformed by 2%, that would still represent a loss of 18%, which is substantial in absolute terms. A pension fund's liabilities are unlikely to be related to the equity market on a time horizon of one year, so this would also represent a significant loss relative to liabilities.

It is becoming increasingly popular to recognise the importance of a pension fund's liabilities, and to set benchmarks and investment performance targets in relation to those liabilities. Liability-related benchmarks may be composed of a combination of default-free cashflows (such as government bonds), credit-risky cashflows (such as corporate bonds), inflation-linked cashflows and possibly other elements as well. It is then possible to construct a multi-asset portfolio and measure its risk relative to the liability-based benchmark.

Risk relative to liabilities is a more relevant measure for a pension fund than active risk measured against a traditional composite benchmark consisting of, for example, bond, equity, real estate and cash components.

Pension funds have been increasingly using derivatives to adjust their risk exposures. Interest rate swaps, inflation swaps and bond futures are particularly relevant. These instruments can be used to reduce the risk of a portfolio of investments relative to liabilities and are explained further in Appendix D.

Figure C.8 Visualising risk



Source: UBS Asset Management

Impact of volatility

Equity index volatilities were low in 2005 and early 2006 until a volatile period in May 2006. After mid-2007, equity index volatilities increased dramatically. By the end of 2008, they had reached a level not seen since shortly after the stock market crash of 1987. In 2009, volatilities reduced, ending the year a little above their long-term average. Since then, volatilities followed a decreasing trend, but with some sudden increases, especially in autumn 2011 and late 2015 to early 2016.

Cross-sectional volatilities (the variation between individual stocks' returns over a given period) were also high at the start of 2009 but low from 2010 to 2014, except for a short period of high cross-sectional volatility in late 2011. More recently from late 2014 through early 2016, cross sectional volatility increased, but decreased again from mid 2016. These recent changes are reflected in typical equity portfolio active risk as measured using risk models with a short-term perspective, such as Barra's UK, Europe and global models or UBS Global Asset Management's proprietary short-term model. Longer term risk models, for example UBS Global Asset Management's proprietary long-term model, have shown stable or decreasing risk, as the high volatility period around the financial crisis is replaced by a period of lower volatility.

Figure C.9 shows the short-term volatility of the FTSE All-Share Index over time (calculated from daily returns over a rolling 60-day period), and the index volatility that would be shown by typical risk models. The typical short-term model line uses weekly returns weighted with a 250 business day half-life, so returns one year ago have half the weight of the most recent returns. The long-term example model uses monthly returns weighted with a 48 month half-life.

By looking at option prices, it is possible to see the volatility that option market participants are expecting in the future. This 'implied volatility' from the market in FTSE 100 options is shown. *Figure C.9* shows periods when volatility increased suddenly. Longer term risk models include such periods in their calibration and, therefore, implicitly recognise the possibility that volatility may increase at some point in the future.

If portfolios took more concentrated positions in response to a low risk figure from a short-term risk model, there would be the possibility that if volatility increased suddenly, the portfolio returns could diverge from benchmark returns by an unexpectedly large amount.

Overall, the key point is that the time horizon of the risk model should be aligned with the time horizon of the investment objectives.

The yield volatility of high quality treasury bonds was also very high in the middle of 2009. It fell close to its long-term average level at the end of 2010, and has fluctuated since then but with a decreasing trend. *Figure C.10* shows bond yield volatility over time.

Advanced risk models

Since the financial crisis, there has been an increased focus on the risk of large losses realised over a short period. Several commentators have drawn attention to the shortcomings of using a normal distribution to model the possibility of loss. You can see in *Figure C.3*, at the left of the diagram, that there are far more monthly losses greater than 12% in the FTSE All-Share Index than would be suggested by the normal distribution. One type of model that addresses this problem is a stochastic volatility model. This allows for volatility changes over time by modelling future possible changes in volatility, and for volatility to be correlated to changes in the market. Normally, volatility increases when markets decline, and this is captured in such a model. *Figure C.11* shows how a stochastic volatility risk model can allow for a higher probability of large losses than a risk model based on the normal distribution. However, the model still only partially captures the possibility of large losses.

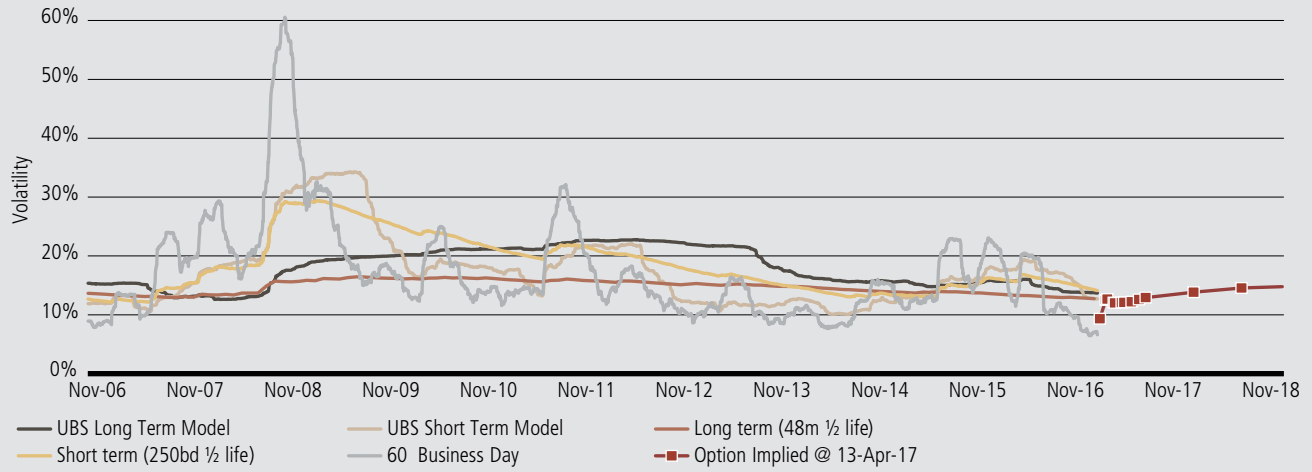
Stress testing

Even advanced risk models that allow for shifts in volatility cannot fully capture the potential for sudden unexpected events in the financial markets. Such events include severe crises like the financial crisis of 2008, and also instability in markets that were previously stable, like the Eurozone sovereign credit crisis that started in 2010. Extreme events can be explored using stress testing.

Stress testing consists of choosing appropriate shifts for each market, and applying these shifts to a portfolio to produce a profit or loss as a result. The shifts seen together as a set are called a scenario. Usually a set of scenarios are used to cover a range of different possibilities that could threaten the investment objectives for the portfolio. Positive scenarios can also be used to see how well a portfolio would perform in a benign economic environment or in a possible rebound after a crisis. After all, a portfolio that is too defensively positioned may not produce the required returns over time.

There are three common ways of choosing scenarios. Historical scenarios replay historical events to see what their effects would be on the current portfolio. These

Figure C.9 Simulated FTSE All-Share Index volatilities



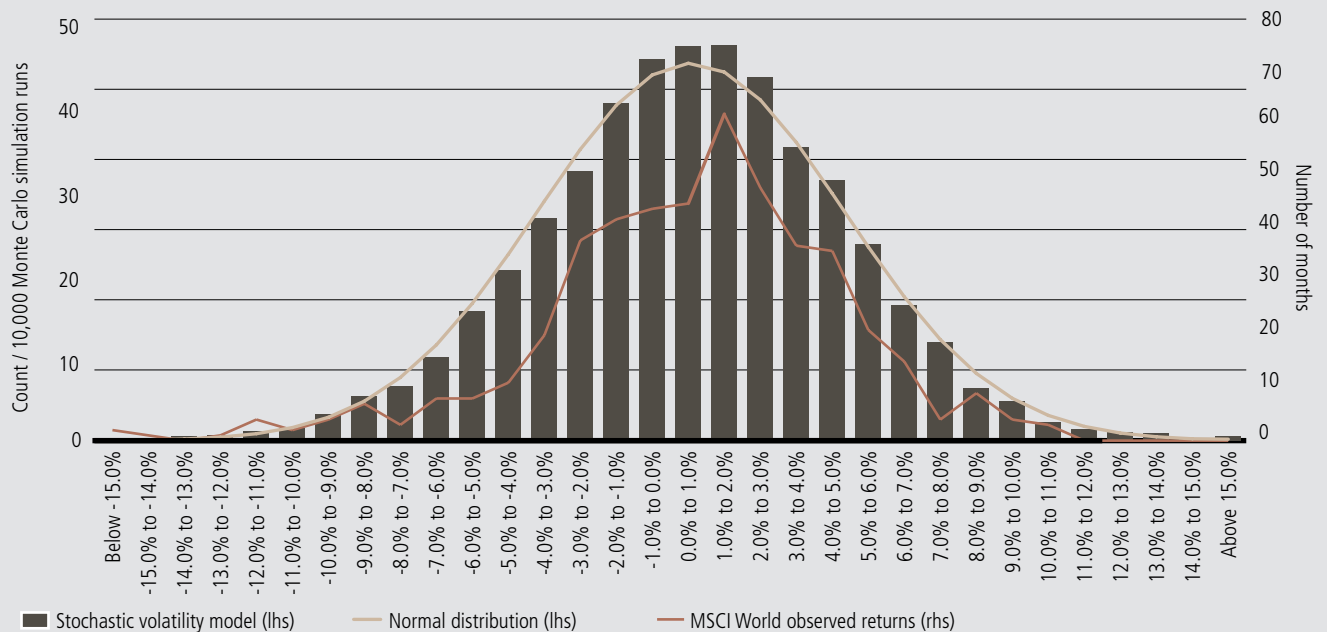
Source: UBS Asset Management. Option implied figures are for FTSE 100.

Figure C.10 Bond yield volatilities



Source: Bloomberg, 10 year government bond yield, 30 week volatility.

Figure C.11 MSCI World monthly returns, 1977-2016 – stochastic volatility model

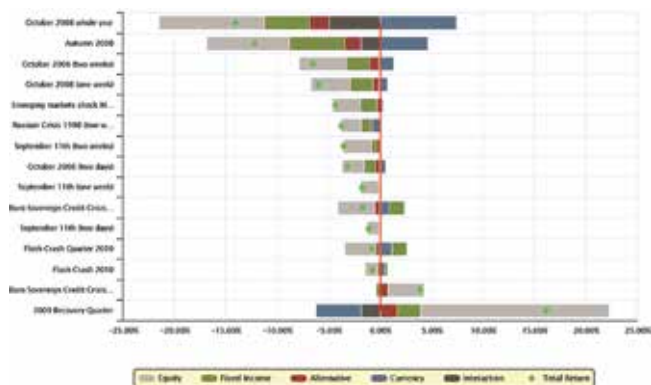


Source: Bloomberg, UBS Asset Management

are often the easiest risk measures to understand. Often people remember the historical crisis, and the associated losses, so the information about how the current portfolio would have performed is a direct way of appreciating risk. Forward looking economic scenarios are also popular. These allow you to explore the possible consequences of a future crisis. They can be chosen from a range of situations that might give cause for concern. Examples could include what if the oil price remains low; suppose Greece exits the Euro; perhaps UK interest rates will rise. To construct a forward looking scenario, the relationship between markets in the prospective crisis must be judged. The third popular type of scenario is a standardised scenario, where markets are shifted by chosen amounts, for example, developed equity markets could go down 20% and interest rates up 70bp, with more volatile markets and those with higher rates moving more. Standardised scenarios can help to compare different portfolios and to compare the risk of a single portfolio over time. Scenarios with symmetrical up and down shifts are useful for evaluating options strategies such as downside protection or call overwriting.

Figure C.12 shows historical stress test results for a sample multi-asset fund, with 63% equity, 30% fixed income and 7% cash, and with an active currency overlay.

Figure C.12 Historical stress test on sample multi asset portfolio



Source: UBS Asset Management

Information ratio

The measurement of risk can be combined with the achieved outperformance of the benchmark to give an indication of the skill of an investment manager. One commonly used statistic is the information ratio, which is the outperformance divided by the risk. For example, a fund that outperforms by 1% p.a. with 2% p.a. risk relative to the benchmark, has an information ratio of 0.5.

Liquidity risk

Liquidity risk is the risk that cash is not available when the investor needs it. Liquidity may be needed for a variety of purposes, for example to pay pensions, or when there are redemptions. Different organisations have different liquidity needs. For example, a manager of pooled funds needs to keep an appropriate liquidity profile in case investors redeem their units or switch into different funds. A defined benefit pension fund needs to pay pensions as well as manage inflows. Liquidity needs can be classified according to whether they are predictable or event-driven and by time horizon. Liquidity may be required to meet business needs or to comply with regulations, rules and laws. Sources of liquidity include selling assets, contractual cashflows such as bond coupons, dividends, and derivative cashflows, and borrowing. The portfolio of assets should be structured to meet anticipated liquidity needs at an acceptable cost.

To measure the liquidity of a portfolio, the three different sources of liquidity: selling assets, contractual cashflows, and borrowing can be considered separately, and then results can be combined to give a projection of liquidity available over time at a particular cost. The question of cost appears because if assets have to be sold quickly in an illiquid market, lower prices are generally realised (due to market impact and bid-offer spreads) than if the assets can be sold more slowly. Liquidity risk measurement is often done assuming a normal market and then again assuming stressed market conditions with reduced liquidity.

A liquidity calculation can use the following inputs: bid-offer spread and supply curve analysis; volume of securities traded per day; repo and stock lending possibilities; sizes of bond issues and market capitalisation of equities; and the market where the instrument is traded. For illiquid assets such as investments in real estate, hedge funds, and private equity, contractual liquidity provisions may apply (e.g. redemption notice periods or minimum periods of investment). The result of the liquidity calculation is an amount of cash available at each time horizon for a range of costs.

When appropriate liquidity policies are in place for a fund or business, liquidity can be managed by reviewing liquidity measurements against the policy and deciding on actions to maintain an appropriate level of liquidity.

Derivatives

Derivatives are financial instruments that are based on the movements of underlying assets. They allow exposures to markets and individual assets to be adjusted, often in a flexible and cost-effective way. This allows the risk profile of portfolios to be changed: risk can be increased, decreased or transformed. Just like an asset, whether an individual derivative increases or decreases the risk of a portfolio depends on the other instruments in the portfolio and on the benchmark for that portfolio.

Growth in derivatives markets

The global derivatives market has expanded over the years, and the total notional principal outstanding in 2016, shown in *Figure D.1*, is very large. This demand for derivatives has arisen from the desire of banks, companies and investors to manage their financial exposures in an efficient way

Figure D.1 Derivative amounts outstanding

USD billion	OTC	Exchange traded futures	Exchange traded options
Foreign exchange / Currency	74,036	225	122
Interest rate	418,082	25,947	40,951
Equity-linked	6,631	2,526	3,613
Commodity	1,392	n/a	n/a
Credit default swaps	11,777	n/a	n/a
Unallocated	31,936	n/a	n/a
Total	543,854	28,698	44,686

Source: Bank for International Settlements. Futures and options data as at December 2016 (BIS Quarterly Review March 2017), OTC data as at December 2016 (BIS Quarterly Review March 2017)

Derivative users

Derivatives are used in many different ways by a variety of users. Banks, for example, use interest rate derivatives to manage potential mismatches between their assets and liabilities. Companies use derivatives to manage the risk on movements in exchange rates and commodity prices which might affect the profitability of their business. Increasingly, pension funds are using derivatives, such as interest rate and inflation swaps, as part of a liability driven investment strategy. Speculators also use derivatives to take positions.

Types of derivatives

Derivatives can be classified according to the way that they behave as a function of the underlying asset prices. First we shall look at forwards and futures, then swaps and finally options.

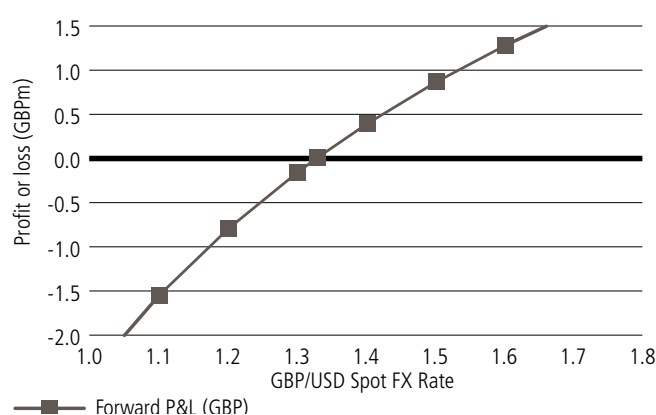
Forwards and futures

Forwards and futures are based on the idea that instead of buying (or selling) an asset now, you can enter into a contract to buy (or sell) the asset at a future date at a fixed price. To enter this contract at a neutral price costs nothing (although initial margin may be required — see below).

If the asset rises in price, the holder of the contract to purchase (known as a 'long position') will make a profit, as the contract now gives the right to buy the asset at a discount to its current price.

On the opposite side, the holder of a contract to sell the asset at a fixed price (a short position) will make a loss if the asset rises in price, as they will be obliged to deliver the asset at a discount to the market price. For example, if on 30 June 2016, an investor entered a forward transaction to sell currency of USD 10 million for GBP 7.5 million on 31 December 2016. The current exchange rate on 30 June 2016 (the spot rate) was GBP/USD = 1.3268, meaning that 1.3268 US dollars would buy 1 pound. Here the forward rate was slightly different because of the different interest rates in the two currencies and stood at 1.3284. *Figure D.2* shows the profit or loss made by the investor if the exchange rate changed.

Figure D.2 Forward contract to pay USD 10m and receive GBP 7.5m



Source: UBS Asset Management

If the pound strengthened (so 1 pound would buy more dollars, moving to the right of the graph shown in *Figure D.2*), the investor would make a profit. In fact, the exchange rate on 31 December 2016 was 1.2418, so the investor would have received GBP 7.5 million while paying USD 10 million. The amount paid was worth GBP 8.1 million at the prevailing market rate, so the investor makes a loss of GBP 0.53 million.

Price movements of forwards and futures usually mimic the price movements of the underlying asset closely. They may represent an efficient way of gaining exposure to the market. For example, buying a FTSE 100 future replicates a position in the 100 stocks that are members of the index, but only involves a single transaction rather than the purchase of positions in 100 stocks.

Derivatives contracts are based on underlying assets, thus their supply is only limited by counterparties' willingness to create contracts. Thus it is easy to take short positions in derivatives that can be used, for example, to reduce exposure to equity market movements while retaining stock selection exposure in a portfolio. For bond portfolios, short positions in bond futures can be used to reduce duration.

In general, futures are suitable for taking tactical market positions. Trading spreads are narrow and liquidity in the most popular contracts is high. However, the most liquid futures contracts typically have short maturities and so have to be rolled over, usually every three months. This means that strategic views are still best expressed using the underlying assets.

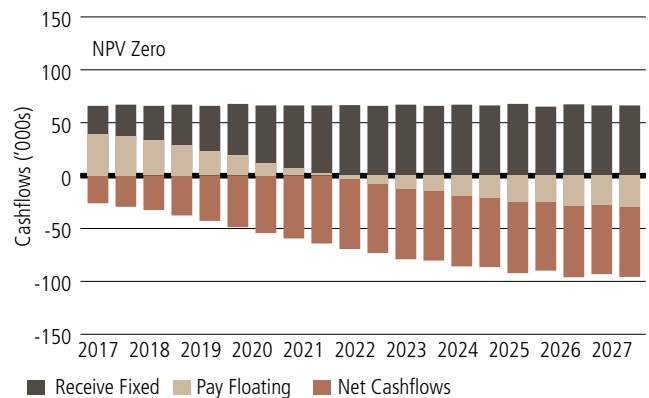
Long positions in futures can be used to gain extra exposure to the market. For example, when there are small incoming cashflows from coupons or dividends, futures can be used to bring the fund back to a market exposure equivalent to being fully invested. This can be more efficient than using each small cashflow to buy very small positions in a variety of stocks. Foreign exchange forwards in the major currencies are very liquid and provide a cost-effective way of transferring currency exposure among market participants. They can be used to hedge currency exposures associated with investments in foreign stocks or bonds and to express currency views as part of a currency overlay strategy. Foreign exchange futures may be preferred for the convenience of trading on an exchange and if there is very frequent trading.

Swaps

Interest rate swaps

Swaps are contracts between two parties to exchange payments based on different assets. There is a highly liquid and mature market in interest rate swaps in the major currencies with maturities up to 30 years. In an interest rate swap, one party pays a fixed coupon to the other, while receiving a set of floating cashflows in return. The two sides of the swap are usually called 'legs': the fixed leg and the floating leg. *Figure D.3* illustrates the cashflows for a sterling 10-year interest rate swap with a notional amount of GBP 10 million, where the investor is receiving a fixed 1.32%, and paying six month LIBOR on the floating leg (first payment at 0.53%). Payments are made every six months. The future floating payments are unknown but their expected values can be forecast from current interest rates and it is these projected rates that are shown in *Figure D.3*.

Figure D.3 Swap cashflows 10 year, GBP 10m, receive fixed



Source: UBS Asset Management

The fixed rate of an interest rate swap is usually selected so that the swap has a zero value at inception. Whilst *Figure D.3* shows large cashflows on each side, actually, these amounts are netted and only the net cashflows (shown in green) are paid. The value of the discounted net cashflows in this example is close to zero.

If interest rates change, the expected floating payments change but the fixed payments do not. If interest rates rise strongly, the expected net cashflows all become negative. This is because the fixed payments have remained fixed while the floating payments have increased. In this example, a 1% rise in interest rates would imply a net present value (NPV) of the swap contract of minus GBP 894,890.

Relative to the notional value of the swap of GBP 10 million, this is a change of -8.9%. This change in value is the same change that would have been seen if investing GBP 10 million in a bond with a coupon of 1.32% trading at par. Swaps are often represented like this as it makes them easier to understand in terms of familiar bond characteristics.

Interest rate swaps are usually quoted at one year maturity intervals out to 10 years and then at wider intervals out to 30 years, or longer in some markets. This can give more flexibility than the available spectrum of issued bonds. Also, as interest rate swaps can have long maturities, they are suitable for hedging long-term risks, for example adjusting the duration profile of a portfolio to correspond more closely to expected pension fund liabilities. Traditionally, an investor would have to invest mainly in long maturity bonds to be able to hedge long-term liabilities. Now it is possible to gain the desired duration profile using swaps and to diversify investments more widely across asset classes.

Inflation swaps

In recent years, inflation swaps have become popular. An inflation swap replaces the fixed coupon bond-like leg of an interest rate swap with a leg that looks like an inflation-linked bond. Inflation-linked bonds have coupons and a principal

that change in line with an inflation index such as the retail price index (RPI). Another type of inflation swap accumulates all the notional floating flows and inflation-linked flows until the maturity date of the swap and then has just one cashflow at maturity.

Whatever the details of the structure, inflation swaps allow investors to change their exposure to inflation. This increases the possible range of investments for pension funds with inflation-linked liabilities. Instead of investing directly in inflation-linked bonds, investments can be spread more widely and the desired exposure to inflation can be achieved using inflation swaps.

Credit default swaps

Credit default swaps (CDSs) provide similar possibilities in adjusting exposures to corporate or sovereign bond issuers. They provide the most efficient way of expressing a negative view on a corporate or sovereign credit. Whilst a negative view on a bond issuer can be expressed by taking short positions in individual bonds, such positions can be difficult or expensive to sustain over a long period, as the lender of a bond can usually call it back at a few days' notice or charge a higher borrowing fee.

In contrast, as long-term instruments (a typical maturity is five years), credit default swaps provide a flexible alternative for taking long or short positions. CDSs on indices have become increasingly popular. Like equity index products, they allow exposure to a whole basket of credits to be taken or hedged with a single instrument. For example, the Markit CDX EM Index is based on a basket of 15 emerging market sovereign issuers. CDSs on this index are a popular way of adjusting exposure to emerging market debt. Liquidity is high for swaps on the most popular bond issuers and credit indices. However, valuing and managing credit default swaps is somewhat more complex than for interest rate swaps.

Equity swaps

Equity swaps provide the return on a single stock or equity index in exchange for a cashflow usually linked to a floating rate or the total return on a different equity basket or index. Equity swaps on single stocks are widely used in market neutral and 130/30 funds to establish short positions, and sometimes for long positions too. They are a more efficient way to manage a short position than borrowing a stock and selling it on because a borrowed stock may be called back at any time by the lender with just a few days' notice, whereas an equity swap is unlikely to be terminated by the counterparty.

Equity index swaps are often used in absolute return and portable alpha funds to reduce exposure to a particular market or sector. For example, if you find a technology fund that you believe will deliver positive alpha but you do not

want exposure to the technology sector, you could invest in the fund and remove the sector exposure using an equity index swap based on an appropriate sector index.

Exchange traded funds (ETFs) that use long positions in equity index swaps to generate their returns have also become popular. Such a fund typically invests its assets in a substitute basket of equity securities for the pay leg of the equity swap and then receives the return on the index. The advantage of such an arrangement is reduced tracking error and possibly reduced management costs.

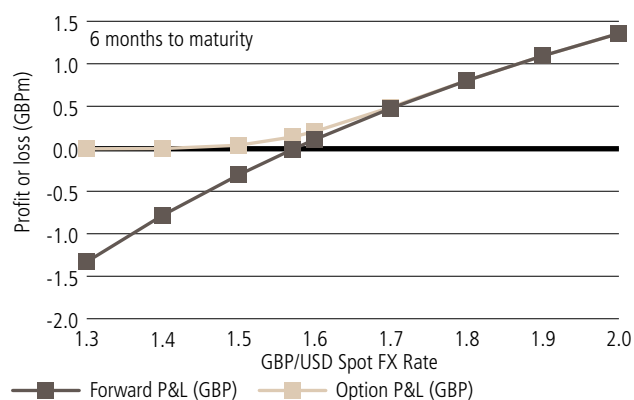
Options

The buyer of an option pays a premium to the seller (or 'writer') of the option and receives the right — but not the obligation — to buy or sell the underlying asset at some point in the future at a fixed price. An option to buy an asset is a 'call', while an option to sell is known as a 'put'. It is the 'right but not obligation' of the option contract that makes it different from a forward, future or swap contract.

After buying an option, the buyer is said to hold a long position in the option, whereas the seller is said to hold a short position. For example, if on 30 June 2016, an investor bought an option to sell USD 10 million for GBP 7.5 million on 31 December 2016 and the current exchange rate on 30 June 2016 (the spot rate) was GBP/USD = 1.3268, meaning that 1.3268 US dollars would have bought 1 pound.

Here the forward rate was slightly different because of the different interest rates in the two currencies, and stood at 1.3284. *Figure D.4* shows the profit or loss made by the investor if the exchange rate changed and, for comparison, also shows the profit or loss from the forward contract given as an example earlier in *Figure D.2*.

Figure D.4 Forward and option contracts to pay USD 10m and receive GBP 7.5m



Source: UBS Asset Management

The option price in the above example is GBP 282,991. This price depends on the rate at which the US dollars can be sold (the strike price: in this case, 1.3284); the current spot rate (1.3268); time to maturity (6 months); the volatility that the market anticipates (the implied volatility: in this case 13.17%) and the interest rates in sterling (0.68%) and dollars (0.92%).

Figure D.4 shows that the option price decreases more slowly as the dollar strengthens (moving to the left on the graph), while it increases more quickly as the dollar weakens. This curvature becomes stronger as the option gets closer to maturity and there is less time left for the exchange rates to change again.

If the dollar strengthens, the most the investor can lose is the premium paid on the option (in this example GBP 282,991).

There is no obligation to sell the dollars at an unattractive price; the holder can just let the option expire.

A short position in an option on its own is riskier. If the seller of this option leaves it unhedged, the potential for loss is large if the dollar weakens, and the option seller is obliged to buy USD 10 million at expiry for GBP 7.5 million. However, as part of a portfolio, short positions in options may reduce risk.

The price of options or the premium paid will depend on the life of the option (the longer the time to maturity, typically the more expensive it will be) and also on the volatility of the underlying asset (an option on a stock that moves 5% on average per day will be more expensive than one on a stock which moves 1%). Options are available on stocks, indices, bonds and currencies.

Pension funds' use of options is very much dependent on their risk profile. Where a fund has a need to achieve a particular target, such as 'no loss of capital', this can be guaranteed through the use of options. This is like buying an insurance policy.

Pension funds can also attempt to enhance their returns or cashflow by writing (i.e. selling) options. This should only be done when the fund manager considers the risk to be lower than the market price is implying. A particularly popular strategy is selling call options with a strike price above the current market price against shares held within the portfolio. This gives the buyer of the option the right to purchase the shares at the agreed price. If the share price rises above the strike price at expiry, the option is exercised. The fund manager may have sold the shares anyway at this price and the proceeds of the option sale are also received. Selling options generally results in a lack of flexibility in the portfolio and may increase risk. However, if the option price achieved is sufficient, this strategy can be worthwhile.

Derivative market structure and credit risk

There are two methods of trading in derivatives. Trading is possible by using recognised exchanges such as the CME Group or Intercontinental Exchange (ICE), with standardised contracts and a central counterparty, such as CME Clearing or ICE Clear.

Exchange-traded contracts are usually standardised with fixed maturity dates and contract sizes. More recently, exchanges have offered 'flex options' that allow participants to tailor the strike price and expiry date of single stock options but still benefit from trading on the exchange.

Standardised contracts increase liquidity, as all market participants trade a limited range of contracts. The clearing house structure reduces credit risk. Market participants must post an initial margin (a cash deposit) to cover the risk that their positions move against them, and also post a daily variation margin if their positions make losses. If the positions make profits, the variation margin is paid out to the holder of the positions. In this way, if a market participant defaults, the losses should be limited to one or two days' market movement on their positions minus their initial margin payment. The daily margin process realises profits and losses as they occur.

In the 'over the counter' (OTC) market, contracts are between two counterparties. The contracts can, in principle, be tailored to fit any requirements. However, in practice, some types of OTC trades are standardised. For example, interest rate swaps are often executed for standard maturities and coupon levels. Credit risk in OTC markets, especially for long-term contracts, used to be much higher than when trading on an exchange. However, most regular dealers of OTC contracts now use collateral agreements. This requires a counterparty to post collateral (usually in the form of cash or government bonds) to cover unrealised losses. If the counterparty defaults, the collateral taken covers any losses, except for those representing market movements since the last collateral posting. Collateral taking has significantly reduced the credit risk associated with OTC derivatives.

OTC derivatives market reform

The G20 Pittsburgh Summit in September 2009 concluded with a number of key commitments to financial market reform, stating that:

- All standardised derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by the end of 2012 at the latest;

- OTC derivative contracts should be reported to trade repositories;
- Non-centrally cleared contracts should be subject to higher capital requirements.

The G20 timeline proved to be ambitious and regulators across the globe continue to develop the necessary rules to implement the reform. These requirements are met by the Dodd-Frank Act in the US which became the first financial market to effect change, followed closely by the European Market Infrastructure Regulation (EMIR) which addresses the reform in each member state.

Recognising the importance of cost effective access to the derivatives market, the EU legislators split participants between financial counterparties and non-financial counterparties, the latter benefitting from certain exemptions. These apply to the clearing and risk mitigation techniques obligations only.

EMIR came into force in August 2012. Pension schemes benefit from a limited exemption from EMIR's headline measure — the clearing obligation — until at least August 2015, which the European Commission has recently recommended be extended for a further two years. The extension is to provide central clearing counterparties with further time to develop technical solutions enabling pension funds to post non-cash assets to meet margin calls.

Central clearing

A key element of the new regulatory approach is the central clearing of derivatives (see *Figure D.5*). A central clearing counterparty (CCP) stands between OTC derivatives counterparties, insulating them from each other's default. Effective clearing mitigates systemic risk by lowering the likelihood that defaults proliferate from counterparty to counterparty.

Clearing currently takes place for clients and funds classified as 'US persons', as well as all other clients and funds trading with a counterparty which is classified as a US person. The technical standards for clearing under EMIR have now been finalised and we expect clearing under this regulation to be phased in from Q3 2015 through to Q1 2018.

How will clients benefit from clearing?

Central clearing of swaps provides significant risk management and potential benefits that are not available in the OTC world. Central clearing ensures market integrity by mitigating counterparty default risk through interposing the clearing house as the counterparty to each trade.

If a trade is defaulted upon, the default is contained between the defaulting party and the clearing house, protecting the opposite party to the trade. Further, central clearing offers multi-lateral offsetting of gross market risk down to lower levels of net market risk.

Typical risk waterfall for a CCP

CCPs rely on a waterfall of financial resources to absorb defaults (see *Figure D.6*). The first element of the waterfall is the defaulter's margin (both initial and variation) followed by the defaulter's contribution to the CCP default fund — or its equivalent. Once these resources are exhausted the CCP will look to others such as their own capital contribution or default fund contributions of non-defaulting members.

If default losses exceed even this element of the waterfall, CCPs typically have the right to assess non-defaulting members to make additional contributions. These additional assessment rights are usually limited, commonly to a firm's initial contribution to the default fund.

Eligible instruments

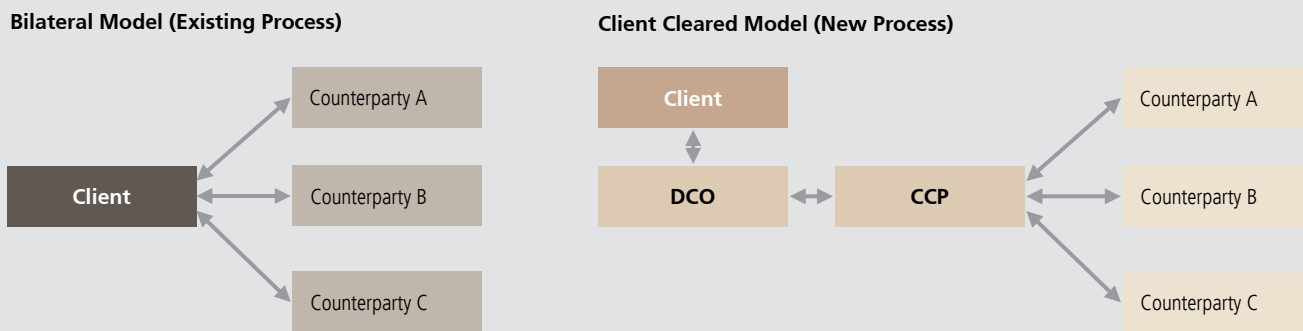
In the spirit of the G20 framework, any contract which can be standardised can be mandated for clearing and financial markets are taking a phased approach. The final list of mandated instruments, for Dodd-Frank in the US includes:

- Interest rate swaps
- Forward rate agreements
- North American Untranchcd CDS Indices — investment grade & high yield (specific tranches)
- European Untranchcd CDS Indices — investment grade & high yield (specific tranches)
- Specified single name CDS
- While under EMIR's current proposal, mandatory clearing is expected apply to the following instruments:
 - Interest rate swaps in GBP, EUR, USD and JPY
 - Forward rate agreements and overnight interest swaps in GBP, EUR and USD
 - iTraxx Europe Main and iTraxx Europe Crossover CDS with 5-year maturity

The cost of clearing?

The fall in the creditworthiness of counterparties has contributed to two-thirds of losses made by financial institutions in recent years, according to the regulators. The key driver for the reform is therefore the reduction in counterparty risk. This comes at a cost, however, and centrally cleared trades require counterparties to post both initial and variation margin, making cleared trades far more capital intensive than the current bilateral model.

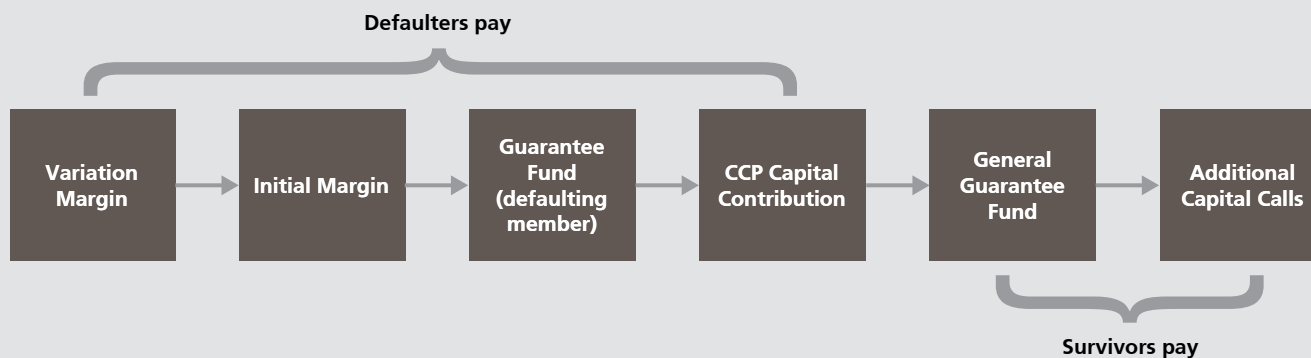
Figure D.5 Central clearing model



DCO – Derivatives Clearing Organisation CCP – Central Counterparty

Source: UBS Asset Management

Figure D.6 Typical risk waterfall for a CCP



Source: MSCI

Reporting derivative transactions

One of the fundamental differences between Dodd-Frank and EMIR is the product scope. Dodd-Frank regulates OTC derivatives, whereas EMIR covers both OTC and listed derivatives. Under Dodd-Frank trade reporting is the responsibility of the registered swap dealer, but with EMIR both sides of the transaction have an obligation to report. EMIR transaction reporting for both exchange-traded and OTC derivatives became mandatory at the beginning of 2015.

Electronic trading

In the US, the Commodities Exchange Act (CEA) requires swaps that are subject to mandatory clearing to be executed via either a designated contract market (DCM) or swap execution facility (SEF) where that swap has been made available to trade (MAT).

There are a variety of SEFs jockeying for market share. In January 2014, the US regulator announced the first MAT submission from a SEF had been approved which became effective in February 2014. Further MAT submissions have since been accepted and implemented. Once a SEF includes an instrument in an accepted MAT submission, that instrument then becomes mandated for SEF trading.

Similarly to the clearing rules under Dodd-Frank the regulation will only apply to US clients or funds or non-US clients or funds trading with US counterparties.

Looking to the future

The derivatives market is facing unprecedented regulatory change, the impacts of which are far-reaching in terms of the magnitude and scope of change, but also in terms of the sheer breadth of market participants affected.

Portable alpha

The growing acceptance of derivatives has bred the concept of 'portable alpha'. Essentially, the ability to outperform a benchmark (or create 'alpha') can now be transferred from one asset class to another.

For example, if a manager can outperform the Japanese equity market, it is possible to create a portfolio that outperforms the US equity market. This is achieved by selling Japanese equity futures against the Japanese equity portfolio and buying US equity futures. Hence the manager has transported alpha from Japan to America. Similarly, alpha can be transported between equities and bonds permitting, for example, achievement of a greater outperformance target for bonds than would be normally possible by conventional management techniques.

The operation of these innovative strategies is facilitated by the availability of customised products from investment banks. These are designed to adjust the risk profile of funds, and by the growth of ETFs, single share and sector futures, all of which provide extra liquidity and opportunities for leverage or risk control.

Controls

Sound methods of accounting and control, and a clear understanding of derivative markets together with confidence in the managers of the fund, are prerequisites for undertaking operations in these instruments.

Derivatives are often seen as relatively high risk. This view arises from the ability to make geared investments, which can result in losses several times the size of the initial margin. However, there is no need to expose an investment portfolio as a whole to excessive risks if derivatives are used responsibly and within clearly defined guidelines.

When considering the risks of derivatives, it is important to focus on the risk profile of the whole portfolio. Individual derivatives taken in isolation may appear high risk, not unlike an investment in a single stock. Set in the context of the portfolio of which they are a part, derivatives may increase or reduce risk.

The traditional advice to invest only in things you understand applies, especially to derivatives. Trustees should demand satisfactory explanations of the use of derivatives by their fund managers and the associated risks, before giving permission to deal in them.

It is especially important that if derivatives are to be used, the fund manager has suitable systems and controls. These would include the ability to value and measure risk on derivatives' portfolios on a regular basis.

Performance measurement

Calculating returns

It is generally accepted that most comparisons of fund performance should be made using time-weighted returns. The time-weighted return is, essentially, the rate at which the fund would have grown without any new money but holding the same underlying assets as the actual fund. It can be calculated accurately by compounding the growth rates of the fund for the periods between the flows of new money. This could be complicated and involve frequent valuations but there are a number of recognised ways of estimating time-weighted returns which simplify the work involved.

Time-weighted returns are used in preference to money-weighted returns since the former are independent of the timing of the cashflows into the fund, a factor which is normally beyond the control of the investment manager. For example, a fund which receives new money just before a period when a low return is earned will show a lower money-weighted return than a fund with the same investments which does not receive any new money. If the underlying investments are identical, however, the time-weighted returns will be the same. Whilst the way in which returns are used can seem quite complicated and at first sight unfamiliar, the concept of time-weighted return is quite well known. The progress of a pooled fund's price, for example, and the comparisons of pooled fund returns frequently shown in the financial press, are based on the time-weighted return of the funds' assets. The exception to this general rule is the measurement of the performance of certain closed-ended funds, namely funds with a limited life which are subject to periodic distributions of capital and income. Private equity funds are often of this type as the revaluation of their assets, and thus distributions, tends to be irregular. In such cases, the money-weighted rate of return provides a better indication of the return to investors over the life of the fund. It is important, however, to ensure that the return on any comparative benchmark has been calculated in the same way.

Comparisons

Having calculated time-weighted returns on an individual fund, it is necessary to find a measure for comparison. The 'league table' approach of the large performance surveys is to rank the funds in order of return and quote the fund's place in that

ranking. The upper quartile is the mark which 25% of funds are above and 75% below; the median is the half way point in the league table; and the lower quartile is the point which 75% of funds are above and 25% below. It is common to hear talk of 'upper quartile performance' when these positions in the ranking are discussed. In the UK there are two major surveys offering a performance measurement service for UK pension funds: the first is provided by the WM Company (owned by State Street) and the second is provided by Russell/BNY Mellon Analytical Services, a joint venture between two US industry leaders – Frank Russell Company and BNY Mellon Asset Servicing (a.k.a. BNY Mellon), formerly Mellon Analytical Solutions (MAS), formerly CAPS. The latter was formed by the merger of Combined Actuarial Performance Services, a long-time performance measurer of UK funds, and BNY Mellon, a leading performance analyst in the US.

Benchmarks

Clearly the league table approach is not suitable for all pension funds because they have different objectives. Many funds now measure their performance against a benchmark asset allocation which is tailored to the fund's objectives. The benchmark is normally constructed so that its performance can be measured in relation to market indices. Larger funds are increasingly employing the services of specialist managers in each market and measuring their performance against specific index benchmarks. The difficulty with this approach is that it does not provide a direct mechanism for managing asset allocation. In some cases, funds maintain the asset distribution in line with their benchmark and do not take tactical policy decisions. Others appoint a specialist asset allocation manager to implement policy decisions through overlay strategies. These developments mean that the performance surveys no longer provide a suitable means of comparison for what is now a majority of funds. As a result, the performance measurers have extended their broad surveys to cover a number of specialist mandates as well as offering more fund-specific analysis. This trend to increasing specialisation is evidenced by Russell/BNY Mellon ceasing to calculate their CAPS Balanced Discretionary Medians from 1 January 2004 as a result of a diminishing sample of balanced mandates.

In addition to making a switch to a customised benchmark, many pension funds have increased their investment in pooled arrangements. The performance of individual funds is analysed in the Russell/BNY Mellon quarterly survey of pooled pension funds that provides performance comparisons between similar funds over different time periods. Whilst this offers a ranking service, it is important that trustees fully understand the investment strategy of the managers concerned so that the results can be judged in this context. Interpretation of these simple comparisons

is important but can be quite difficult. Any quarter or even year on its own can seldom lead to strong conclusions but persistent patterns can be informative and can provide valuable information. For trustees, the most generally informative study is of emerging trends over three to five year periods, or even longer.

Standards

The 1980s and 1990s witnessed the successful establishment of a number of local market standards for the presentation of fund managers' performance on a consistent basis. These included the Performance Presentation Standards of the Association for Investment Management and Research (AIMR-PPS), predominant in North America and the UK's Pensions and Lifetime Savings Association (PLSA) Performance Code. The increasing global nature of investment management resulted in an initiative by the European Federation of Financial Analysts to bring together all interested parties, including AIMR and the NAPF, to develop a truly global code. Participants from over 20 countries were actively involved in developing the Global Investment Performance Standards (GIPS) which were launched in 1999 and have subsequently become the de facto global standard. They can be viewed as a successful consolidation of the existing national codes. In the UK, the Performance Code has been modified so that it now complies fully with GIPS, together with compulsory verification by an independent agency in lieu of external measurement. The AIMR-PPS code was also updated and the new version was published in 2001, as the North American version of GIPS.

The evolutionary nature of the standards is highlighted by the release of the 'gold' standard GIPS. These have the twin objectives of improving the original (1999) GIPS plus helping to eliminate the need for separate investment performance standards in different jurisdictions. The final 'gold' standard GIPS were issued in February 2005 but firms had until 1 January 2006 to comply with the new requirements. Also, in 2005, the CFA Centre for Financial Market Integrity adopted a revised version of GIPS which eliminates the need for different country versions. As a result, the North American version of GIPS, the AIMR-PPS, fully converted to GIPS on 1 January 2006. This effectively announced the dissolution of the AIMR-PPS brand.

GIPS work by three main principles: fair representation, full disclosure and comparability. Fair representation ensures that all managers have to provide a proper numerical account of the performance achieved for all their discretionary mandates. It prevents them from selecting only their best performing funds. Full disclosure ensures that all pertinent information regarding the manager is disclosed. This would include information regarding the size and number of funds under management and the dispersion of returns achieved

on those funds. Comparability is essential for trustees and consultants when reviewing performance track records for various investment managers. For example, this would ensure that the calculation of composite returns reflected the universe of funds with similar performance objectives. Equally, this principle would prevent differences in fee structures from distorting comparisons between managers. The standards are all voluntary codes of practice so if the investor and consultant wish to be afforded the benefits that the standards offer, the initiative lies with them to ensure their adoption. As the standards achieve general acceptance, there is strong pressure for fund managers to conform. GIPS allow for a global comparison of investment managers' performance records, reducing the barriers to entry in each market and stimulating international competition. In practice, local characteristics, both in terms of the nature of investment briefs and how they are managed, are likely to remain influential, requiring great care in the interpretation of apparently comparable records.

The operation of GIPS is overseen by the Investment Performance Council (IPC) whose international membership includes representatives from a wide range of users and providers of performance statistics. The IPC also has a number of sub-committees comprising mainly performance specialists, who are charged with providing greater clarity and definition to what are, in many cases, fairly generalised statements of principle.

The work of the Interpretations Sub-Committee has resulted in the publication of a number of Guidance Statements which provide a more detailed description of the practices that investment managers should follow, in such areas as the definition of the investment firm and the construction of composites of like-managed funds. The Verification Sub-Committee has also been active in defining the role of the verifier and the principles of verification. AIMR is now known as the CFA Institute and full details of GIPS can now be obtained by reference to the CFA Institute website. The Institute also provides an advisory service whereby questions on GIPS are speedily answered or passed on to one of the specialist committees for further review.

To maintain global relevance, and in recognition of the dynamic nature of the investment industry, the GIPS standards are continually updated. In 2008, the GIPS Executive Committee began its latest review of the GIPS standards, working in close collaboration with its technical sub-committees, working groups and GIPS country sponsors. Following the resulting 2010 edition of the GIPS standards, GIPS underwent major revisions in 2011 in an effort to improve investment transparency and foster full disclosure in the wake of the financial crisis. The new revisions are poised to have a profound effect on investors and investment managers alike. Starting with investment performance in 2011, GIPS have been revised around three major factors.

The aim is to provide a framework and guidance which helps investors make better-informed decisions on which fund managers can help them achieve their goals:

- Fair Value – For investments where no market value is available, new GIPS require that assets be valued using fair value methodology. This is the current value at which an asset could be exchanged between willing counterparties and takes into consideration the best information available at the time of valuation.
- Compliance Statement and Verification Status – Investment managers are now required to disclose their GIPS' verification status and also use prescribed language describing what is, and what is not, covered by the verification or examination.
- Risk – Investment managers are now required to present investment risk measures along with rates of return.

Attribution analysis

An important trend in performance measurement has been towards greater detail in the analysis of what has contributed to the returns on funds. Performance attribution allows the impact of different decisions to be accurately assessed. This can be helpful to investment managers in identifying strengths that can be more fully exploited and weaknesses that need to be tackled.

In earlier years it was feasible to attribute performance only between stock selection and asset allocation. Nowadays, advances in computing power have made it easier to attribute performance down to the level of individual securities. A further level of sophistication in attribution has allowed a fund's relative performance to be analysed into the contributions from various factors such as company size and style characteristics. Such analysis provides insights into the style and consistency of the fund and its manager.

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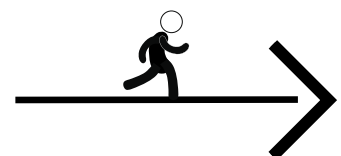
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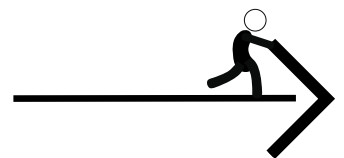
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¹ Thereof around 1,300 from corporate center. Data as at 31 December 2016

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