

Investment Horizons

Issue 7 | 2017

Contents

2

What does the “Rise of the Robots” mean for asset prices?

Robotics has moved from science fiction to industrial reality, leading pessimists to paint a bleak picture of social dislocation. We are optimistic that, if handled well, automation will create neither widespread joblessness nor rampant inequality. However, investors will need a roadmap of its effects on inflation, growth, interest rates and asset prices if they are to remain ahead of the game.

13

Why investors need a multi-layered approach to risk

Equity risk management has had to adapt to roller-coaster markets, new demands from clients and regulators and advances in technology. These pressures have highlighted the limitations of traditional risk measures, prompting a search for new approaches. We argue that investors now need a multi-layered approach as they build portfolios.

5

Churn is not necessarily burn: debunking the myths of portfolio turnover

Our research challenges the assumption that high portfolio turnover results in poorer performance. We found no evidence of any general relationship between turnover and returns among active equity portfolios, apart from emerging market funds. What our analysis did show was that picking the right active manager is more important than ever among funds that trade frequently.

16

Primer: constructing a case for infrastructure finance

Infrastructure covers a wide variety of assets, from airports and telecommunications networks to hospitals and schools. Their unifying characteristic is often stable operating cash flows, which appeal to equity investors while providing comfort to lenders. There are many routes in to the market, offering a wide variation in risk and return, but in all cases, expertise is required to steer a clear path.

9

Emerging market assets: zoom out and refocus

Emerging markets are a big part of global markets, yet are typically under-represented in investors' portfolios. Many are now asking how they should build a strategic allocation. We argue that investors need to be selective. Emerging market equities and local debt are two areas well placed to outperform other EM assets handsomely over the medium term. Their outlook also compares favourably with developed market assets.

Adapting to changing horizons

If there is one thing investors have learned over the past few years, it is that it is unwise to rely on past trends. From politics to technology, old assumptions are being overturned. But with change comes opportunity: for investors able to adapt, we think the outlook remains bright.

Robotics is a case in point. Like the internet before it, the technology of automation is set to eviscerate old industries and upend employment practices. But should investors presume that the effects will be universally bad? Certainly, the prophets of doom see what has been called “the second machine age” leading to a dystopian society, divided by its participants’ ability to profit from the new technology. We are much more optimistic. Either way, it is clear that investors need to engage in depth with the progress of robotics.

At a more prosaic level, “automation” in investment is turning investors away from active management, where it is often argued that higher trading costs mean lower returns. Once again, assumptions can lead investors astray. We examined the evidence and found little to support the case. What we did find is that investors need to keep a particularly close eye on their managers as the penalties for failure are higher with high turnover funds.

Scepticism about emerging markets is widespread. That has certainly been the right call since the financial crisis in 2008-09, but this year has seen that change as emerging markets have started to outperform again. We identify the most efficient ways of achieving emerging markets exposure.

Here again, rigorous analysis will provide a better guide for investors than glib assumptions. It’s a conclusion that applies equally to the management of risk. As our penultimate article points out, the science of risk has moved on greatly in recent years. Investors can no longer simply rely on one measure; they need to use several to build a many-dimensional view of where the possible threats to their portfolios lie.

Finally, we take a look at the investment opportunities in infrastructure, a sector that embraces everything from airports to green energy. We find that there is still a lot to be attracted to, notably stable cashflows and high-quality assets, but investors need to be careful to pay the right price.

We hope you find something that captures your attention amongst this eclectic mix of subjects. Longer versions of all the articles are available on the Schroders web site. As ever, please get in touch if there is anything you would like to discuss further.



Yours sincerely,

Gavin Ralston, Head of Thought Leadership



What does the “Rise of the Robots” mean for asset prices?

Alice Leedale CFA, Fixed Income Strategist

Robotics has moved from science fiction to industrial reality over the last few decades, with many asking which parts of the labour market robots will invade next. The pessimists paint a bleak picture of mass displacement of labour accompanied by increasingly wealthy robot owners. Yet the history of technological change offers a decidedly more sanguine prognosis. We are optimistic that, if handled well, the rise of the robots will create neither widespread joblessness nor rampant inequality in the long term. Even so, labour market disruption in the coming decades could still be sizeable. Investors will need to develop and maintain a roadmap of how the “second machine age” is likely to affect inflation, growth, interest rates and asset prices if they are to remain ahead of the game¹.

Understanding the techno-pessimists

Both “techno-pessimists” and “techno optimists” agree that robotics and automation should boost the combined output of capital and labour. The controversy centres on how the gains are distributed. Techno-pessimists typically predict a period of intense job destruction, with the extra wealth created by higher productivity narrowly distributed amongst those who own the new technology. Moreover, they argue that any new jobs will be reserved for highly skilled tech-savvy workers, further skewing the income distribution.

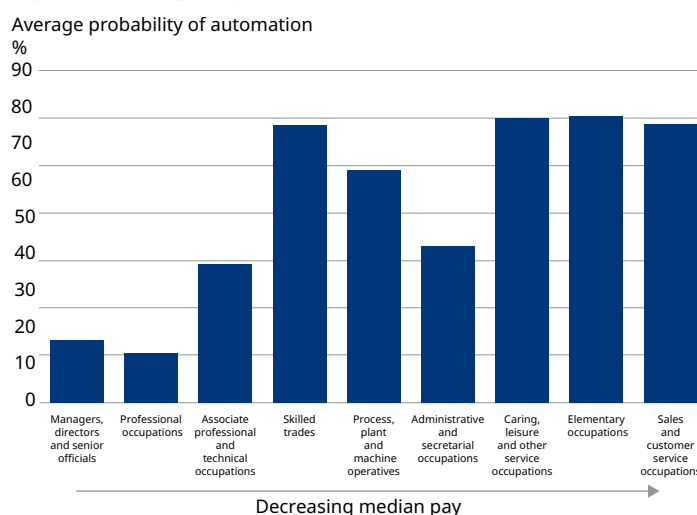
There is certainly evidence to suggest that the “fourth industrial revolution” will bring about significant labour market disruption. Studies by the Oxford Martin School have estimated that around a third to half of jobs in developed countries such as the UK, US and Japan could be at risk of automation, the majority in the low and middle skilled brackets². This is reflected in work by the Bank of England applying the academics’ approach to UK data (Figure 1).

Meanwhile, a recent theoretical study by the International Monetary Fund which modifies their standard macroeconomic model by adding robots as a form of capital concludes that in virtually all scenarios where robots become more effective substitutes for humans, labour loses out to capital and inequality goes up³. At best, even if greater labour productivity does ultimately outweigh the effects of job destruction, it could be 20 years before wages start to recover.

Automation becomes “blind to the colour of your collar”

Rising inequality can have a negative impact on politics, often precipitating a lurch towards populism. Many would argue this is evident in the US, where recent decades have seen a

Figure 1: Low-paid jobs are more at risk from automation



Estimated probability weighted by UK employment. Source: “Labour’s share”, Andy Haldane speech, Bank of England, 12 November 2015; UK Office for National Statistics data, Frey and Osborne (2013) and Bank of England calculations.

“hollowing out” of manufacturing employment, driven by technology and globalisation⁴. But now the jobs that have been a fall-back option for many displaced manufacturing workers, predominantly low-skilled services roles such as retail and food preparation, could also be at risk from an invasion of robots. Furthermore, artificial intelligence is making rapid progress in “non-routine cognitive processing”, encroaching on knowledge-based professions such as medicine, law, and finance, which currently remain the preserve of highly-skilled white collar workers. Displacement here would be particularly disruptive for developed countries. In the US, for example, non-routine cognitive-type work has created most of the jobs growth in the past 25 years (Figure 2).

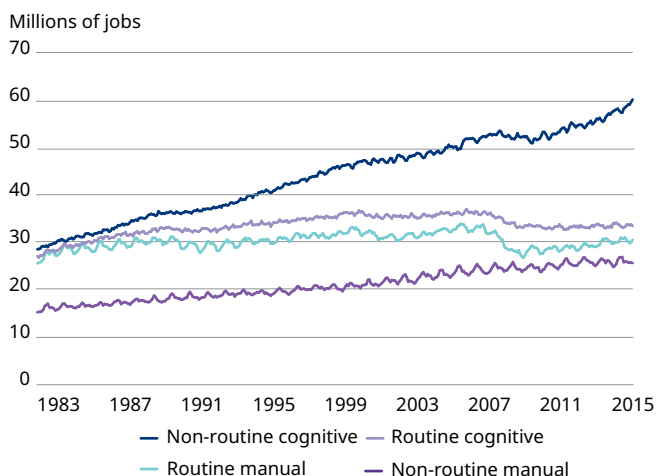
¹ A longer version of this article is available on the Schroders website.

² See for example “The Future of Employment: How Susceptible are Jobs to Computerisation?”, Carl Benedikt Frey and Michael Osborne, *Oxford Martin School working paper*, September 2013.

³ “Robots, Growth, and Inequality”, Andrew Berg, Edward F. Buffie and Luis-Felipe Zanna, *Finance & Development*, vol 53, no 3, International Monetary Fund, September 2016.

⁴ See for example “Rising Income Inequality: Technology, or Trade and Financial Globalization?”, Florence Jaumotte, Subir Lall and Chris Papageorgiou, *IMF Economic Review*, 61(2), June 2013.

Figure 2: Jobs involving non-routine tasks have driven employment in the US



Source: Federal Reserve Bank of St. Louis and US Current Population Survey, data as at March 2016.

Technology remakes work

On the face of it, the case for an extended period of labour market disruption does seem compelling. However, we are not convinced that in the long term the techno-pessimists' dystopian vision of the future will win out. The history of technological change offers plenty of hope that technological revolutions can be successfully accommodated, even though there is typically a period of adjustment.

Indeed, over the course of the 20th century, not only has technology led to huge productivity improvements that raised living standards for all, we would argue that it has also created more jobs than it has destroyed, particularly via new markets and industries. As Deloitte points out in a 2015 study, the technology debate is unduly skewed towards job destruction partly because the creative process is inherently so unpredictable⁵. However, just because we cannot yet imagine the jobs of the future does not mean we should assume that there won't be any.

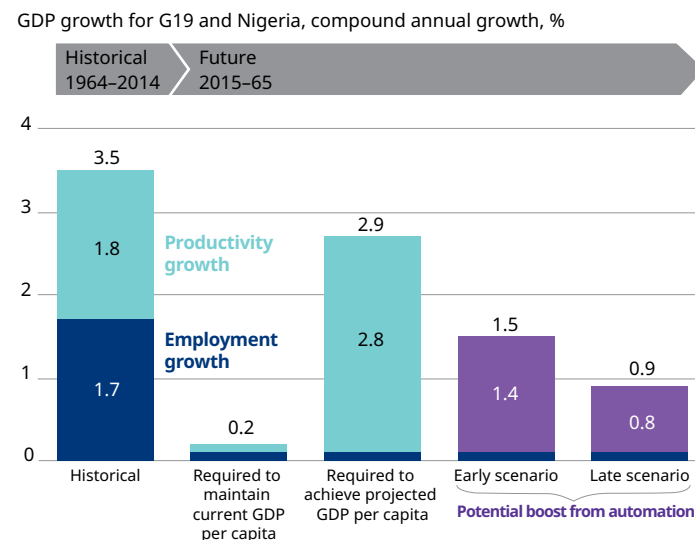
There is room to be optimistic for other reasons. An automation revolution should bring a much-needed boost to productivity growth, raising trend growth rates. There is already some evidence of this taking place. Academics at the Centre of Economic Performance found that on average the use of robots contributed around 10% of the total growth in developed economies in the period 1993-2007⁶. Such a fillip would not only help reverse recent poor productivity growth, but could also offset downward pressure on trend growth from deteriorating demographics.

The Oxford Martin School and investment bank Citi estimate the headwind from demographics in advanced economies could be 0.2 percentage points per annum

⁵ *Technology and people: The great job-creating machine*, Deloitte, August 2015.
⁶ "Robots at Work", Georg Graetz and Guy Michaels, *CEP Discussion Paper No. 1335*, March 2015.

over the next 20 years⁷. But if forecasts by McKinsey prove correct, that would be more than made up for by productivity gains associated with automation. Looking at a larger group of countries (the G19 group plus Nigeria), the management consultant predicts that the second machine age could boost economic growth by 0.8-1.4 percentage points annually until 2065, depending on the pace of adoption⁸. Clearly, at that rate, automation could go quite a long way to meeting longer-term growth expectations for these countries (Figure 3).

Figure 3: The next industrial revolution could help offset "demographic drag"



Source: *A future that works*, McKinsey Global Institute, January 2017, The Conference Board Total Economy database and the United Nations Population Division.

The effects of automation will be uneven

If the adoption of automation and robotics in an economy helps to offset deteriorating demographics, it could challenge the conventional wisdom that developing countries with large, young populations have a significant demographic advantage over developed economies. This is particularly pertinent given developed economies are more likely to have the resources and expertise to be early adopters of robotics and automation (although China and South Korea, where robots are in high demand, are major exceptions⁹).

Furthermore, if unskilled labour does become less attractive compared to robots, then the growth aspirations of many lower income emerging economies could be called into question. Countries such as India and the Philippines may find that their "demographic dividend" of cheap labour no longer provides a major competitive advantage.

⁷ *Technology at Work v2.0: The Future Is Not What It Used to Be*, Oxford Martin School and Citi, January 2016.

⁸ *A future that works: automation, employment and productivity*, James Manyika, Michael Chui, Mehdi Miremadi, Jacques Bughin, Katy George, Paul Willmott and Martin Dewhurst, McKinsey Global Institute, January 2017.

⁹ *World Robotics 2016: Industrial Robots*, International Federation of Robotics.

Smoothing the transition

Both the history and the potential for productivity improvements suggest to us that the long-term benefits from the second machine age will be substantial. However, in the shorter term there is clearly a risk that automation initially raises joblessness and inequality before labour markets have time to adjust, particularly if the pace of technological innovation and subsequent adoption is rapid. In the absence of a proactive public policy response there could be widespread social dislocation. Clearly, policymakers have an important role to play in ensuring that things don't get worse before they get better.

Potential solutions to rising "techno-inequality" could be direct, including large-scale government redistribution schemes, such as a universal basic income or negative income taxes, or could be indirect, through public works programmes, better education and training, or even wider distribution of capital. However, none of these options are free from difficulties. Many are controversial and most are expensive: the owners of the robots would likely be required to pay higher taxes to help compensate those who have lost out.

The outlook for investors

The most obvious macroeconomic consequence of an automation revolution is disinflation, as technology typically increases productivity and decreases the cost of goods and services on a quality-adjusted basis¹⁰. Moreover, if the techno-pessimists are right, weak consumer spending means overall demand could rise less than supply. In this case we would expect even more downward pressure on inflation and for monetary policy to stay accommodative for longer.

Other conclusions are less clear. Given the huge uncertainties, we prefer to look at a range of potential outcomes between two extremes: "techno-dystopia", in which high unemployment and rising inequality prevail, and a "positive productivity shock", where automation facilitates a widely-distributed productivity boom (see table to the right). Of course, sequencing matters: we may shift closer to techno-dystopia first before policymakers and labour markets have time to adapt. To assess how events are unfolding, we will be monitoring both the advance of the technological frontier and the pace of adoption of new technology into the mainstream. Labour market changes and income distribution markers will also be closely watched.

From an investment perspective, techno-dystopia represents a world where many of the issues that have been facing the global economy – weak demand, subdued inflation, low wage growth and inequality – are intensified. Developed world bond yields would likely fall further, despite deteriorating public finances, with inflation premia becoming structurally impaired. Carry trades, particularly corporate credit, would remain in vogue, although flare-ups of populism and political uncertainty could see risk assets suffer periodically, especially in emerging markets. Interestingly, we believe developed equities could still perform reasonably well in this scenario as the capital share of income should rise further.

If the future is brighter, and automation helps the global economy emerge from its current malaise, developed bond yields should finally break out upward from their five-year range, and improved sentiment could even drive buoyant, demand-driven, inflation. In a sense it would represent an amplification of the nascent "reflation trade" we have witnessed recently. This should be a very good environment for developed world risk assets, with commodities and inflation-protected assets also doing well. It would certainly warrant an underweight (or short) position in developed world bonds.

Macro driver/asset price	Techno-dystopia	Positive productivity shock
Trend growth rate	Moderately higher	Higher
Consumer demand	Weaker	Stronger
Wage growth	Weaker	Stronger
Fiscal dynamics	Deteriorate	Improve
Inflation	Lower	Initially higher
Monetary policy	Looser	Tighter
Long term real rates	Remain low	Rise
Long term bond yields	Remain low	Rise
Equities	Prefer DM over EM	Prefer DM over EM

Source: Schroders.

¹⁰ Although this is not often captured in official inflation data: see "Is inflation overstated?", *Investment Horizons*, Issue 5, 2016.

Conclusion

It is clear that robotics and automation will see old jobs disappear and new ones emerge. Whether this leads to a new age of prosperity or a "techno-dystopia" of mass un- and under-employment, glaring inequality and widespread social upheaval is not clear at this stage. However, we would argue that in the long term history is firmly on the side of the optimists. Over the last 200 years, more new jobs have been created than destroyed by technological progress, and mankind has largely successfully adapted to some of the most profound technological changes ever seen. Moreover, any boost from automation could be particularly helpful for more developed, ageing economies. Developed market equities may be a good way to ride the technology wave whatever happens, but investors need to be aware that the outlook for bonds and other assets will depend on how the new machine age unfolds. There remains the risk of short and medium term labour market disruption and concerns about inequality may linger for some time. Investors will therefore need to keep a close eye on how policymakers and individual beneficiaries of automation rise to the challenge of spreading its financial benefits widely throughout society.



Churn is not necessarily burn: debunking the myths of portfolio turnover

Duncan Lamont, Head of Research and Analytics, and Kristjan Mee, Strategist, Research and Analytics

There is a widely-held view that the additional costs associated with high portfolio turnover result in poorer performance. Our research challenges this simplistic assumption. We have found no evidence of any general relationship between turnover and returns among active equity portfolios. Our research shows that high turnover active US equity funds have generated sufficient value to offset additional transaction costs over the last quarter century or so.

However, we did find that higher turnover can hit the performance of emerging market funds. Moreover, our analysis suggests that picking the right active fund is more important than ever among high turnover funds. The best high turnover US equity funds outperform the best low turnover funds, but the worst do worse and there is an increased likelihood of a high turnover fund failing to survive over time. Performance also tends to suffer more in difficult markets.¹

Transaction costs, and by implication portfolio turnover, are a whipping boy for critics of the asset management industry. The charge is that turnover leads to higher – and often hidden – costs that damage performance. It is true that high trading levels can be indicative of a lack of conviction or undue short termism. Trading too often does eat into returns. However, by the same token, returns may be enhanced when a manager replaces an underperforming stock with an outperformer, even when costs are taken into account. To provide a fair comparison, we have focused on whether turnover results in better or worse performance among active equity funds after all fees and expenses, explicit and implicit. Our analysis focuses on US-domiciled active US equity and emerging market equity funds, where the data are more plentiful than in any other stock market².

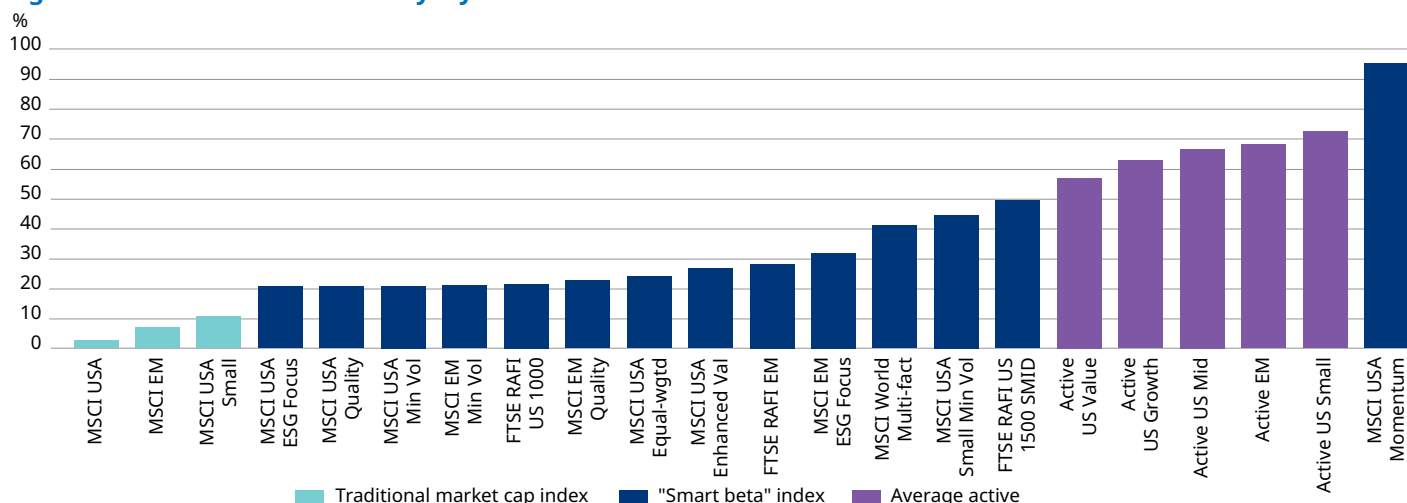
Variation is wide

The cost of portfolio turnover is driven partly by how often securities are traded and partly by the charges attached to each trade. Trading costs can be divided between “explicit costs”, such as commissions and taxes, and “implicit costs”, such as bid-offer spreads and market impact, the effect of the trade itself on the price. The variation in these costs between markets is considerable. Commissions vary from as low as 4 basis points in US large cap stocks to over 12 basis points in US small cap and emerging market stocks. Similarly, average bid-offer spreads are only around 3 basis points on average among US large caps, but over 15 basis points in emerging markets and almost 25 basis points among US small caps.

The other part of the cost equation is the frequency of trading. High turnover is often associated with active management but, as Figure 1 shows, even passive

¹ A longer version of this article is available on the Schroders web site
² US-domiciled funds are obliged by the Securities and Exchange Commission to report portfolio turnover levels, which is not the case in most other markets such as the UK.

Figure 1: Annual turnover varies by style



Source: FTSE, Morningstar, MSCI and Schroders. Data cover calendar year 2016 for active funds and FTSE indices, 12 months to end of February 2017 for MSCI indices.

investments that track equity indices involve some turnover. So-called “smart beta” strategies experience noticeably higher levels of turnover than index-trackers and, while active funds typically trade even more, “momentum smart beta” strategies are right at the top end of the scale.

Our methodology

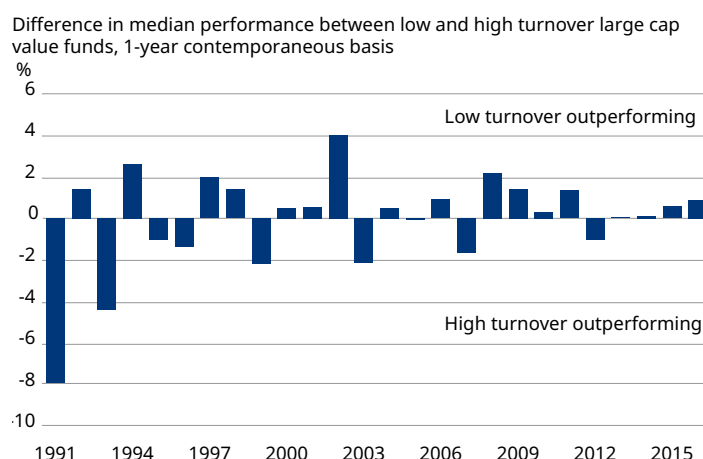
We analysed turnover and returns compared with benchmarks among active US equity and US domiciled emerging market equity funds, net of fees. As turnover levels vary by sector, we split US equity funds into “blend” (those with no style bias), value, growth, mid-cap and small cap. Emerging market equity funds were treated as one due to the smaller sample size. We analysed both whether funds perform over the period to which the turnover corresponds (contemporaneous approach) and whether past turnover predicts future performance (predictive approach). Fund data is sourced from Morningstar to provide a comprehensive overview of the marketplace. As an example, our analysis of the 2015 calendar year covered over 2,100 funds.

Our analysis also brought to light two other notable features. First, we found that fund managers appear prone to increasing trading when markets are crashing, with turnover rising across all styles around the time of the bursting of the dot com bubble and again during the Great Financial Crisis of 2007-09. Secondly, average turnover levels have been declining over recent years in a number of sectors. Turnover levels are now much more closely bunched across different sectors than in the past. 2015 average turnover among domestic US growth, small and mid cap equity funds was at or close to 25-year lows. That said, many style-neutral US equity funds and emerging market equity funds have not experienced such a pronounced decline and now exhibit higher turnover than the rest, a reversal of the historic norm.

No link between turnover and performance

Figure 2 charts the median difference in performance between low and high turnover US large cap value funds against their turnover in the same year (i.e. contemporaneous basis: see “Our methodology” for more detail). It is hard to spot any real trends in the performance of these funds. High and low turnover funds outperform roughly an equal amount of time without exhibiting any definite pattern: performance differences are usually small, although there are exceptions.

Figure 2: Does turnover predict performance?



Source: Morningstar and Schroders; data to end 2016.

We have also analysed performance on a three-year basis, again finding no obvious difference between low and high turnover US value funds. Nor is there any evidence that past turnover (on a one- or three-year basis) has any predictive power over future (one- or three-year) relative returns for US value funds.

Analysis of other styles of US equity investment yields a similar apparently random distribution of results on both a contemporaneous and predictive basis. The table in Figure 3 summarises the median annual difference in excess return over the benchmark between low and high turnover funds during the 1991-2015 period. Most of the differences are not large and none is statistically significant. It means that there is insufficient evidence to conclude that the results are likely to be anything other than chance. High turnover US equity managers have demonstrated at least enough skill to offset the additional transaction costs they are exposed to.

Emerging market funds face a headwind from turnover

While there is no evidence of a relationship between turnover and performance in US equity funds, we did find statistically-significant evidence that low turnover emerging market equity funds consistently outperform high turnover funds over a three-year horizon (Figure 4)³.

³ The rolling three-year analysis includes overlapping periods and also reflects serial correlation, which can result in a “false positive” result i.e. a significant conclusion when there is none. We have applied a Newey-West adjustment to correct for this.

Figure 3: US funds’ performance seems unaffected by turnover

Difference between median excess returns earned by low and high turnover funds, % annualised

(None are statistically significant.)

	1-year contemporaneous	1-year predictive	3-year contemporaneous	3-year predictive
US large cap value	0.0	-0.1	0.2	0.4
US large cap growth	-0.4	-1.3	0.0	-0.1
US large cap blend	0.2	-0.5	0.6	0.0
US mid cap	-0.9	-2.1	0.2	0.5
US small cvap	0.8	-0.9	0.9	2.2

Source: Morningstar, Schroders, data 1990-2016.

Figure 4: Low turnover trumps high in emerging market funds over three years



Source: Morningstar and Schroders; data to end 2016.

Those with average turnover of less than 50% over a trailing three-year period on average outperformed those with turnover of more than 100% by 2.7% a year over the subsequent three years. The equivalent three-year contemporaneous figure was 1.8%. Moreover, emerging market funds in the top quartile of performance have, on average, had annual turnover of 58%, or more than 10 percentage points less than the 72% average turnover of bottom quartile performers. Higher trading costs in emerging markets are likely to be at least partly to blame. However, this relationship does not appear to hold over a one-year horizon.

Fund selection is vital among high turnover funds

Thus far, we have not looked at the possible range of returns within different levels of turnover. Such an analysis reveals a larger difference in performance between top and bottom decile performers among high turnover US funds than in low turnover equivalents. This is illustrated in the table in Figure 5 below, which shows the median difference between the high turnover inter-decile range and the low turnover inter-decile range. A positive figure indicates a greater dispersion of returns among high turnover funds. The greater dispersion among high turnover funds arises because the best high turnover funds do better than the best low turnover funds, but the worst do worse.

This feature is relatively persistent over time and is statistically significant. It holds over one- and three-year horizons and for other styles of US equity fund, with the difference greatest among small and mid caps.

What this means in practical terms is that choosing the right fund seems to have a bigger impact on performance in the high turnover part of the market. Interestingly, this conclusion does not hold for emerging market equity funds, where there is greater performance dispersion within low turnover funds.

Further support for the argument that fund selection is vital comes from our finding that high turnover funds also have a lower survival rate. In other words, there is an increased likelihood that a high turnover fund is liquidated or closed down. This has been true for all styles of fund, especially emerging markets, where around a third of high turnover funds have disappeared, on average over a given three-year period, compared with only around 10% of low turnover funds. This finding is statistically significant for emerging market, growth, mid- and small-cap funds.

Historically, high turnover funds have also tended to underperform low turnover funds when markets have been crashing or volatility increasing. They struggled relative to low turnover funds in both the dot com crash and Great Financial Crisis, as Figure 6 shows (overleaf).

Figure 5: High turnover winners do better, but losers do worse than low turnover US equity funds

High turnover inter-decile range minus low turnover inter-decile range

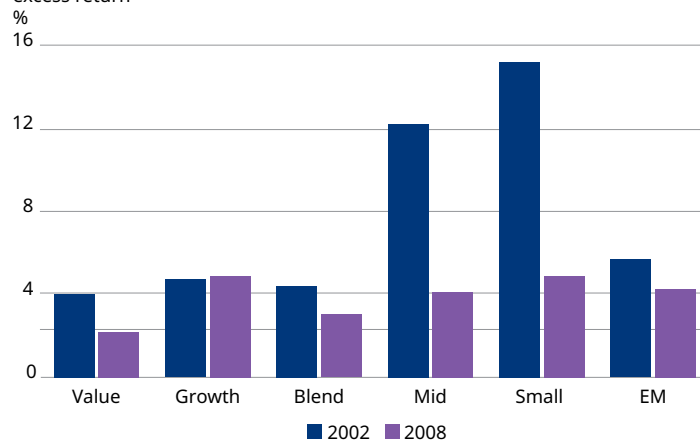
(Figures in bold are statistically significant.)

	1-year contemporaneous	1-year predictive	3-year contemporaneous	3-year predictive
Large Cap Value	2.4	3.1	2.1	1.5
Large Cap Growth	3.1	4.2	2.9	1.2
Large Cap Blend	2.1	1.8	0.7	-0.1
Mid Cap	7.7	5.7	4.6	3.7
Small Cap	6.5	6.7	4.6	3.1
EM	-1.4	-2.3	-1.7	-1.8

Source: Morningstar and Schroders; data 1990-2016 for all styles other than emerging markets, which cover 1996-2016.

Figure 6: Low turnover funds scored well during the last two major bear markets

Median low turnover fund excess return minus median high turnover fund excess return



Source: Morningstar and Schroders.

This phenomenon can also be seen more generally in the correlation between falling market returns and the outperformance of median low versus high turnover funds. A similar correlation can be found with market volatility. This suggests that low turnover funds typically gain relative to high when market returns have been negative and/or when volatility has been increasing, at least in the median case. This is true for all styles.

Conclusion

Our analysis suggests that the presumption that turnover is detrimental to returns is misguided. We found that high turnover US equity managers have been able, on average, to add at least enough value to offset any additional transaction costs. There is no evidence of any significant relationship between turnover and outperformance in US markets. In contrast, we did find evidence that low turnover emerging market equity funds outperform high turnover funds over a three-year (but not one-year) horizon. We also found that selection matters more than ever in high turnover funds. Successfully picking a winner there can result in better outcomes than when choosing low turnover funds, but getting it wrong suffers a higher performance penalty, while there is also a greater risk that the fund will fail to survive. Performance is also likely to struggle more when markets are falling and volatility rising.



Emerging market assets: zoom out and refocus

Duncan Lamont, Head of Research and Analytics

Emerging markets (EM) are a big part of global markets, yet are typically under-represented in investors' portfolios. This has led many to ask what is the best way to build up their strategic allocation to these assets. EM equities and hard, local and corporate emerging market debt (EMD) all have very different characteristics, meaning investor-specific risk and return requirements must be taken into account.

EM equities and local EMD have underperformed substantially over recent years but are well placed to outperform other EM assets handsomely over the medium term. Their outlook also compares favourably with developed market assets. Investors with high required returns are likely to benefit from a higher equity exposure. For more moderate return objectives, local EMD could improve portfolio efficiency. There is also a case for including hard and corporate EMD in an EM portfolio on diversification grounds, despite their being unattractive in isolation.

EM assets are not a homogenous group. They vary considerably by size, diversity, regional exposure, return drivers and risk (see Figure 2 overleaf).

For example, Asia is 70% of the EM equity market but less than 20% of the main hard EMD benchmark. China is 40% of EM equities but barely features in the investable debt markets. However, performance differences between countries can be so significant that EM equities should be thought of as more than just an investment in Asia and/or China. For example, EM equities returned 12% in USD terms over 2016, despite the fact that Asian equities returned 6.5% and Chinese equities were broadly flat. This occurred thanks to a 25% return from non-Asian equities.

Within local EMD, country concentration is an issue as the main benchmark includes bonds issued by only 16 countries, with the ten largest representing almost 90%. Hard and corporate EMD are more well-balanced. However, the uninitiated may be surprised to learn that local EMD is the safest EMD market in terms of credit risk, with 80% having an investment grade credit rating.

The underlying drivers of return also vary by asset class:

- 1 EM equity** returns are driven by dividend income and capital growth, with the latter in turn driven by changes in market valuations and corporate earnings growth.
- 2 Hard and corporate EMD** are US dollar borrowings, so yields are driven by a combination of US Treasury yields and a credit spread.
- 3 Local EMD** bonds are the local currency borrowings of EM countries, so yields are driven by local interest rates. Even so, returns tend to fall when US rates rise and there is currency risk for foreign investors.

EMD definitions

Hard EMD: US dollar sovereign emerging market debt

Local EMD: Local currency sovereign emerging market debt

Corporate EMD: US dollar corporate emerging market debt

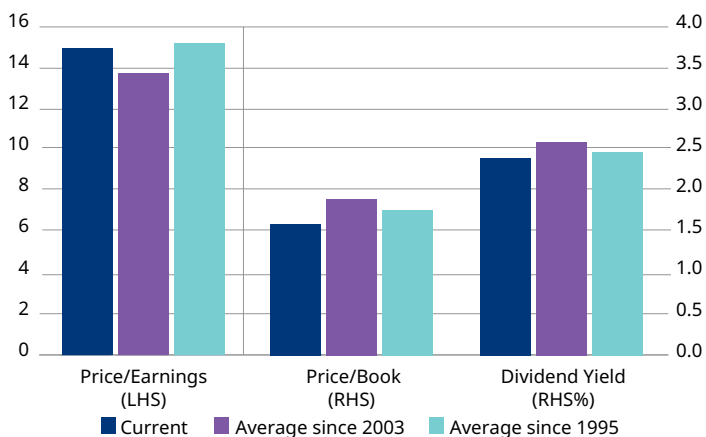
The most widely-adopted EMD benchmarks are the 'diversified' indices maintained by JP Morgan, on which we base our analysis. These limit the weights of those countries with larger stocks of debt.

EM equities offer the highest return prospects

Although long-run EM performance has been strong, it has been highly variable recently. Returns from hard and corporate EMD have been three to four times those of EM equities or local EMD since 2010. However, the tables look set to turn, in part due to current valuations.

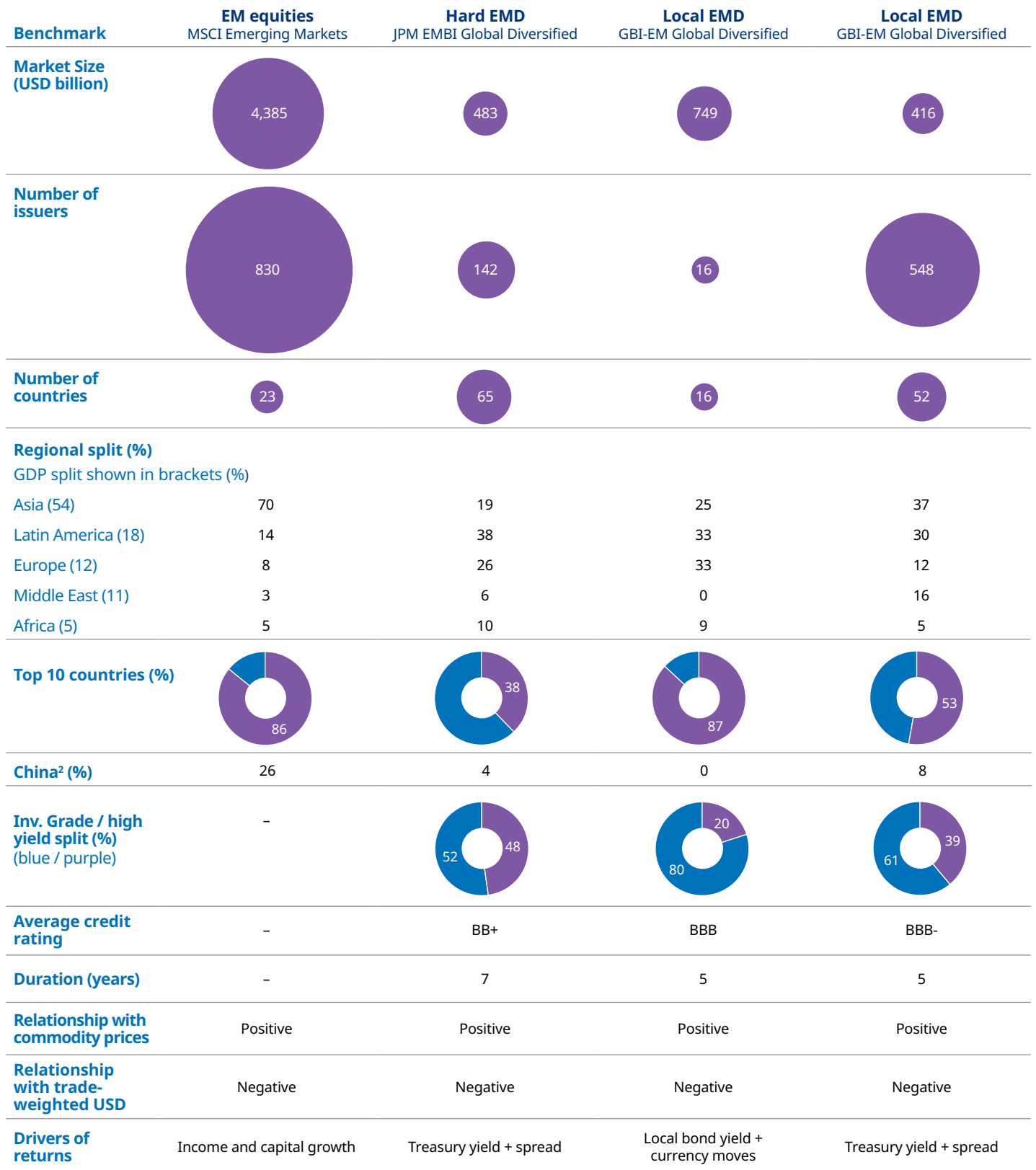
EM equity valuations are reasonable in absolute terms (Figure 1) and cheap relative to developed markets. A sub-par outlook for economic growth means that returns are likely to fall short of the double-digit levels of the past, but our projection for a nominal return of 8.7% in USD terms and a real return of 6.6% compares favourably with other asset classes¹.

Figure 1: The EM equity valuation picture is mixed



¹ Based on market conditions as at 31 March 2017. For equities, we use a Gordon's growth model approach, in which returns are generated through the initial dividend yield and the growth rate of dividends. We make explicit productivity forecasts, using historical averages and our own view of the outlook. For hard and corporate EMD returns, we take account of current yields and spreads and expectations for defaults and downgrades.

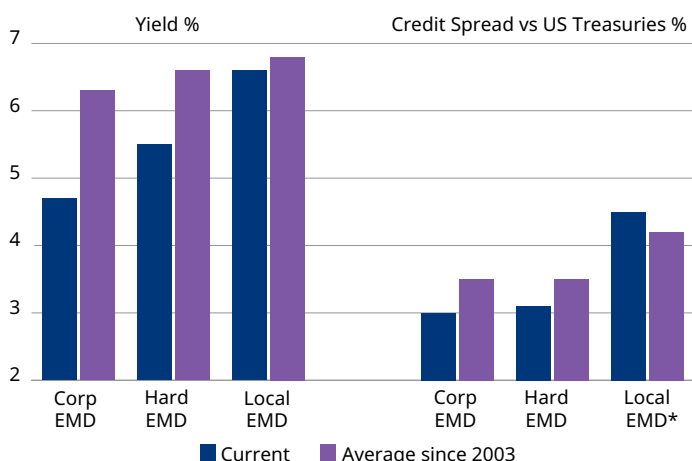
Figure 2: Key features of most common emerging market benchmarks



Source: Datastream, MSCI, JP Morgan. Data to 31 March 2017.

² China was an estimated 39% of emerging and developing world GDP in 2016; source: International Monetary Fund, *World Economic Outlook*, October 2016.

Figure 3: Hard and corporate EMD are expensively valued vs history, unlike local EMD



Source: Schroders, JP Morgan, MSCI, Datastream. Current as at 31 March 2017.

* Whereas hard and corporate EMD yields are comprised of a Treasury yield and a credit spread, local EM yields relate to local market bond yields with no explicit Treasury yield or spread component. For the purpose of this analysis, a local EMD credit spread has been calculated as the difference in yield between local EMD and Treasuries of approximately equivalent duration.

In contrast, past strong performance has driven spreads and yields lower for hard and corporate EMD (Figure 3), so both now look expensively valued compared with recent and longer-term averages, particularly corporate EMD. These depressed yields result in return expectations of only 3.5% a year for corporate EMD and 4.0% for hard EMD, low in both absolute terms and compared with past experience.

Yields on local EMD have not fallen to the same extent and are only slightly below their longer term average (Figure 3), while at the same time offering an above average pick-up over equivalent duration US Treasuries. This supports the return outlook for local EMD. (Although emerging currencies have fallen sharply and are cheap on some measures, the outlook is not clear, so we have made no allowance for further currency movements in our projections.) Our projected return of 5.8% for local EMD is much higher than that offered by either of the other EMD asset classes.

Our projected nominal and real returns along with volatilities and risk-adjusted returns are summarised in Figure 6, overleaf. Figure 6 also includes details of various portfolios of EM assets, which are described later.

But EM equities also carry the greatest risk

Although we project EM equities will generate attractive returns, they are not without risk. Historically, they have been significantly more volatile and suffered far greater losses in market downturns than EMD. Since 2003, EM equities have been almost twice as volatile as local EMD, more than 2.5 times as volatile as hard EMD and approaching three times as volatile as corporate EMD. They have also been much more volatile than developed market equities. As well as resulting in a bumpy ride, this volatility makes it incredibly difficult for investors to try to time an entry point. Markets can move a long way in a short period of time. A strategic approach to investing in EM equities is therefore likely to be more appropriate for most than one based on market timing.

It is notable that volatility levels across most asset classes have recently been lower than typical, but we believe that it would be imprudent to assume that this will persist. In our assumptions, we therefore project that volatility will increase to longer term norms over time.

As well as experiencing a more volatile journey, investors in EM equities have also had to shoulder much greater losses. Where risk is a primary concern, EM equities, at least in isolation, are unlikely to be the ideal solution.

Combining risk and return

The additional risk involved means EM equities are less attractive than local EMD in risk-adjusted terms (Figure 5). However, a 3.8% real return for the latter is unlikely to meet the aspirations of growth investors, so an EM equity allocation may be a necessity for most. Hard and corporate EMD fare much better in risk-adjusted terms than in simple return terms, thanks to their relatively low volatility, even if it is not enough to raise them to the level of EM equities or local EMD.

Portfolios of EM assets

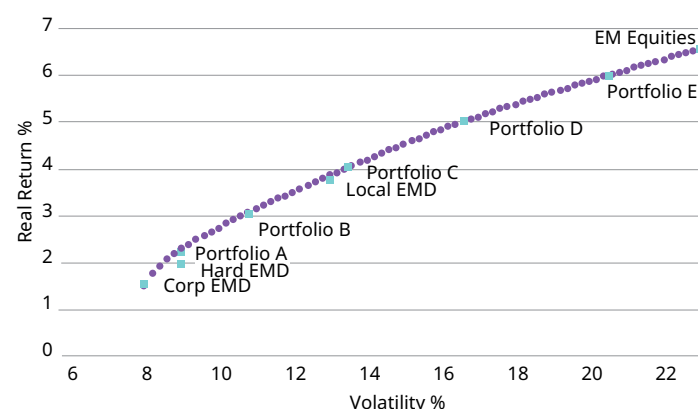
Correlations between asset classes vary over time but, on average, EM equity and all forms of EMD have been relatively highly correlated with each other historically (correlations of 0.7-0.9 since 2003). This has been especially the case in the post-crisis world, where a risk-on/risk-off environment has prevailed. With idiosyncratic risk on the rise as economic policies diverge and administrations change, these correlations may change in future but we have conservatively made no allowance for this in our assumptions.

High correlations suggests that diversification benefits are limited. However, hard and corporate EMD are less correlated with EM equities and local EMD, which indicates that they can add some value to a portfolio of EM equities and local EMD, despite being less attractive in isolation.

Figure 4 shows a curve representing all the 'efficient' portfolios of emerging market assets, as well as the individual assets themselves, based on our projected returns, volatilities and correlations. This shows, at any given point along the curve, the highest real return obtainable for a given level of risk or, alternatively, the lowest risk for a given level of real return. For example, a portfolio of 55% hard EMD, 20% local EMD and 25% corporate EMD would have the same volatility as hard EMD, but with a 0.3% higher expected return. All individual asset classes lie close to the efficient frontier as a result of the relatively high correlations between them.

We constructed four other theoretically 'efficient' portfolios which should meet real return objectives of 3%, 4%, 5% and 6%. Figure 5 overleaf sets out the asset allocation and the future expected risk/reward statistics for each, alongside the core asset class assumptions. Portfolio C, which is diversified across all EM assets, offers the highest projected risk-adjusted returns (as measured by the Sharpe ratio).

Figure 4: Efficient frontier



Source: Schroders. As at 31 March 2017.

Figure 5: Forward looking portfolio statistics, %

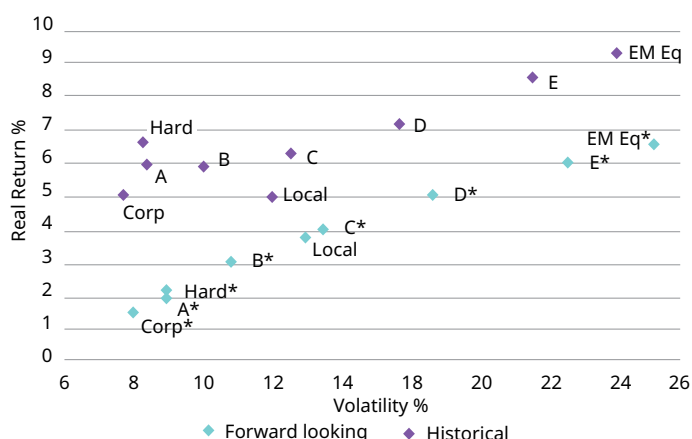
	Asset allocation				Expected real return	Expected nominal return	Expected volatility	Sharpe ratio
	EM Equities	Hard EMD	Local EMD	Corp EMD				
Corp EMD	0	0	0	100	1.5	3.5	8.0	0.30
Hard EMD	0	100	0	0	1.9	4.0	9.0	0.31
Portfolio A	0	55	20	25	2.2	4.2	9.0	0.34
Portfolio B	5	35	50	10	3.0	5.1	10.8	0.36
Local EMD	0	0	100	0	3.8	5.8	13.0	0.36
Portfolio C	20	10	65	5	4.0	6.1	13.5	0.37
Portfolio D	45	0	55	0	5.0	7.1	16.6	0.36
Portfolio E	80	0	20	0	6.0	8.1	20.5	0.34
EM Equities	100	0	0	0	6.6	8.7	23.0	0.33

Nominal Return = (1 + Real return) x (1 + inflation) - 1. The figures are forecasts and are not necessarily a reliable indicator of future performance. Source: Schroders. As at 31 March 2017.

In general, the higher the required return, the greater the need for equity exposure, whereas at slightly lower return targets, increased allocations to local EMD improve portfolio efficiency and at the lowest return targets, hard and corporate EMD are preferred.

Unfortunately for investors, in all cases, future expected returns fall short of past experience as can be seen in Figure 6. Harder times lie ahead.

Figure 6 : Lower returns and slightly higher risk across the board



Source: Schroders, JP Morgan, MSCI, Datastream. Forward looking assumptions as at 31 March 2017. Historical figures cover January 2003-March 2017.

Broader portfolio considerations

Having investigated emerging markets on a standalone basis, the question arises as to how they should fit into a wider portfolio. For simplicity, we have assumed that this incorporates global, US aggregate bonds and US high yield debt. There are two approaches:

1. On an asset-class-by-asset-class basis

Local EMD offers more attractive potential risk-adjusted returns than traditional developed market assets and our analysis indicates that it deserves to find a place in all portfolios at present. EM equities offer higher return prospects than developed equities and broadly equivalent risk-adjusted returns. On this basis, the underweighting of both in many investor portfolios is hard to justify. However, hard and corporate fail to make the grade at present, offering poorer expected risk-adjusted returns and more limited diversification benefits than aggregate bonds.

2. On a holistic EM portfolio basis

For those investors who instead prefer to think of EM assets as a whole, a strong case can be made for an allocation to a standalone EM portfolio which includes all EM asset classes, including hard and corporate EMD. Adding a 20% allocation of our Portfolio C, which offered the highest expected risk-adjusted return of the five we considered, to a traditional 60/40 portfolio would result in a 20/40/40 portfolio. The resulting portfolio would lie on the efficient frontier with a Sharpe ratio of over 0.4. We would argue that, by considering a combined EM allocation in this way, investors can gain exposure to a different range of return sources than when investments are considered along more traditional individual asset class lines.

Conclusion

As EM assets have cheapened relative to developed markets, investors are asking how to build up their exposure. We have shown that the universe of these assets is diverse, with significant differentiation in exposures and return drivers. The optimal portfolio will depend on an individual investor's risk and return objectives. We expect the asset classes that have performed worst over recent years, local EMD and EM equities, to be the standout performers going forwards. In particular, there is a strong case for including local EMD in all portfolios at present. A lack of exposure or underweight exposure to EM equities is also difficult to support. Hard and corporate EMD are likely to come some way behind in return terms.

The higher the required return, the greater the need for equity exposure, whereas for lower return targets, increased allocations to local EMD can improve portfolio efficiency. And although they are unattractive in isolation, a case can also be made for including hard and corporate EMD in an EM portfolio on diversification grounds.



Why investors need a multi-layered approach to risk

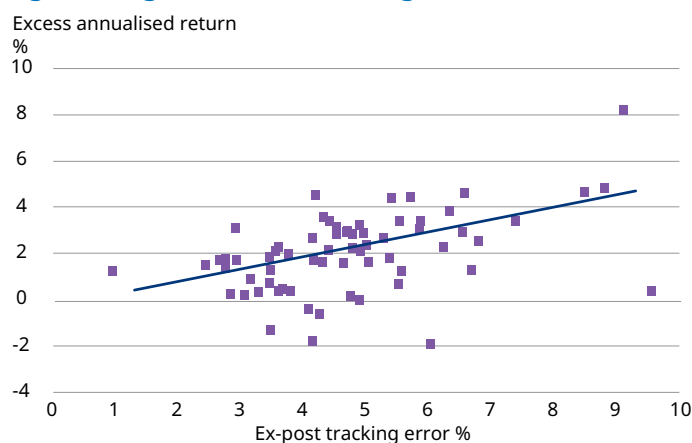
Duncan Squire, Head of Equity Risk and Performance Analytics

Equity risk management has changed significantly in the past 20 years, driven by roller-coaster markets, new demands from both clients and regulators, and advances in technology. It remains of central importance to portfolio management, but the limitations of traditional measures of risk like tracking error and beta have prompted a search for new approaches. We conclude that investors should now use a much more extensive risk toolkit to support them in building robust portfolios to achieve their clients' targets.¹

In active management, risk-taking is essential: investments are selected with the objective of beating a benchmark, but in the knowledge that the outcome could disappoint. Active managers therefore need to manage risk, rather than avoiding it. The key risk management questions are: under what circumstances might the portfolio underperform, is the scale likely to be significant; and what can and should be done about it?

Figure 1 illustrates the importance of risk. It plots the average annual excess return (gross of fees) against tracking error (the volatility of excess return) for 66 Schroders equity strategies for which we have 10-year data, ranging from UK Smaller Companies to Global Emerging Markets. The link between return and risk is clear.

Figure 1: Higher return means higher risk



Data cover period from 2007 to 2016. Each dot represents a representative portfolio from each of Schroders' equity strategies. All composites with a history of 10 years or more are included. Source: Schroders.

One of the biggest changes in risk management results from the poor equity returns seen since the turn of the century. The search for better results has prompted investors to take more risk, to make more use of derivatives and to adopt multi-asset approaches. This has, in its turn, fostered the use of more sophisticated risk management techniques.

Tracking error has long been a cornerstone of measures to determine risk. Like beta, it can be seen as a temperature gauge. Used thus, such measures can be compared for portfolios with similar benchmarks and can signal material changes in risk. But they can only ever be a rough guide in "average" circumstances. In truth, "average" markets rarely occur: what sets managers apart is largely their performance in unusual markets.

Tracking error after the fact ("ex post") will also differ from ("ex ante") predictions as a result of market events and portfolio changes. Predictions will generally be too low when volatility and/or dispersion rises and too high when they fall, but the timing and degree are unpredictable. What can be said is that a model that is consistently biased towards under-prediction is almost certainly not capturing all the risk factors that it should. Further, experience shows that excess return can be highly positive or negative even when tracking error is low. Drawdowns can be much larger than tracking error appears to imply, and the problem with focusing on tracking error is that investors may not be braced sufficiently for the range of possible outcomes.

Beta is simply a statistical estimate of sensitivity to the market or benchmark index and also has limitations. Firstly, it may be based on a weak link with past performance. Secondly, there are many non-market influences on share prices. For example, a portfolio with a "safe" predicted tracking error of 3% and beta of around 1 might still underperform materially. This could be due to a style rotation, or a rally in a sector where the portfolio is under-represented. There is no fixed pattern to market returns.

The biggest risks for equities include events that have never happened, or not in recent times, such as a permanent shift upwards in the yield curve, deteriorating US-China relations and the possible disintegration of the EU. A risk management framework might help managers here, but concepts such as tracking error and beta would not.

¹ A longer version of this article is available on the Schroders web site.

Risk is not necessarily volatility

Standard measures of portfolio risk are ultimately based on individual stock volatility forecasts. However, past volatility can deceive. For instance, volatility forecasts which are derived from historical time series of returns will almost certainly be proved wrong in the future. In our view, this does not make volatility useless, as sophisticated volatility forecasting techniques can be used to react quickly to changing market patterns.

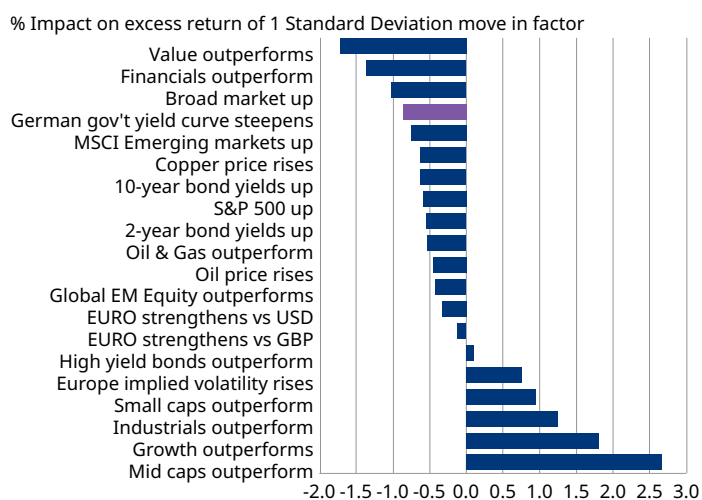
Another criticism of volatility relates to the different time periods covered by the components of risk forecasts. The typical input for risk models is the standard deviation of short-term returns, whereas tracking errors are annualised. To make them comparable, a “square root of time” multiplier is used to extend the period covered by volatility. But this also removes the trending of returns, so risk is likely to be underestimated over long periods.

In any case, a key point is that a volatile share price will not matter to long-term investors. If the investment is well chosen and acquired cheaply on a positive valuation trend, volatility should be irrelevant. Indeed, high volatility may be a signal of greater opportunity.

Stress-testing and scenario analysis can help to address these issues. Stress-testing shows how a portfolio might react to significant changes in key variables, such as equity indices, interest rates, currencies or commodity prices. The results can be instructive if they show worse than expected losses or detect large unexpected risks.

Related to this, factor sensitivity analysis can show how an equity portfolio might be affected by a change in an extraneous factor, like the oil price or the shape of the yield curve. For instance, our factor analysis shows that, should the yield curve for German government bonds steepen by one standard deviation (based on five years’ data), a given portfolio is likely to underperform its benchmark by around 0.9% (Figure 2).

Figure 2: Why factors can matter



Source: Schroders as at 31 December 2016.

Scenario analysis involves thinking about sets of occurrences, their consequences for returns and, sometimes, what might be done about them. For example, it would have been useful in October 2016 to think through the implications of an “unlikely” Trump victory for bond markets, commodity prices, the dollar and the prospects for emerging versus developed markets.

We should remember that a risk profile can change, even if the manager has made no transactions, because of changes, in relative prices or corporate actions such as takeovers. The “dynamic” nature of active risk makes it vital for automated IT processes to be in place so that managers can always view the most current risk reports. There is no substitute for a frequent review of positions and thinking about where unintended risks may lurk.

Making use of active share and fundamental risk scores

While stress-testing and scenario analysis represent greater sophistication in measuring risk, other recent developments represent a degree of simplification. One example is active share, which is a straightforward measure of the extent of “bets” being taken against the benchmark, defined as (one half of) the total magnitude of a portfolio’s overweight and underweight positions.

There has been much debate about whether active share can predict outperformance². It is already widely used to indicate whether an active manager’s performance will be different – and by extension better – than the benchmark. This may make sense, although it can be misleading if used to compare different strategies. For example, an active share of 80% would be high for a pan-European large cap fund but low for a small cap fund, while 70% would be high for UK equities but not for Europe ex UK, given the different concentrations in the relative benchmarks.

In similar vein, some fund managers who recognise the limitations of volatility have ascribed “risk scores” to individual stocks. The scores are calculated as weighted averages of “fundamental” risk factors, such as operating and financial leverage, exposure to adverse environmental, social and governance issues and political or country risk. Figure 3 shows “fundamental risk scores” for a Schroders global equity portfolio plotted against the active weight of each stock in the portfolio. The bigger bets are on stocks with below-average risk, with smaller bets where risk is greater.

How much active share do you need?

Scenario 1:

Let’s say the manager is skilful and/or lucky. On average, 55% of the stocks selected outperform the benchmark by about 15% on average, while losing stocks underperform by 10%. How much outperformance should we expect? The sums would theoretically look like this:

Outperformance from 100% active share =
 $55\% \times 15\% - 45\% \times 10\% = 3.75\%$
 If the outperformance target is 2.5%, active share need only be 67% ($2.5\%/3.75\%$).

² See for instance: “How Active Is Your Fund Manager? A New Measure That Predicts Performance”, Martijn Cremers and Antti Petajisto, International Center for Finance, Yale School of Management, 31 March 2009.

Scenario 2:

Let's now suppose the manager is only marginally successful – a “hit rate” of just 52% – but the results are more extreme: the winners typically outperform by 20%, while the losers underperform by 16%. We would expect slightly lower returns:

Outperformance from 100% active share =
 $52\% \times 20\% - 48\% \times 16\% = 2.7\%$

To hit the target of 2.5%, active share would need to be 92% ($2.5\%/2.7\%$).

Clearly, most factors are outside the control of the manager, but they can set their level of active share. If it is too low, they may be unnecessarily inhibiting their ability to outperform.

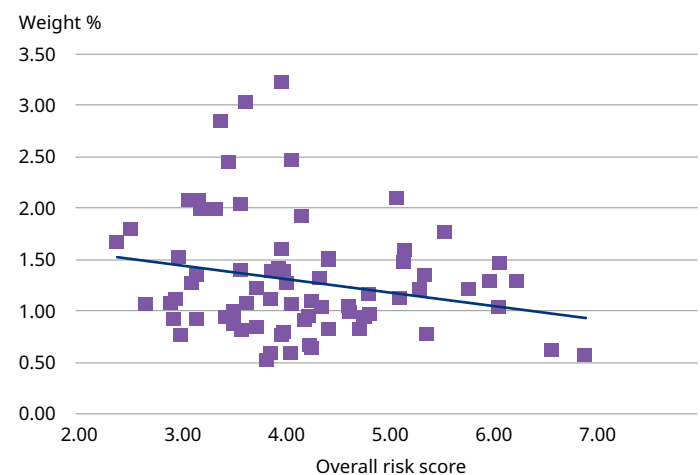
Risk scoring techniques are also highly applicable to unconstrained mandates. Here, managers need a way to demonstrate – without reference to a benchmark – that position sizes reflect expected risk as well as expected returns, and also that the portfolio is well diversified. A fundamental risk framework would meet both these requirements, by-passing the need to use volatility and correlation as measures.

The principal benefit of this approach is that investment analysts already use fundamental factors in their evaluations. The methodology is flexible, with scope to add new factors as required, and also dynamic, as inputs can quickly reflect new information rather than waiting for volatility data to emerge. Overall, portfolio managers are much more likely to engage in a discussion about fundamental risks than in one about volatility.

Future developments

New ways to look at risk have also resulted from the increased availability of computing power at ever-diminishing cost. Indeed, the scope for interrogating market data to identify what is driving financial markets seems huge.

Figure 3: Position sizes broadly follow the fundamental risk scores



Source: Schroders as at 31 December 2016.

For example, clustering algorithms can be used to identify similarities between patterns of returns that traditional risk models have missed or that a portfolio manager has not previously considered. Data may show that stocks in different countries and sectors have moved together in surprising ways, with further investigation revealing what they have in common.

The growth of e-commerce and the internet has expanded the array of data from which we can derive insights. For example, credit card transactions and word usage in social media can reveal patterns, trends or changes that should matter to markets³. Similarly, new data sources can be used to assemble maps of supply chain linkages and geographic revenue exposures, from which a more comprehensive view of fundamental business exposures can be built. The increased availability of this information and its quantity means investment managers are increasingly building “Big Data” capabilities to create a stronger overall risk management framework.

³ For more on the investment implications of technology see “Harnessing the data deluge”, *Investment Horizons*, issue 6, 2016.

Conclusion

Taking risk is vital if investment portfolios are to have a chance of achieving their goals. Risk management must therefore be an integral part of portfolio construction. Good risk management is multi-layered. First and most importantly, managers need to consider risk on a continuous basis. Secondly, asset owners need to ensure that their managers are taking the right risks by regularly monitoring a variety of measures. Thirdly, asset owners need to be sure that a comprehensive risk management framework is in place. Managing risk is not an exact science and is constantly evolving. It is therefore vital that all the necessary layers are in place and that a manager has access to the whole toolkit.



Primer: building a case for infrastructure finance

Duncan Lamont, Head of Research and Analytics, and Clement Yong, Strategist, Research and Analytics

Infrastructure covers a wide variety of assets, from airports and telecommunications networks to hospitals and schools. These assets are often characterised by high barriers to entry, long lives, stable operating cash flows (often inflation-linked) and a limited sensitivity to the broader economic environment¹. The stability of the cashflows appeals to equity investors while providing comfort to lenders. There are many routes in to the market, offering a wide variation in risk and return. Both debt and equity, in listed and unlisted forms, are available, but not all are equally attractive right now. Equity is generally fully priced, whereas some areas of private debt are still attractive for those who can accommodate liquidity constraints. In all cases, expertise is required to steer a path through this market.²

The traditional distinction in infrastructure is between operational assets (“brownfield” projects) and those at the construction stage (“greenfield” projects). In both cases, stable cashflow and asset backing mean they can support high levels of debt (typically 75% of enterprise value³).

Equity finance can come from a variety of sources but, in Europe at least, 70-80% of debt finance has historically been provided by banks, with the rest from capital markets, the opposite of the US. However, banks are retreating from the market under the impact of banking regulation, with institutional investors increasingly filling the void. The different ways to invest are shown below in increasing order of governance burden:

Listed infrastructure equity

Global indices, such as the Dow Jones Brookfield Global Infrastructure Composite Index (DJBGICI), tend to be dominated by North America (65%) and the utilities and energy sectors (c. 85%). Since it was established in 2002, the DJBGICI has generated a higher return than the broader global equity market with lower volatility. It has also outperformed all individual sectors of the global equity market in absolute and risk-adjusted terms, while it trades on a much higher dividend yield than the market. The differences are highlighted in the following table:

Equity

1. Listed infrastructure equities (a subset of global equity markets)
2. Unlisted equity investments in infrastructure projects via funds and external managers
3. Direct investment/co-investment in specific infrastructure projects or companies

Debt

1. Infrastructure corporate bonds (a subset of the broader corporate bond universe)
2. Private infrastructure loans via funds with external managers
3. Private infrastructure loans via direct lending or segregated accounts through an asset manager

	Listed global infrastructure	Global equities
Return p.a.	12.3%	8.5%
Volatility p.a.	12.8%	14.9%
Sharpe ratio	0.9	0.5
Correln. with global equities	0.8	n/a
Beta to global equities	0.7	n/a
Dividend yield	4.2%	2.5%
Price/earnings multiple	34.3	21.9
Price/book multiple	2.5	2.2

Source: Datastream, S&P and Schroders, 31 December 2002-31 December 2016. Yield and p/e multiple as at 31 December 2016.

However there are a number of caveats. Firstly, listed infrastructure has been highly correlated with broad markets and has therefore offered little diversification. Secondly, infrastructure indices have little or no exposure to financials, so the historic comparison has flattered infrastructure after the credit crunch.

¹ Revenue and dividend payouts in privately-held infrastructure investments, EDHEC Infrastructure Institute, March 2016.

² A longer version of this article is available on the Schroders web site: see *Infrastructure financing - an overview*.

³ Association for Financial Markets in Europe

Thirdly, listed infrastructure trades on a higher price/earnings multiple than the broader market and this is looking stretched compared with historical norms. Against a backdrop where high valuations have driven expectations for public equities down to mid single-digit percentage return levels (or lower), it is difficult to argue that listed infrastructure equities are in a position to offer much more.

Unlisted infrastructure equity

Unlisted infrastructure investments can be made through funds or segregated accounts or by investing directly. The last of the three is the cleanest route, but requires a significant amount of expertise and governance oversight. Given that larger amounts also need to be committed, this method tends to be restricted to very large investors.

A more traditional route for institutional investors is through a closed-ended private equity style vehicle with a long horizon. Realised internal rates of return have varied by fund and risk level, but have been broadly 8-10%, net of fees. However, expected returns are now only around 6-8%, with target cash yields around 5%, slightly more than expected from listed equities but less than private equity funds typically aim for.

These low returns have been driven by the general rise in asset prices, combined with heavy demand, flat deal volumes and a dearth of assets. The increased competition has pushed up prices, with deal multiples now back at levels not seen since before the financial crisis.

Infrastructure debt

Due to retrenchment by the banks, there is a growing opportunity for institutional investors to lend to infrastructure projects. Senior infrastructure debt offers a more stable alternative to equity, increasing its appeal to certain investors. In particular, senior debt can be very long dated, and sometimes inflation-linked. The junior parts of the debt structure are normally shorter duration and offer the potential for higher returns, with higher risk than senior debt but less risk than equity. Figure 1 shows the diversity of opportunities.

Infrastructure corporate bonds

Infrastructure corporate bonds are a small subset of the broader corporate bond market. They range from investment grade to sub-investment grade, with an average rating of low investment grade. At the strategic

level, they have offered little that could not be captured through broad market exposure. Risk-adjusted returns have been slightly better than the market, but only in line with corporate bonds of equivalent credit rating, with similar credit spreads. Furthermore, the correlation with corporate bonds has been close to 1 over the past 10 years, so they have offered little by way of diversification.

Like infrastructure equities, the bonds have been less volatile than market comparators, but only due to limited exposure to financial services. Infrastructure corporate bonds can offer the prospect of superior returns, but only on a tactical rather than a structural basis.

Private infrastructure debt

In Europe, the private market accounts for c.80% of infrastructure debt, offering a greater diversity of exposures than the corporate bond market. It has the following features:

- **Credit spread:** private debt offers a significant premium to public bonds, estimated at between 1.0% to 1.5% for a similar credit profile in Europe
- **Liquidity:** private debt is not readily tradable, as most debt instruments are loans
- **Security:** most loans are secured, whereas corporate bonds are usually unsecured
- **Covenants:** negotiated covenants offer more scope to manage risk than public bonds
- **Structuring:** bespoke structures offer more scope to match the risk of the asset
- **Fee income:** private lenders are normally paid fees by borrowers, which can be material
- **Fund management fees:** fees tend to be only slightly higher than corporate bond funds'.

Private infrastructure debt has been a growing market in recent years, offering institutional investors a higher yield without a commensurate increase in credit risk. They will, however, need to tie up their money for longer. On the supply side, the structural issues and regulatory changes already described have created an opportunity for institutional investors to step in and fill the void left by the banks. And here Europe dominates the lower-risk brownfield market, accounting for a 43% global share in 2015.

Figure 1: The wide-ranging characteristics of infrastructure

Liquidity	Nature	Sectors	Geography	Business	Rating	Maturity	Seniority	Currency	Rate
Public	Greenfield	Transport	Western Europe	Merchant*	>A-	20Y+	Senior	EUR	Fixed
Private	Brownfield	Power	CEE	Contracted	BBB/BBB+	10Y – 20Y	Sub-ordinated	GBP	Floating
		Utilities	UK	Concession	BBB-	7Y – 15Y	HoldCo	USD	Linker
		Telecom	OECD	Regulated	BB+/BB	<7Y		AUD	
		Social	Emerging	Availability†	NR			Other	

*Where revenue is market related to some degree. †Where payment is made by the contracting partner, normally the government or other public body, rather than the user. Source: Schroders.

Figure 2: The characteristics of infrastructure debt

	Core	Higher yielding	Long duration
Maturity (years)	5-10	5-7	10-30
Fixed/floating	Mainly floating	Floating and fixed	Fixed
Bonds/loans	Mainly loans	Loans or bonds	Bonds
Rank	Senior	Most subordinated	Senior
Credit risk (average)*	[BBB]	[BB]	[BBB]
Credit spread (bps)	200	400+	150-200
Annual issuance (€bn)†	50	5	10

*Implicit rating as not often officially rated. Estimated for UK and Europe. Source: Schroders, January 2017.

Private infrastructure debt is a heterogeneous asset class, mirroring the variety of risk profiles among infrastructure companies, as detailed in Figure 1, and types of debt, as shown in the table in Figure 2. As with unlisted infrastructure equity, investments are typically made via closed-ended private equity style vehicles, although larger institutions can also lend to specific projects or companies on a direct or co-invested basis or through segregated accounts.

Banks' domination of infrastructure financing in Europe means the majority of the market is structured as 5-7 year floating rate loans⁴. Most share characteristics with bonds of low investment-grade credit quality. However, very long-dated fixed-rate debt is also common. Unlike other forms of private infrastructure debt, these share characteristics with corporate bonds, often being unsecured and with neither financial nor maintenance covenants. There is a small market for higher yielding investments in a variety of structures, but always with security packages and covenants, in contrast to most high yield bonds.

Private debt has offered a persistent spread pick-up over public debt. Pricing data are limited, but Figure 3 compares representative European private transactions with investment grade characteristics against a European infrastructure corporate bond index.

⁴ InfraDeals database.

On average, infrastructure debt offered 100-300 basis points (bps) over equivalent government bonds in the 18 months to March 2017, 50-200 bps more than public bonds.

As with the equity, demand for senior infrastructure debt has outpaced supply. It is particularly strong in long duration, where European insurers like its favourable treatment under Solvency II capital requirements. Spreads look tight at 150-200 bps, down from 250-300 bps after the financial crisis⁵. In contrast, they have remained more stable on shorter-dated core infrastructure debt at around 200 bps. And in the less mature and less competitive subordinated debt market, spreads have actually risen to above 400 bps.

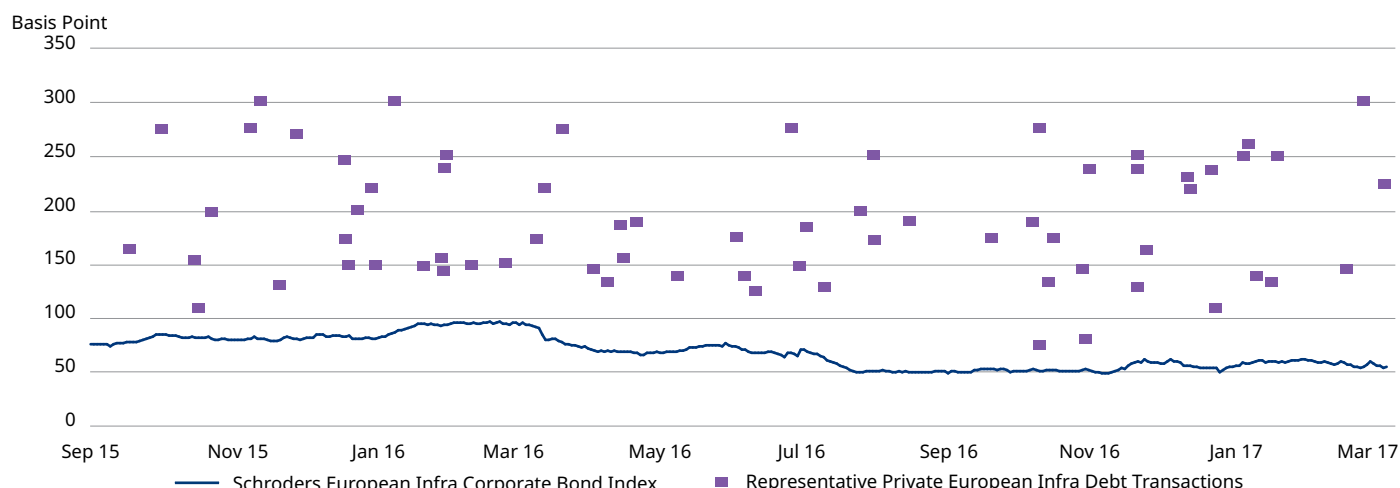
In terms of losses, infrastructure debt has suffered less than similar corporate bonds due to:

1.A lower likelihood of suffering either a deterioration in credit quality or a default

Rated infrastructure securities have been less likely than the broad market to be downgraded. BBB-rated infrastructure securities have also seen lower defaults over long horizons. At lower credit qualities, the default experience has been far superior (Figure 4).

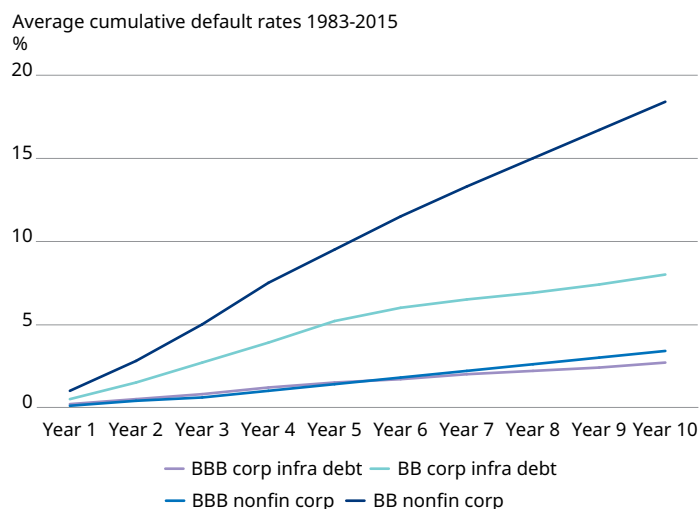
⁵ European Infrastructure Investors Survey 2016: A positive horizon on the road ahead?, Deloitte

Figure 3: Private debt offers a spread pickup over listed infrastructure bonds



Data relate to bonds or transactions with explicit or implicit investment grade characteristics. Source: Bank of America Merrill Lynch ("BoAML"), Bloomberg, Cbonds.com, InfraDeals database, Schroders and The Private Placement Monitor. Index is a proprietary BoAML European infrastructure corporate bond index developed with Schroders. As at 31 March 2017.

Figure 4: Infra debt has tended to be lower risk than its mainstream rivals

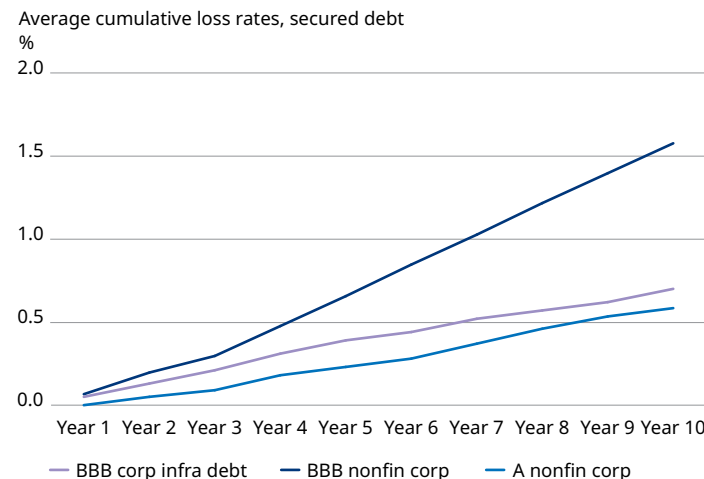


Source: Moody's Infrastructure Default and Recovery Rates, 1983-2015.

2. Higher recovery rates in the event of default, resulting in lower default loss rates

Senior secured infra debt has had a historic recovery rate of 74% in the event of default, compared with only 54% for senior secured corporate bonds. For senior secured BBB-rated infrastructure debt, the combination of similar near-term but lower long-term default rates and a much higher recovery rate have resulted in slightly lower short-term default loss rates and significantly lower loss rates over longer periods. Over the long run, default losses on BBB-rated securities have been almost 1% lower than non-financial equivalents, with performance closer to A-rated securities than BBB (Figure 5).

Figure 5: Default losses have been closer to bonds a full credit rating higher



Loss rate has been calculated as default rate x (1 - recovery rate). Source: Moody's Infrastructure Default and Recovery Rates, 1983-2015, and Schroders.

Within the subordinated sub-investment grade market, recovery rates are broadly the same across infrastructure debt and non-financial corporate debt. Even so, the much lower default experience of BB-rated securities has contributed to loss rates around half those of BB non-financial issues.

It is fair to say that infrastructure debt is still more exposed to political, regulatory and event risk than traditional corporate bonds. For instance, only 2% of non-financial defaulters had an investment grade credit rating the year before their default, compared with 28% of infrastructure debt defaulters. Given this background and the fact that credit quality can change rapidly, many institutional investors prefer to focus on areas with more stable credit ratings, such as north and western Europe.

Conclusion

Infrastructure investment, in listed and unlisted forms of both debt and equity, is increasingly available to non-specialist investors, but not all routes to market are equally attractive. Equity, for instance, is generally priced at elevated levels, whereas private debt remains attractively priced. As well as providing a higher credit spread, infrastructure debt has demonstrated lower credit risk than public bonds of similar credit profile. Competition for deals and lack of supply has dimmed its attractions lately, particularly at longer durations. However, advantages remain, especially at shorter durations and in riskier parts of the market. It is true that investors face different risks and must be ready to lock up their money for some time, but infrastructure undoubtedly offers attractive features not available to them elsewhere.

Schroder Investment Management Limited
31 Gresham Street, London EC2V 7QA, United Kingdom
Tel: +44 (0) 20 7658 6000

 [schroders.com](https://www.schroders.com)

 @schroders

Important information: For professional investors and advisers only. The views and opinions contained herein are those of the authors, and may not necessarily represent views expressed or reflected in other Schroders communications, strategies or funds. This document is intended to be for information purposes only and it is not intended as promotional material in any respect. The material is not intended as an offer or solicitation for the purchase or sale of any financial instrument. The material is not intended to provide, and should not be relied on for, accounting, legal or tax advice, or investment recommendations. Information herein is believed to be reliable but Schroders does not warrant its completeness or accuracy. No responsibility can be accepted for errors of fact or opinion. Reliance should not be placed on the views and information in the document when taking individual investment and/or strategic decisions. Past performance is not a reliable indicator of future results, prices of shares and the income from them may fall as well as rise and investors may not get back the amount originally invested. The forecasts stated in the document are the result of statistical modelling, based on a number of assumptions. Forecasts are subject to a high level of uncertainty regarding future economic and market factors that may affect actual future performance. The forecasts are provided to you for information purposes as at today's date. Our assumptions may change materially with changes in underlying assumptions that may occur, among other things, as economic and market conditions change. We assume no obligation to provide you with updates or changes to this data as assumptions, economic and market conditions, models or other matters change. Third Party Data Disclaimer: Third party data is owned or licensed by the data provider and may not be reproduced or extracted and used for any other purpose without the data provider's consent.

Third party data is provided without any warranties of any kind. The data provider and issuer of the document shall have no liability in connection with the third party data. The Prospectus at www.schroders.com contains additional disclaimers which apply to the third party data. FTSE International Limited ("FTSE") © FTSE 2017. "FTSE®" is a trade mark of London Stock Exchange PLC and The Financial Times Limited and is used by FTSE International Limited under licence. All rights in the FTSE indices and/or FTSE ratings vest in FTSE and/or its licensors. Neither FTSE nor its licensors accept any liability for any errors or omissions in the FTSE indices and / or FTSE ratings or underlying data. No further distribution of FTSE Data is permitted without FTSE's express written consent. UK Investors: The data contained in this document has been obtained from sources we consider to be reliable. No responsibility can be accepted for errors of fact and the data should be independently verified before further publication or use. This does not exclude or restrict any duty or liability that Schroders has to its customers under the Financial Services and Markets Act 2000 (as amended from time to time) or any other regulatory system. The sectors and company names shown are for illustrative purposes only and not to be considered a recommendation to buy or sell securities. Exchange rate changes may cause the value of any overseas investments to rise or fall. Investments in smaller companies can be less liquid than investments in larger companies and price swings may therefore be greater than in larger company funds. Investments that focus on specific sectors can carry more risk than investment spread over a number of different industry sectors. Issued in July 2017 by Schroder Investment Management Limited, 31 Gresham Street, London EC2V 7QA. Registration number 1893220. Authorised and regulated by the Financial Conduct Authority. For your security, communications may be taped or monitored. SCH28976