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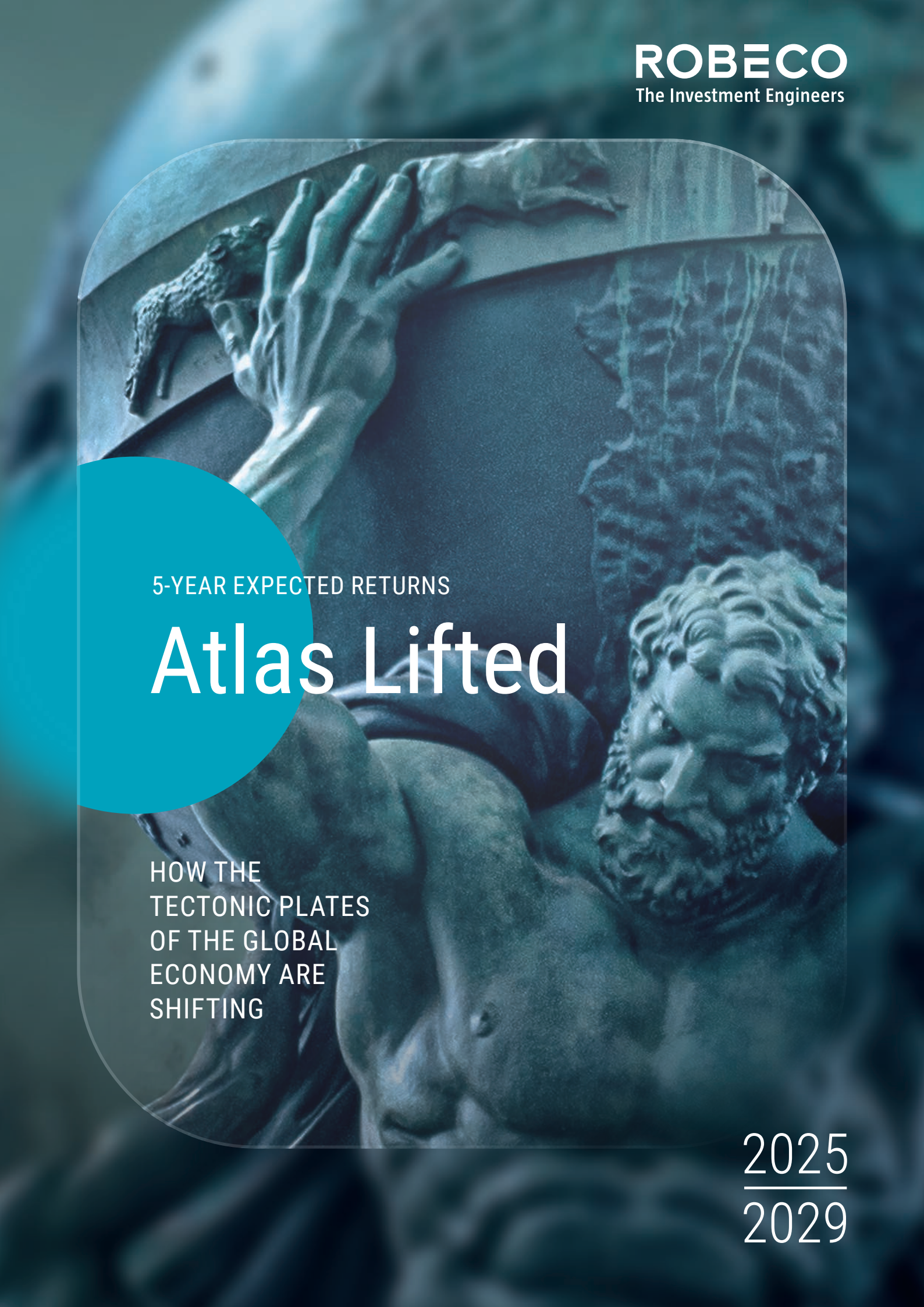

5-YEAR EXPECTED RETURNS

Atlas Lifted

HOW THE TECTONIC PLATES OF THE GLOBAL ECONOMY ARE SHIFTING

2025
2029

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September 2024

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For an assessment of the long-term expected returns, please visit our website.

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Foreword

This year's report features the mythological titan Atlas who lifts the world on his shoulders with the help of entrepreneurial innovations in artificial intelligence and an abundance of other profitable investment opportunities. Atlas is not only lifting the world, but also investment returns in most major asset classes. In our base scenario, the world's continents are not drifting further apart economically and politically, as in our bearish scenario, but we also do not foresee that they become much more connected, as in our bullish scenario.

Expected returns are a vital element of any investor's strategic decision-making. The approach we take in this report is, as always, based on a five-year outlook, extending through to 2029. Our forecasts are used in the investment process of Robeco's Sustainable Multi-Asset Solutions team and can also be utilized to guide the investment plans of both institutional and professional investors.

In addition to these climate-aware capital market assumptions, we include three special topics that are likely to shape future investment policies: half the bubbles do not burst but turn out to be rational, how to finance the sustainable energy transition and the parallels and contrasts between the Chinese and Japanese economies and financial markets.

For over 95 years, research has been at the heart of Robeco's investment strategies and that is why we have included numerous references to academic and non-academic publications for readers who wish to delve deeper.

We enjoy the rewarding discussions with our clients zooming in on the details of the methodology and data that we use to underpin our return expectations and the special topics covered. Feel free to reach out and continue the conversation.

Mark van der Kroft
Chief Investment Officer

The authors

This document has been compiled by Laurens Swinkels and Peter van der Welle (September 2024). It represents the views of Robeco's Multi-Asset team, which are not necessarily shared by other teams at Robeco. Please visit our website for more information.

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The team

This Expected Returns publication is produced every year by the Robeco Sustainable Multi-Asset Solutions team, with contributions from colleagues from across the company. The team currently consists of 15 experts, with an average of more than 15 years of investment experience. For its investment solutions the team draws on input from over 200 specialists in our quant, fundamental and thematic investing domains.

A broad suite of assets globally is managed by the team. This includes multi-asset investment strategies, discretionary multi-asset solutions, and customized liability and buy-and-maintain fixed income solutions.

Robeco's approach to multi-asset investing can broadly be split into two approaches: strategic allocation (3-5 years) and tactical asset allocation (0-24 months). These tend not to be correlated to help support diversification and the consistency of returns.

The team can also rely on the expertise of Robeco's 50-strong Sustainable Investing Center of Expertise, which houses our sustainability thought leaders and investment researchers. Sustainability can be used to target specific impact metrics, for example in emphasizing exposures to companies scoring well on the Sustainable Development Goals, or those with a good climate alignment strategy.

The research that creates Expected Returns provides the baseplate from which a coherent and forward-looking multi-asset strategy can be developed. The predictions that it makes for the likely returns of all the major asset classes over the coming five years, including commodities, real estate and cash, can form the benchmark from which to proceed.

EXPECTED RETURNS 2025-2029

1. Introduction

Change has been a constant throughout human history, often emerging in a profoundly non-linear fashion. Take the year 1953, which saw the dawn of the discovery of DNA, the thermonuclear bomb and the digital computer – three major innovations that changed the world. Four years later, US author Ayn Rand published her top-selling philosophical novel Atlas Shrugged, in which the Greek mythological titan Atlas is symbolized by innovative capitalists who 'shrug off' their responsibilities instead of carrying the world's weight on their shoulders. The creatives boycott increasing government intervention, leading to significant economic consequences. Rand's plea for hyper-individualism, free and open markets and limited government resounded in a recovering post-WWII society. She became a source of inspiration for the neoliberal wave in economics under Reagan and Thatcher, and personally admired by former Fed chairperson Alan Greenspan.

Yet the world has moved on since Rand's ideas have started to cede ground. Capital owners increasingly ditch hyper-individualistic pursuits in exchange for synchronizing stakeholder well-being and profits, such as via transition finance. Due to more frequent negative supply-side shocks, the idea of limited government has lost its shine. Meanwhile, the free market economy has become less free and efficient than economists perceive. In the current economic environment, power structures distort free markets as recently conceded by Noble prize winner Angus Deaton: "without an analysis of power, it is hard to understand inequality or much else in modern capitalism". Deaton strongly echoes our last year's 5YER theme 'Triple Power Play' where we described how worsening US-China relations, renewed friction between capital and labor, and an expected battle between monetary and fiscal policy in the post-Covid world are reshaping the global economic landscape.

Instead of 'Atlas Shrugged' we envisage a state of world more akin to 'Atlas Lifted' in the next five years. Whereas the 'Triple Power Play' noted that "Goldilocks shines, but turbulence looms", we are now more constructive as Atlas is doing his job. First, productivity growth will be lifted by broadening AI adoption. We expect rapid economic change propelled by innovation in our base case; 1.75% US GDP per capita growth in the US seems feasible in the fifth innovation wave since the Industrial Revolution. Second, the rising economic tide in the US will lift boats throughout advanced economies such as the UK and Continental Europe, eyeing above-consensus GDP growth in the next five years. Thirdly, the global savings glut is lifted as desired investments are rising versus the level of desired savings. Resilience investments, AI adoption, a declining growth contribution of China, the green transition, the end of the peace dividend and population aging all play their part. More investment opportunities arising for any given level of savings brings improved capital allocation, raising the marginal productivity of capital.

The probability distribution of our three scenarios – Atlas Lifted, Atlas Adrift, and Atlas Connected – reflects elevated forecast uncertainty, with a 50% base case probability, 30% bear case probability, 20% bull case probability, respectively. Unlike the IMF's bearish five-year global growth forecast, we don't foresee a further productivity growth slowdown and contraction in capital formation in our Atlas Lifted base case. OECD labor force growth will remain slightly above 0.5%, and downside risks to global economic growth are gradually diminishing. The upside risks of developed economies' convergence toward the US outweigh the downside risks of China stagnation challenges. While China's deflationary pressures will linger, our base case foresees inflation in developed economies to remain above target on average at 2.5%. Nevertheless, uncertainty looms as volatility in global real GDP is still above historical peaks.

While 2025 may initially feel like a victory against inflation, our bear case scenario Atlas Adrift reflects that inflation risks remain, echoing Volcker's inflation-controlling attempts in the early 1980s. This scenario predicts a second inflation wave driven by US fiscal excesses and the shifting tectonic plates of global power, accelerating the move toward a multipolar world, creating stagflation. In our bull case Atlas Connected, we see an AI-driven productivity miracle emerge after an initial economic soft path. Productivity growth will surge to 2.25% due to rapid adoption of AI and improved geopolitical stability. AI will become more accessible, leading to widespread adoption and capital deepening. Inflation will be lower than in our base case as the elasticity of substitution between expensive labor and capital is higher. Echoing the 1950s, real GDP growth will be close to 3% per year, with inflation around 2%. Central banks will keep policy rates around neutral as Goldilocks endures.

What does Atlas Lifted entail for expected returns in 2025-2029? During this period, we expect asset returns in EUR to remain below their long-term historical averages, except for emerging market debt in local currency, investment grade and commodities. For the first time in this publication's history, our cash return projection equals our steady-state return for a euro-based investor at 3.5%. While other asset classes will still see above steady-state returns in our base case, we don't predict pre-Covid neutral policy rates to return. Furthermore, another round of policy tightening is anticipated in the second half of the 2020s. Considering lower opportunity costs of holding cash, it's reasonable to hold cash for buying opportunities in risky assets.

In the next five years, US equity markets may not harbor the largest opportunities for dollar-based investors as we expect the trade-weighted dollar to depreciate. While we have upgraded our developed equity market return to 6.5% for euro-based investors, we stay skeptical about the continuity of US equity market exceptionalism, expecting a below steady-state return for US equities. Despite the ongoing 'magnificent' rally in US tech stocks, we observe increased downside risk for US equities given historically elevated valuation levels on various metrics. Low volatility stocks in the US are an attractive hedge against this risk. We now expect a small negative equity premium for US equities versus US Treasury bonds of 50 bps for dollar-based investors – a rare but not unprecedented occurrence. Harvesting yield is rewarded, notably at the shorter end of the curve, avoiding credit cycle refinancing risk. We find high yield less attractive given low starting spreads, lower rates sensitivity, and an anticipated default wave in two to three years. Also, we deem German Bunds expensive.

The excess return for emerging market equities versus its developed counterparts has declined by 75 bps with consensus earnings growth appearing overly optimistic, continued risks around China's growth outlook while runner-up India is expensive. Meanwhile returns for Europe and Japan have been upgraded compared to last year. Given increased cross-country variability of emerging market equity valuations, focusing on country selection could pay off. AI-driven sector allocation could prove to be rewarding, but only when in combination with humans weeding out AI nonsense. Finally, we also see an above steady-state return for commodities as a hedge against unexpected inflation. With inflation remaining in the twilight zone at 2.5%, the correlation between equities and bonds could fluctuate, and as such, a standard 60/40 portfolio might still not offer its usual diversification. An important clue for the return of stable diversification can be gleaned from closely assessing the nature of forthcoming rate cuts. Recession-induced rate cuts create significantly more downside risk for risky assets compared to non-recession induced rate cuts like those observed during 1995 or 1984.

An Atlas Lifted world by its very nature carries more alpha opportunities compared to its highly efficient Atlas Shrugged counterpart that epitomizes laissez-faire capitalism. In Atlas Connected, equity investors enjoy above steady-state returns, notably in emerging market equities. In contrast, Atlas Adrift sees just 0.25% real return for developed equities in euro. Either way, generating alpha requires a research-driven approach more than ever. ●

Table 1: Expected returns 2025-2029

Base case scenario 'Atlas Lifted'	5-year annualized return	
	EUR	USD
Fixed income		
Domestic cash	3.50%	4.00%
Domestic government bonds	2.25%	6.00%
Developed global government bonds (hedged)	4.00%	4.50%
Emerging government debt (local)	6.00%	7.00%
Global investment grade credits (hedged)	5.25%	5.75%
Global corporate high yield (hedged)	5.50%	6.00%
Equity		
Developed market equities	6.50%	7.50%
Emerging market equities	7.25%	8.25%
Listed real estate	5.50%	6.50%
Commodities	4.75%	5.75%
Consumer prices		
Inflation	2.50%	2.50%

Source: Robeco, September 2024.

EXPECTED RETURNS 2025-2029

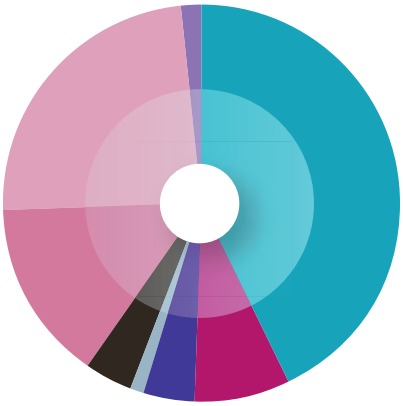
2. Valuation

There has long been a narrative that risky assets were expensive because interest rates were zero or negative. Rates have increased – and for some countries even to steady-state levels – since 2022, but has this affected the valuations of risky asset classes?

In this chapter we set out our views on the valuation of each asset class. In the following chapters, we examine whether these valuations correspond with our long-term macroeconomic outlook.

The global multi-asset market portfolio is the natural starting point for every investor as it shows how the average invested dollar is allocated across asset classes. Figure 2.1 shows the weight of each asset class in the global market portfolio at the end of 2023. Listed and private equity account for a combined weight of 50.8%, which is only slightly below the 52.0% average that Doeswijk, Lam and Swinkels (2014) observed over the 1959-2012 period, but substantially above the 40.0% they accounted for at the end of 2012. Despite the so-called 'wall of debt' in developed markets, emerging market debt is the only subset of fixed income whose weight in the market portfolio has increased since 2012, up from 3.0% to 3.9% at the end of 2023. There is no reason for the weights of the market portfolio to revert to their historical averages as future weights depend on the prices of existing assets and net new issuance.

Figure 2.1: Composition of the global multi-asset market portfolio at the end of 2023



Equities	43.0%
Private equity	7.8%
Real estate	4.0%
High yield bonds	1.1%
Emerging debt	3.9%
Investment grade credits	14.7%
Government bonds	23.9%
Inflation-linked bonds	1.6%

Source: Based on a paper by Doeswijk, Lam and Swinkels (2014) and updated from the Erasmus University Data Repository of Laurens Swinkels: https://doi.org/10.25397/eur.9371741. The figure shows the market capitalization weights of each asset class at the end of 2023.

2.1 Government bonds

We assess the valuation of the major government bond markets according to three metrics: carry, the term premium and mean reversion.

2.1.1 Carry

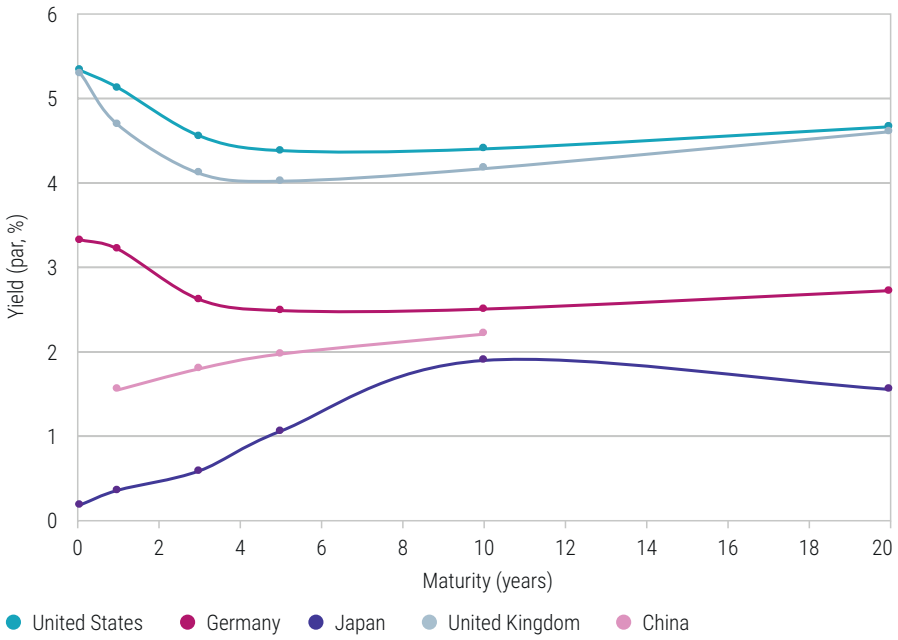
Instead of trying to predict interest rates to determine the value of government bonds, we can start by determining the return they would provide should the interest rate curve remain unchanged. The return in this case is what we call the carry. Here, we ignore the second-order effect of the rolldown. Since our long-run estimate for the excess return of

government bonds relative to bills (in other words, the term premium) is 75 bps per year, we view a carry substantially higher than this as attractive, and a lower carry as unattractive.

Figure 2.2 shows the shapes of the par yield curves of the five main government bond markets on 30 June 2024. The carry, sometimes referred to as the term spread, is often defined as the 10-year yield minus the one-year yield. There is a lot of discussion about whether a negative carry is indicative of a recession; see Harvey (1988). The carry in the US is -0.73%, indicating that bond yields are relatively expensive. Last year, the curve was even more inverted, with a -1.60% carry, but there has not been a recession. German yields are about 2 percentage points lower, but the shape of the yield curve is similar to that of the US, and the carry roughly the same at -0.71%. UK government bonds also provide a negative carry of -0.52%.

From a carry perspective, the Japanese and Chinese yield curves are much more attractive. Even though yields are even lower than those in Germany, their carries are positive. The 0.66% carry provided by Chinese government bonds is close to our long-run term premium estimate of 0.75%, while the Japanese carry is more than double this level at 1.54%.

Figure 2.2: Par yield curves for the five main government bond markets

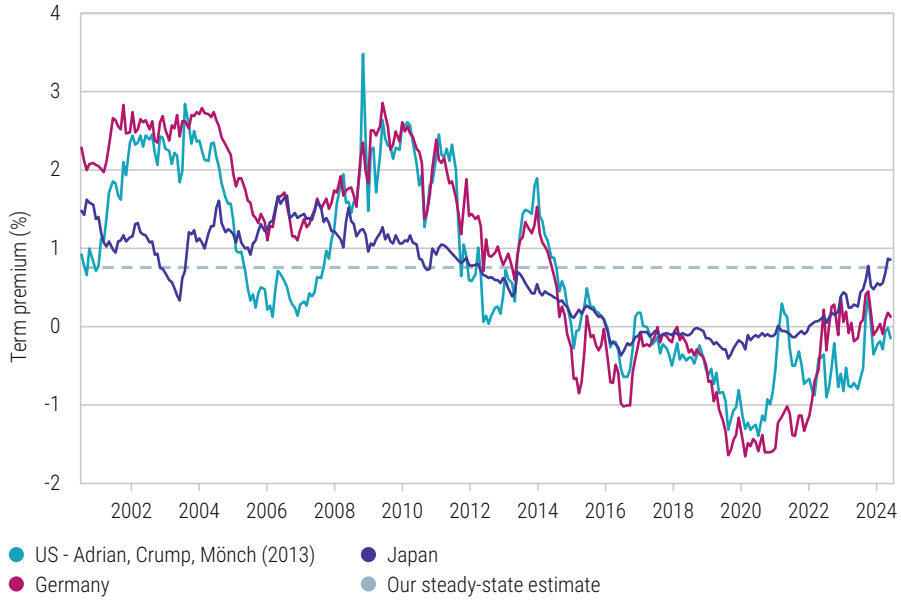


Source: Bloomberg, Robeco. As at 30 June 2024.

2.1.2 Term premium

The term premium refers to the additional return an investor expects to receive from holding a government bond to maturity rather than rolling over bills until the same date. Since the expected path of short-term interest rates cannot be observed, the challenge is to come up with a good estimate. For example, if the expected yield earned by rolling over the bills until bond maturity is the current bill yield, the term premium would be equal to the carry we discussed above. Another option would be to use market-implied forward interest rates as the expected future short-term rates. This would by definition lead to a term premium of zero; that is, the expected return of bonds equals the expected return of bills. This would contrast with the term premium of around 1% that has been observed since 1900.

Figure 2.3: Term premium estimates for 10-year government bonds



Source: Bloomberg, Federal Reserve, Robeco. Updated data from Adrian, Crump and Mönch (2013) is maintained online by the Federal Reserve Bank of New York. Data updated to 30 June 2024. For Germany and Japan, we use our own estimates based on the model by Adrian, Crump and Mönch (2013) with data starting in 1994.

Researchers have been making considerable efforts to determine the expected path of the short-term interest rate – see, for example, Adrian, Crump and Mönch's (2013) model at the New York Federal Reserve Bank. Figure 2.3 shows the US 10-year term premium, which has been updated to 30 June 2024, and is based on data starting in 1961. We show the 10-year term premium as this is what most economists consider. It stands at -0.14% at the end of June 2024. This estimate is higher than in 2020, when it was well below -1%, but is still considerably lower than the 0.75% premium that we expect over the long run. Estimates of the five-year term premium in the US, which correspond with the horizon of our outlook, are somewhat below 10-year estimates at -0.42%.

We are not aware of any external data providers that update term premium models for other countries. Our own estimates for the 10-year term premium, based on the Adrian, Crump and Mönch (2013) model, with data starting in 1994, are also shown in Figure 2.3. The 10-year term premium for Germany was 0.14% at the end of June 2024, while the five-year term premium was -0.29%. Our estimate for the Japanese 10-year term premium at the end of June 2024 is 0.86%, and 0.35% for five years. Except for Japan, 10-year term premia are well below the 0.75% steady-state estimate. We do not have term premium models for the other major markets.

A term premium of zero indicates that investors expect to receive the same return from investing in bonds as in bills. This seems like a bad deal for investors, but there could be several possible reasons that such a situation could occur. First, the investor base for bonds has changed over time. Central banks are now major players in government bond markets, and unlike typical bond investors they are aiming to achieve their monetary goals rather than primarily seeking a particular risk-adjusted return for their investment portfolio. Second, regulation, due to which the liabilities of pension funds and life insurance companies are marked to market, ensures that long-dated bonds provide the risk-free rate for these investors. Pension funds and life insurance companies therefore need to receive compensation for taking on risk in the form of buying short-dated bonds.

Third, as Campbell, Sunderam and Viceira (2017) argue, the correlation of bond returns with equity returns determines the existence of a term premium. A negative correlation implies that when equity markets fall, bond markets should rise in value. This type of insurance against adverse economic circumstances may be worth paying a premium for by all investors, even those who are price-sensitive. However, this last argument may not be as relevant today as the equity-bond correlation tends to increase in inflationary environments; see Molenaar, Sénéchal, Swinkels and Wang (2024).

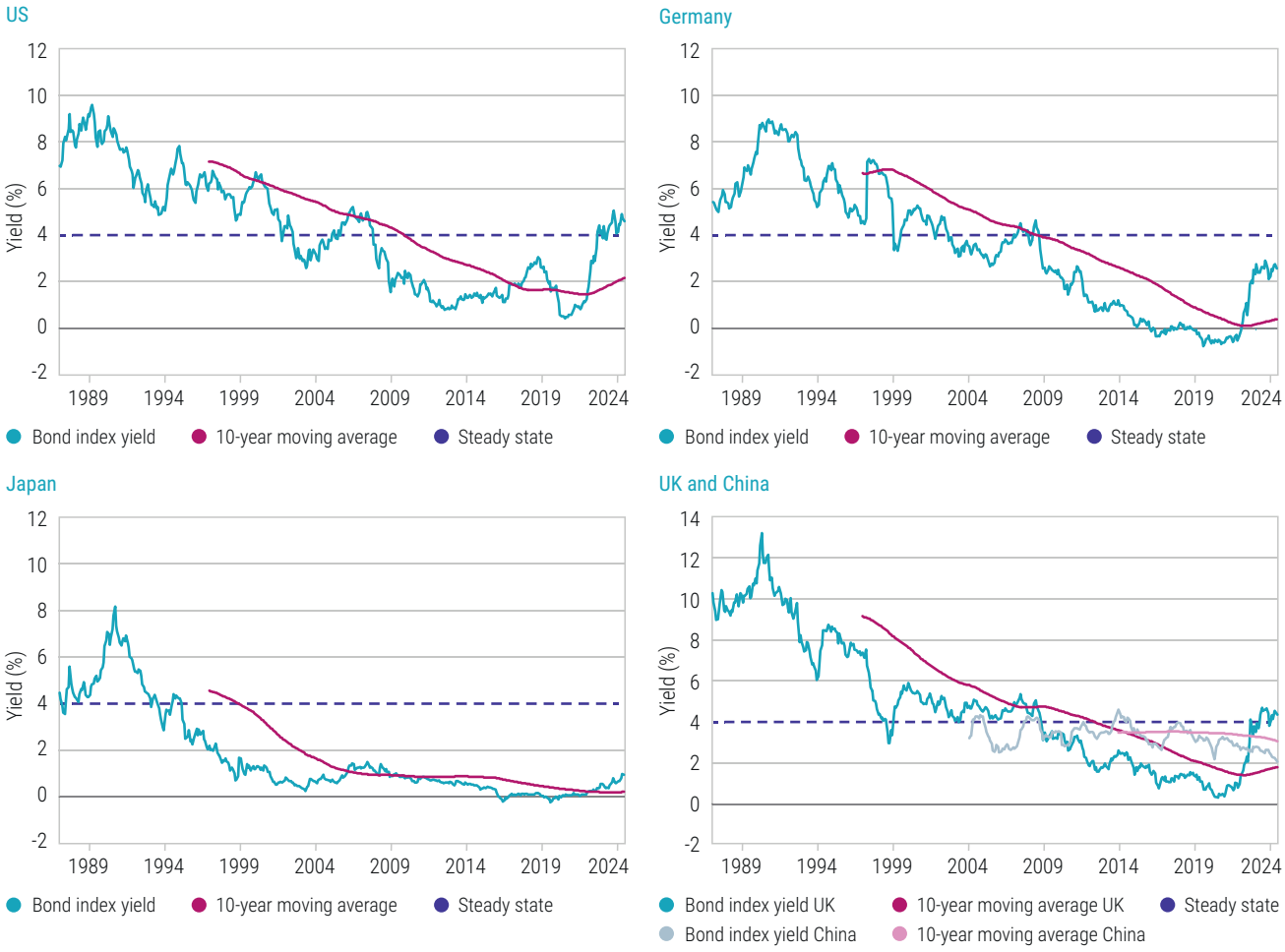
2.1.3 Mean reversion

Another popular way to look at valuation is to forecast a reversion to the mean. For example, Asness, Moskowitz and Pedersen (2013) use mean reversion as their main valuation signal. This is inspired by the excess returns documented by DeBondt and Thaler (1985) for equity strategies based on mean-reversion signals.

The challenge with mean-reversion signals is to determine the level the asset is supposed to revert to. To keep things simple, we compare the interest rate to its 10-year average. This is long enough for the average to cover business cycles, but short enough for it to adapt if there are persistent changes in the level of interest rates. An alternative would be to take the steady-state expected return for safe government bonds of 4% as a starting point.

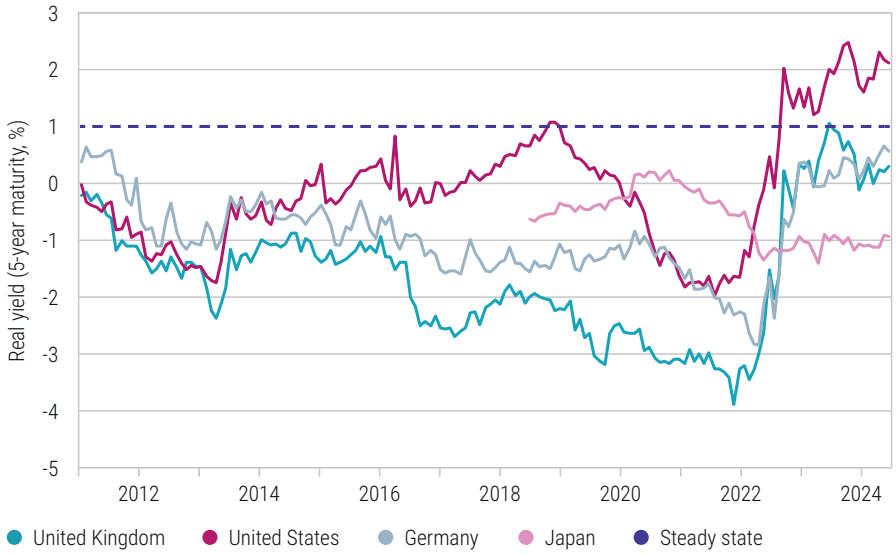
Figure 2.4 shows the government bond index yields of the five main markets together with their 10-year moving averages and a fixed 4% as the mean-reversion levels. The figure shows that US, German, UK and Japanese yields are above their 10-year moving average, suggesting that these bond markets are currently relatively cheap according to this measure. China is the only country whose yield is below its 10-year average. US and UK bond index yields are slightly above the steady-state expected return of 4%, relative to which these markets are not expensive. Even though German bond yields have increased substantially over the past two years, they are still about 150 bps below steady-state expected return. We view the average yields of recent decades as a slightly more useful mean-reversion indicator than the 4% that we expect in the steady state, because it adapts to structural changes in the economy, such as productivity, aging or central bank policy. This means that the mean-reversion signal indicates that the US, UK, German and Japanese bond markets are cheap, while the Chinese market is expensive.

Figure 2.4: Mean-reversion signal of government bond yields



Source: Bloomberg, Robeco. The yield to maturity of the Bloomberg Treasury indices for the US, Germany, Japan, the UK and China, and their 10-year moving averages.

Figure 2.5: Real interest rates



Source: Datastream, Robeco. Real interest rates derived from inflation-linked bond markets.

Bond yields tend to increase when expected inflation increases. If increases in expected inflation were equal to nominal yield increases, the real interest rate would remain the same. Figure 2.5 shows that real interest rates have actually risen considerably since the middle of 2022, except for in Japan, where the real interest rate is close to where it was two years ago and is still negative. Real interest rates in Germany and the UK are positive but are still below our steady-state level of 1%. US real interest rates are above 2%, which is well above our steady-state level. We do not have good estimates of market-implied real interest rates in China.

2.1.4 Summary

We have looked at three different ways to measure government bond valuations in the main markets. Since real interest rates in the US are higher than in other major bond markets, US bonds seem to offer the best value, but the close to zero term premium estimates make US cash look as attractive as long-dated bonds. From a nominal perspective, UK government bonds appear equally attractive, but because expected inflation is higher in the UK, real UK yields are still low. Although they are much cheaper than they were two years ago, German bonds are still on the expensive side. Japanese bonds are expensive relative to the steady state, but attractive compared with the low return provided by Japanese cash.

2.2 Corporate bonds

The quality of bonds in the Bloomberg investment grade corporate bond index has gradually fallen over time, especially in the euro-denominated market. By contrast, the credit quality of the high yield index has increased. Therefore, instead of considering the spreads of entire credit indices over time, we focus on the yields of bonds with specific ratings to judge whether corporate bonds are cheap or expensive. This keeps the credit quality constant – at least as judged by rating agencies.

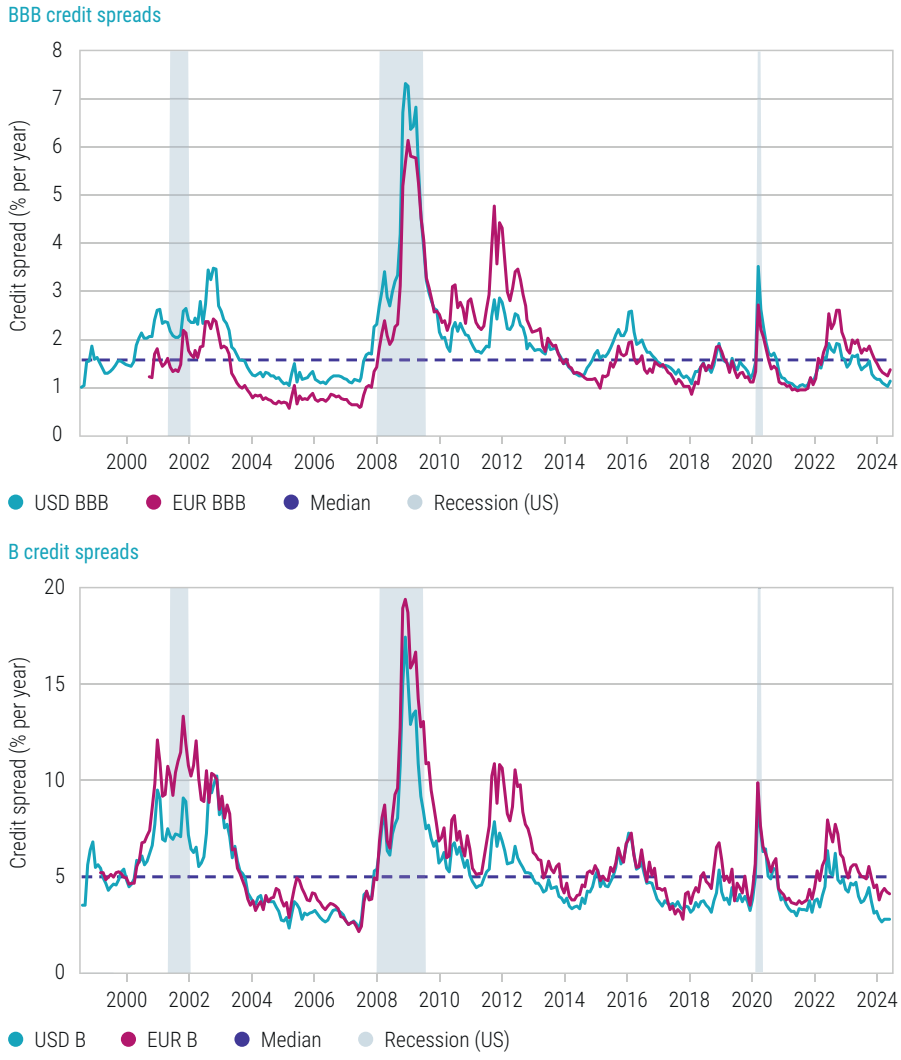
Even though the companies issuing investment grade and high yield bonds are geographically quite diverse, the currencies in which they issue are limited. Corporate bond markets are dominated by US dollar issues, which account for 68% of the investment grade market and 78% of the high yield market. Euro issues come in second place, at 23% of the investment grade market and 20% for high yield, leaving very limited space for bonds issued in other currencies in the Bloomberg indices. Although many non-US companies issue bonds in US dollars, the indices are dominated by bonds issued by US firms, which account for 57% of the investment grade index and 62% of the high yield index.

Figure 2.6 shows that the credit spreads of investment grade (BBB) and high yield (B) corporate bonds have behaved similarly in recent years. They shot up in 2020 in response to the Covid-19 lockdowns across the globe, but after central banks provided liquidity to the market they quickly fell. After a small increase, they have substantially come down again. As of 30 June 2024, USD BBB spreads were trading at 114 bps and EUR BBB spreads at 137 bps. These levels are below the median spread of 159 bps. As spreads and defaults tend to be high during recessions, the fact that spreads are currently below median levels suggests that any impending recession, if one is coming at all, should be mild. In Europe, spreads are a little higher than in the US. This difference may be partially related to the uncertainty linked to the war in Ukraine and the lingering issues with European debt, which may resurface in the event of recession. Meanwhile, USD B-rated bond spreads are 279 bps, while they are 412 bps for EUR B-rated bonds, levels that are below the median of 495 bps over the 1998-2024 period.

The global investment grade index's credit spread was 104 bps at the end of June 2024. Assuming that about half of this spread will be needed to cover losses due to defaults, investment grade's expected excess return relative to duration-matched government bonds is below the neutral steady-state level of 75 bps. The global high yield corporate bond index's credit spread is 328 bps. If half of this spread is lost due to defaults, the remaining credit return would also be below our neutral steady-state expected excess return of 175 bps.

From a valuation perspective, both investment grade and high yield corporate bonds look expensive.

Figure 2.6: Credit spreads of BBB- and B-rated corporate bonds

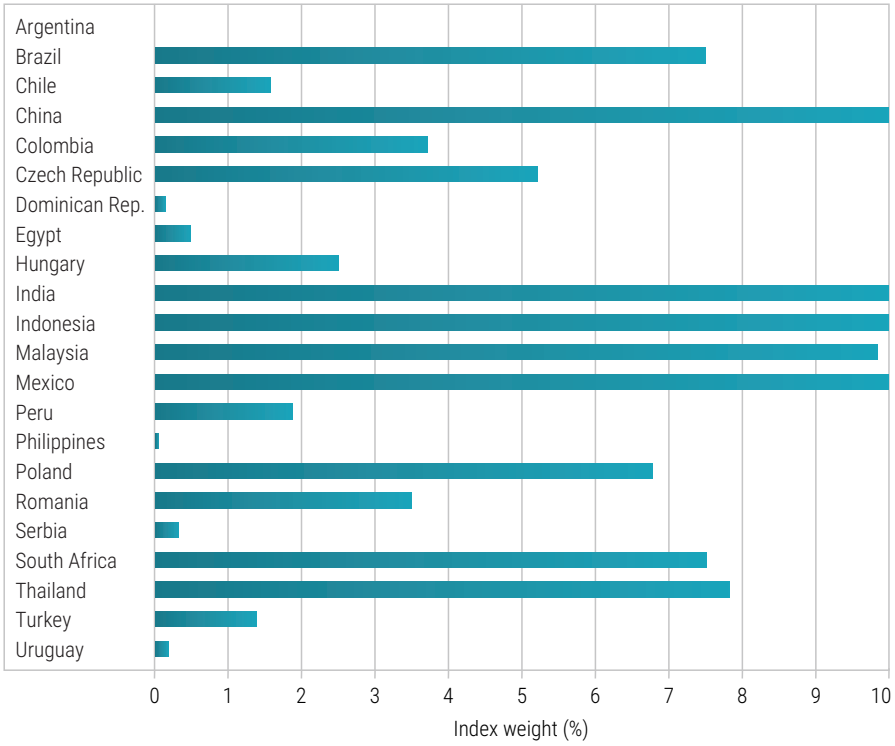


Source: Barclays Live, NBER, Robeco. The top figure shows the option-adjusted credit spreads of BBB-rated bonds in the Bloomberg Barclays US Corporate index and the Bloomberg Barclays Euro Corporate index. It also shows median credit spreads over the sample period. The bottom figure shows the option-adjusted credit spreads of B-rated bonds in the Bloomberg Barclays US High Yield index and the Bloomberg Barclays Euro High Yield index. It also shows median credit spreads over the sample period. Areas shaded grey indicate NBER contraction periods.

2.3 Local-currency emerging market sovereign debt

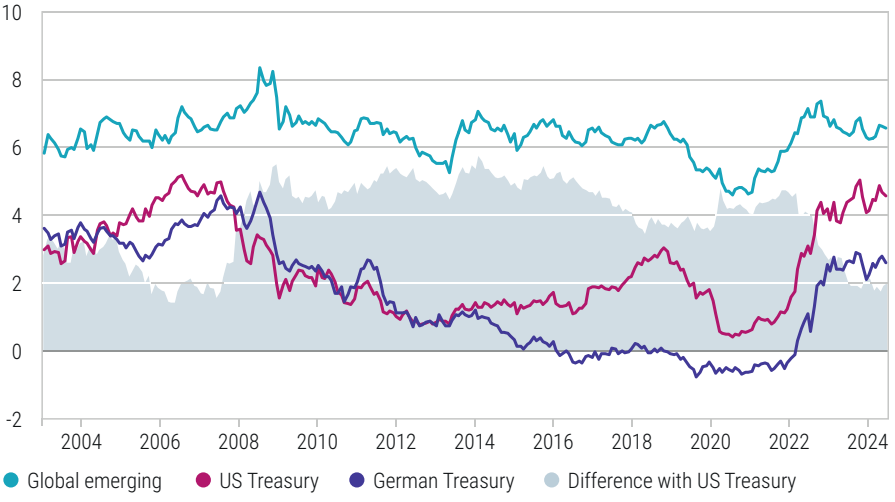
To assess the valuation of local-currency emerging market sovereign debt, we use the JP Morgan Government Bond Index-Emerging Markets (GBI-EM) Broad Diversified Index. The country breakdown of this index at the end of June 2024 is shown in Figure 2.7. The main constituents of the index are Brazil, China, India, Indonesia, Malaysia, Mexico, South Africa and Thailand. Each of these countries accounts for over 7% of the index, which limits individual country weights to 10% for diversification purposes.

Figure 2.7: Country weights in the local-currency bond market index



Source: JP Morgan, Robeco. Index weights of the JP Morgan GBI – Emerging Markets Broad Diversified Index as at 30 June 2024.

Figure 2.8: Yield to maturity of global emerging market bonds and US and German government bonds (%)



Source: JP Morgan, Bloomberg, Robeco. Yield to maturity of the JP Morgan GBI – Emerging Markets Broad Diversified Index ('Global emerging'), the Bloomberg US Treasury Index and the Bloomberg Germany Treasury Index. The shaded area is the difference between the yield of global emerging markets and US Treasuries.

Figure 2.8 shows the yield to maturity of US and German government bonds and emerging debt. We can see that the nominal yield of emerging market debt has always been higher. Since 2003, emerging debt markets have yielded around 6% per year, with a short-lived spike above 8% during the Global Financial Crisis. They then fell back toward 5%, but the 2013 taper tantrum saw yields jump back up to 7%. After dipping below 5% in 2020, emerging market yields rose above 6% again, where they remain.

We can see from the chart that the difference in yield between emerging debt and US Treasuries increased after 2006, mainly due to lower interest rates in the US and the addition of riskier countries to the local-currency emerging market government bond index. The nominal yield pick-up, or carry, provided by emerging market debt fell from 4.0% two years ago to 2.0% a year ago, back to where it was in 2006. It has remained the same over the past year. There is still a 4.0% yield difference with Germany, but this is down from 6.0% two years ago.

Table 2.1: Differences in the real yields of local-currency emerging debt with those of US and German government bonds

Yield	2017	2018	2019	2020	2021	2022	2023	2024	
Emerging	6.26%	6.38%	5.33%	4.62%	5.91%	6.87%	6.40%	6.57%	
United States	2.19%	2.61%	1.80%	0.57%	1.23%	4.18%	4.37%	4.57%	
– difference	4.07%	3.77%	3.53%	4.04%	4.67%	2.69%	2.03%	2.01%	
Germany	0.05%	-0.07%	-0.31%	-0.61%	-0.35%	2.54%	2.63%	2.59%	
– difference	6.21%	6.46%	5.64%	5.22%	6.26%	4.33%	3.76%	3.98%	
Inflation									2025-2029
Emerging	3.65%	2.86%	3.54%	2.24%	5.78%	8.99%	4.90%	4.18%	3.13%
United States	2.20%	1.90%	2.10%	1.56%	7.39%	6.41%	3.20%	2.39%	2.14%
– difference	1.45%	0.96%	1.44%	0.68%	-1.61%	2.58%	1.69%	1.79%	0.99%
Germany	1.60%	1.80%	1.70%	-0.53%	5.43%	10.81%	2.97%	2.22%	1.98%
– difference	2.05%	1.06%	1.84%	2.77%	0.35%	-1.82%	1.92%	1.96%	1.15%
Real yield									
Emerging	2.61%	3.52%	1.79%	2.38%	0.12%	-2.12%	1.50%	2.40%	3.44%
United States	-0.01%	0.71%	-0.30%	-0.99%	-6.16%	-2.23%	1.17%	2.18%	2.42%
– difference	2.62%	2.81%	2.09%	3.37%	6.28%	0.12%	0.33%	0.22%	1.02%
Germany	-1.55%	-1.87%	-2.01%	-0.07%	-5.78%	-8.27%	-0.34%	0.37%	0.61%
– difference	4.16%	5.40%	3.80%	2.45%	5.91%	6.15%	1.84%	2.03%	2.83%

Source: IMF, JP Morgan, Robeco. The 2024 column shows yields as at 30 June 2024. End-of-year and projected 2025-2029 inflation is from the IMF World Economic Outlook (April 2024). The emerging markets numbers are based on JP Morgan Global Bond Emerging Markets index weights at 30 June 2024.

Table 2.1 provides an indication of the attractiveness of local-currency emerging market debt yields compared with those of US Treasuries and German Bunds. We subtract inflation from yields to obtain real yields for each region. Emerging market debt's real yield at the end of June 2024 is 22 bps higher than that of US Treasuries based on subtracting the IMF's inflation expectations for the current year from current yields, and 102 bps higher if we subtract inflation expectations for the next five years. Both levels are in stark contrast to the end of 2021, when emerging debt's real yield was 628 bps higher. The differences with the German bond market are also much smaller than in 2021, at 203 bps based on expected calendar-year inflation and 283 bps based on expected inflation over the next five years. While nominal yields in emerging markets are higher than in both developed markets, higher expected inflation in the region partially offsets the difference.

The difference in real yields may partially represent compensation for credit risk, even though there is virtually no credit risk associated with nominal debt issued by sovereigns that can print their own currency to pay off debt. However, such money printing would be expected to lead to inflation and currency devaluation. This means that the credit risk inherent in local-currency emerging debt should be viewed as a currency risk from the perspective of an investor from the US or Europe. Overall, the carry provided by emerging debt seems to be relatively low.

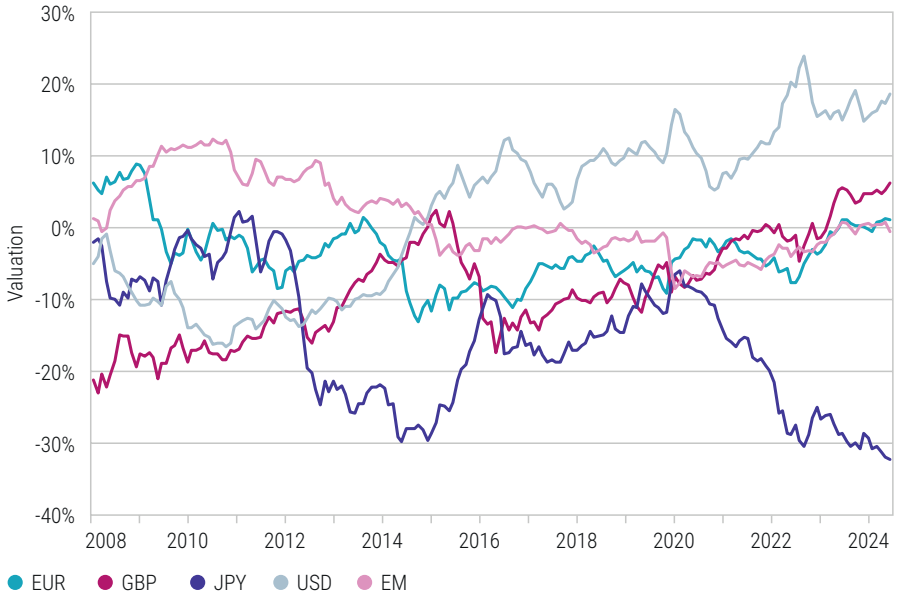
2.3.1 Currencies

In assessing the overall valuation of local-currency emerging debt, we also need to consider currency valuations. In doing so, we use Bank for International Settlements (BIS) real effective exchange rates (REERs) for the emerging market bond index based on its composition at the end of June 2024. We subtract its 15-year average from each of the REERs as we assume that such a long-term average is a good representation of its fair value.

In Figure 2.9, we compare the emerging market REER with those of the US dollar, euro, sterling and yen. From 2009 to 2014, emerging market currencies were overvalued, whereas the latest figures suggest that they are close to fairly valued, on average. The valuation difference with the US dollar is 19% as Figure 2.9 shows that the US dollar is 19% overvalued. Emerging currencies are valued very similarly to the euro, suggesting that euro investors should not expect returns from currency appreciation when investing in local-currency emerging market debt.

The Japanese yen is substantially undervalued compared to all of the other currencies. The British pound has seen its valuation steadily increase since it plummeted after the Brexit vote in 2016, and is now 5% overvalued relative to the euro.

Figure 2.9: Currency valuations using real effective exchange rates



Source: BIS, Robeco. The BIS real (CPI-based) effective exchange rates as at 30 June 2024 are compared with their 15-year historical averages. The lines for emerging markets are combined based on individual currencies' index weights in the JP Morgan Global Emerging Markets Bond indices on 30 June 2024. NB: BIS does not report REERs for the Dominican Republic, Egypt, Serbia or Uruguay, so we have assumed the currencies of all four are fairly valued.

We would expect relative valuation discrepancies to disappear over time. The early literature on this subject (Rogoff 1996; Frankel and Rose 1996) found that, on average, half the REER gap for developed currencies closed in about five years for developed currencies. More recent estimates by Rabe and Waddle (2020) find that half of the convergence occurs within three years. This seems considerably faster than what our research suggests.

All this has implications for currency hedging. When we consider the relative strength or weakness of individual currencies, we might be tempted to hedge those that are overvalued and are therefore expected to weaken. However, currency hedging comes at a cost, which is equivalent to the difference in interest rates between the foreign country and the investor's home country. We have to account for this cost when determining whether currency hedging is likely to be profitable or not.

2.3.2 Summary

We conclude that the local-currency emerging sovereign bond market is slightly expensive. The differences between the real yields of emerging debt and those of US government bonds are substantially below their historical averages. While a US dollar investor can expect to profit from emerging market currencies being cheaper than the US dollar, this is unlikely to be enough to offset the real yield differential being below the historical average. A euro investor cannot expect to gain much from taking local currency exposure, but real yield differences are somewhat higher than for a US dollar investor.

2.4 Developed market equities

There is evidence that the equity premium can be predicted, even though much of the variation in actual returns typically remains unexplained. One of the predictors that stands out is Campbell and Shiller's (1998) cyclically adjusted price-earnings (CAPE) ratio; see, for example, Ilmanen et al. (2021). This is the main indicator we discuss here, in addition to Tobin's Q and the Buffett indicator.

These are all measures of equities' absolute valuations and do not necessarily indicate how expensive stocks are relative to bonds. This might be important, because – all else being equal – lower bond yields result in higher equity prices due to there being a lower discount rate for future cash flows. The reverse also applies: in periods of rising bond yields, equity valuation ratios should fall.

2.4.1 CAPE ratio

The CAPE ratio is a valuation measure that uses real earnings per share (EPS) over a 10-year period to smooth out fluctuations in corporate profits that occur over different periods of a business cycle. Jivraj and Shiller (2017) show that the CAPE's out-of-sample performance is strong compared with many of its competitor valuation signals.

Table 2.2 contains the CAPEs for the largest developed equity markets. For most countries, the data history for the CAPE starts in December 1981, which means we have over four decades of international data. As structural differences between countries might lead to different CAPEs, we compare each country with its own valuation history.

Table 2.2: Cyclically adjusted price-earnings ratios for developed countries

Country	Start	Median	Current	Valuation	Weight
Australia	Dec-81	20.2	21.6	≈	1.9%
Canada	Dec-81	22.4	22.0	≈	3.0%
France	Feb-99	23.4	23.6	≈	2.9%
Germany	Dec-81	20.4	20.8	≈	2.2%
Hong Kong	Dec-81	19.9	12.3	↓	0.5%
Israel	Sep-04	17.4	16.0	≈	0.2%
Italy	Apr-93	21.0	19.7	≈	0.7%
Japan	Dec-81	36.5	25.4	↓	5.8%
Netherlands	Dec-81	17.5	38.2	↑	1.4%
Singapore	Dec-81	21.0	14.9	↓	0.3%
Spain	Jan-89	16.4	16.0	≈	0.7%
Sweden	Dec-81	22.8	20.7	↓	0.8%
Switzerland	Dec-81	24.0	24.9	≈	2.5%
UK	Dec-81	17.0	16.6	≈	3.8%
USA	Dec-81	24.1	35.0	↑	73.4%
World		**23.6**	**30.1**	↑	
Europe		**19.3**	**21.2**	≈	

Source: Barclays Research, MSCI, DataStream, Robeco. The CAPE ratio for each country has been calculated by Barclays Research using the levels of country-specific indices published by MSCI representing the equity markets for the relevant country, adjusted for inflation using data from DataStream. The 'Start' column indicates the start of the sample period, and the 'Median' column the monthly time-series median of the CAPE ratio from the start of the sample to June 2024. The arrows in the 'Valuation' column indicate whether the current CAPE ratio is above (red arrow up, indicating expensive), close to (black approximately equal sign) or below (blue arrow down, indicating cheap) the median. The last column, 'Weight', is the weight of the country in the MSCI World index at the end of June 2024. The row for Europe uses data from Barclays Research, but the row for World is a weighted average (using the weights in the final column) of each of the individual country figures.

Many developed countries look fairly valued, which we define here as a CAPE that is within two points of its historical median. Four countries look cheap: Hong Kong, Japan, Singapore and Sweden. Several Asian markets seem cheaper than stocks from other parts of the world. Two countries look expensive: the Netherlands and the US. The Netherlands only accounts for 1.4% of the developed market equity index, but the US is by far the largest constituent, accounting for 73.6% of the index. With a CAPE of 35.0, which is well above its historical median of 24.3, the impact of the US makes the global developed stock market index look expensive at a CAPE of 30.1, substantially above its historical median of 23.8.

If we were to remove the Magnificent Seven from our calculations there would be a substantial impact on valuations, as we discuss in the special topic 'Bursting or buzzing bubbles?'. However, our report focuses on asset allocation, not stock selection within asset classes.[1]

1. Robeco has a lot to say about stock selection, but not in this publication. Please contact your relationship manager for more details.

Bunn and Shiller (2014) show that when companies buy back shares, the original CAPE might be artificially slightly lower because the growth rate in EPS is positively affected by buybacks. Shiller's data page therefore includes a 'total return CAPE' to adjust for this bias. While the traditional CAPE for the US was 35.0 at the end of June 2024, the total return CAPE stood at 38.3. This difference is about the same as it has been historically, so both versions of the CAPE signal that the US equity market is very expensive.

2.4.2 Tobin's Q

Tobin's Q is the market value of equities divided by their net worth measured at replacement cost, which is typically a better fair-value metric than the historical cost, especially in times of high inflation. The natural 'fair value' of Tobin's Q is 1, in which case the stock market would be paying exactly the same for a company as the cost of replacing its assets, and an investor should be indifferent to buying the shares or setting up the same company from scratch.

However, it turns out that historically, the average figure has been in the range of 0.6-0.7. Estimates of Tobin's Q for the US from 1900 to 2002 are reported by Wright (2004) and are available from the archive of his website.[2] Figure 2.10 shows that Tobin's Q for the US is currently 1.73, which is substantially above both its historical average and its theoretical value of 1.0, indicating that the US stock market is expensive. Replacement cost data is only available for the first quarter of 2024, but with stock markets rising in the second quarter it is not expected that Tobin's Q will be lower when second-quarter data comes in.

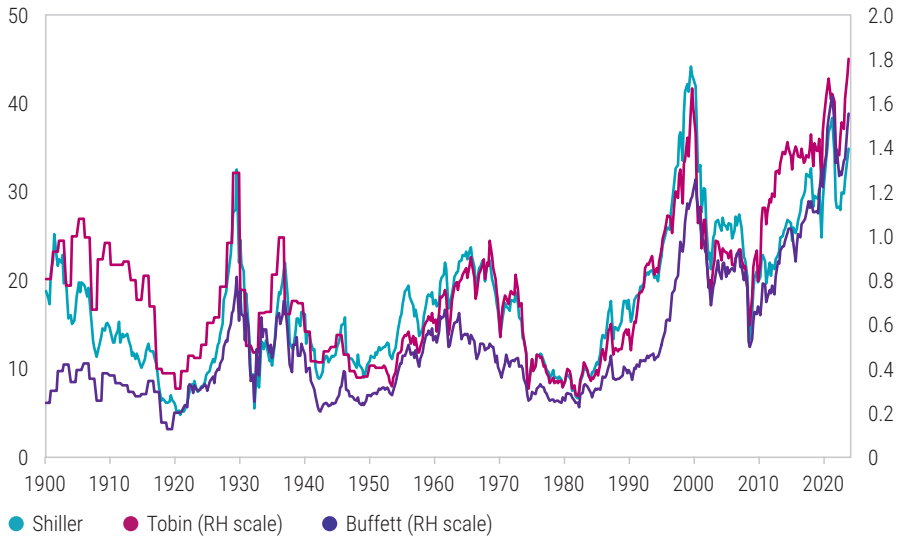
2. https://web.archive.org/web/20151028070108/http://www.bbk.ac.uk/ems/faculty/wright/pdf/Wright2004dataset.xls

2.4.3 Buffett indicator

Warren Buffett popularized the market value of equities relative to the nominal GDP of a country as a measure of overvaluation or undervaluation. Lleo and Ziemba (2019) find that using this ratio in market timing can generate additional returns, mainly through predicting crashes rather than equity market rallies. Umlauft (2020) and Swinkels and Umlauft (2022) report on the long-term predictive powers of the Buffett indicator for the US and international markets respectively. Figure 2.10 shows that the Buffett indicator is now at 1.55, close to the peak of 1.63 that it reached at the end of 2021. The US equity market is expensive on all three measures.

An international comparison for this figure is challenging as it is affected by the percentage of companies that are publicly traded compared with those that are private, and whether a country is attractive to list in for multinational corporations. The ratio may also be more affected by new equity issuance than by valuation changes, even for an individual country over time.

Figure 2.10: Tobin's Q, Shiller CAPE and Buffett indicator for the US equity market



Source: Refinitiv, Federal Reserve, Robeco. The Tobin's Q is calculated using data from the Fed and from Wright (2004) before 1951. The Buffett indicator is the market value of S&P 500 companies divided by the GDP of the US. Before 1964, we use the market value of the NYSE divided by US GDP.

2.4.4 Implied equity risk premium

An obvious explanation for equity market valuations remaining above average used to be low interest rates. However, both nominal and real interest rates have since 2002 increased, nominal rates even from zero to four percent, so this argument is not so strong anymore. One way to put absolute valuations into perspective is to examine the equity risk premiums that are priced in by the market. Damodaran (2020) explains that there are several methods to determine the implied equity risk premium from observable data. Here we obtain it by dividing expected earnings by the price and subtracting the government bond yield. This method is known as the Fed model.

At around 1.5%, the implied equity premium for the US is currently relatively low, especially compared with its level of 4.8% in Europe. The current implied US equity premium shows that expected returns for equity investors are only slightly above those of bond investors. High interest rates and an expensive stock market lead to positive but very low expected excess returns for equity investors. For developed markets as a whole, the implied equity premium stands at about 1.8%, which is about a third of where it was over the period 2010-2020.

Figure 2.11: Implied equity risk premiums

Source: Refinitiv Datastream, I/B/E/S, Robeco. Forward earnings (12 months) to price minus the government bond yield. For emerging markets, Chinese government bond yields are used as a proxy.

Back in 2021, Shiller introduced the 'excess CAPE yield', which is the inverse of the Shiller CAPE adjusted for long-term real interest rates. It serves as a proxy for the expected risk premium on equities. It currently stands at 1.1%, down from 2.1% a year ago and 3.1% two years ago. For more information about its predictive power for US equity markets, see Catanho and Saville (2022). Even though the model underlying the implied equity premium in Figure 2.11 and the excess CAPE yield are somewhat different, both methods currently predict a lower implied risk premium for US equities than a year ago, and lower than the long-run estimate of 3%.

2.4.5 Summary

Most developed equity markets are currently neutrally or cheaply valued, but the US is an outlier in that it is expensive. Because of the impact of the US market, which accounts for almost three-quarters of developed world market capitalization, developed equity markets are expensive overall.

2.5 Emerging market equities

The CAPE ratio for emerging market stocks has historically provided useful information about valuations in emerging markets; see Klement (2012).

Although the figures for developed and emerging markets are not entirely comparable because CAPE data for emerging markets starts substantially later than for developed markets, Table 2.3 shows that the weighted average CAPE for emerging equities is 17.7, substantially lower than the 30.1 of developed markets.

There are several possible explanations for this. First, the higher systematic risk in emerging markets is reflected in higher discount rates, leading to lower prices for the same expected earnings. Second, emerging markets may not be fully financially integrated with the rest of the world, and this market segmentation leads to higher discount rates. Third, emerging equity markets may be tilted toward industries with lower growth potential and therefore lower valuations than developed markets. Therefore, it may be more relevant for valuation purposes to compare each country with its own historic CAPE levels than comparing CAPEs across countries.

The CAPEs of each of the important emerging equity markets except those of India and Taiwan are currently below their historical median levels, and the CAPE ratios for China, Poland and Turkey are particularly low at around 11. India's CAPE of 39.2 is even higher than that of the US, while Taiwan's CAPE of 31.3 is above that of developed equity markets. This substantial variability in valuation levels between countries suggests that country selection within emerging markets may help to improve investment returns. The weighted average CAPE across all emerging markets is 17.7, which is marginally below the historical median level of 18.5. Although according to this measure emerging markets look fairly valued compared with their historical levels, the valuation gap with developed markets is substantial.

Table 2.3: Cyclically adjusted price-earnings ratio for emerging countries

Country	Start	Median	Current	Valuation	Weight
Brazil	May-11	13.6	12.1	≈	4.9%
China	Oct-04	16.5	11.4	↓	28.9%
India	Aug-03	23.0	39.2	↑	22.1%
Korea	Sep-04	15.1	15.3	≈	14.0%
Mexico	Jan-01	23.3	17.7	↓	2.4%
Poland	May-04	13.2	11.8	≈	1.1%
South Africa	Aug-04	20.5	16.5	↓	3.4%
Taiwan	Jul-04	22.7	31.3	↑	22.3%
Turkey	Jan-01	12.0	11.4	≈	0.9%
Emerging		**18.5**	**17.7**	≈	

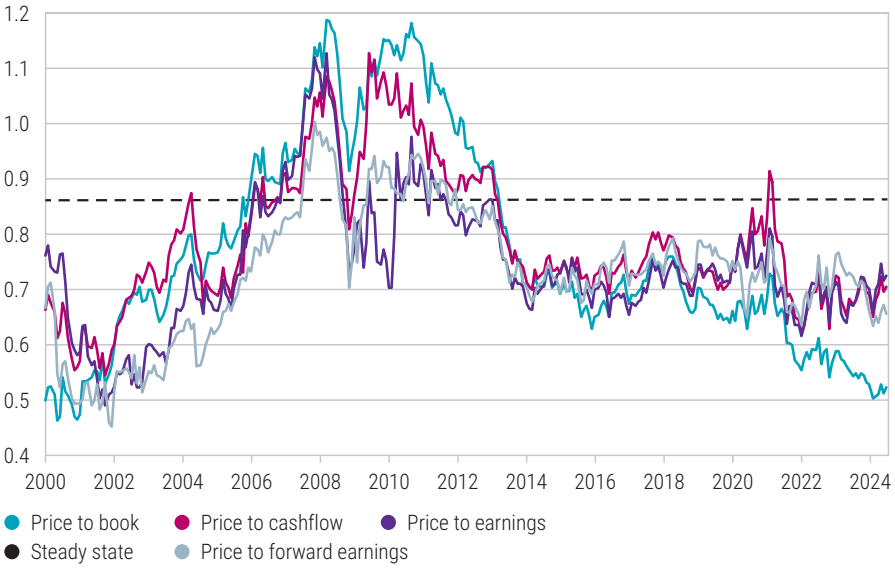
Source: Barclays Research, MSCI, DataStream, Robeco. The CAPE ratio for each country has been calculated by Barclays Research using levels of country-specific indices published by MSCI representing the equity markets for the relevant country, adjusted for inflation using data from DataStream. The 'Start' column indicates the start of the sample period, and the 'Median' column the monthly time-series median of the CAPE ratio from the start of the sample to June 2023. The arrows in the 'Valuation' column indicate whether the current CAPE ratio is above (red arrow up, indicating expensive), close to (black approximately equal sign) or below (blue arrow down, indicating cheap) the median. The last column, 'Weight', is the weight of the country in the MSCI Emerging Markets Index at the end of June 2024. The Emerging row uses a weighted average (based on the weights in the final column) of each of the individual country figures.

2.5.1 Other relative valuation measures

Figure 2.11 includes the implied equity premium for emerging markets. It is elevated at 5.9%, which is above that of Europe, suggesting that emerging market equities are relatively attractively valued. We also drew this conclusion based on the CAPEs in Tables 2.2 and 2.3. To further test the robustness of these valuation measures, we also look at other bottom-up measures of value: price-to-book, price-to-cashflow, price-to-earnings and price-to-forward earnings ratios. Figure 2.12 shows that since 2014, the valuations of emerging market equities have been consistently below those of developed market equities, trading at a discount of 20-30%. Just like with the CAPE, we expect the valuation ratios to be below one on average. A long-term discount of valuation ratios of emerging relative to developed markets can be estimated when we use our assumption of a 0.5% higher cost of capital for emerging market equities over the long term. Under the assumptions of the Gordon growth model, this leads to a relative valuation discount of 14% over the long run. As such, Figure 2.12 shows that emerging equities' current discount relative to developed equities of around 35% on average over the four valuation measures (and based on the price-to-book ratio the discount is now approaching 50%) appears high.[3]

3. See Swinkels and Yang (2023) for a more detailed analysis of the valuation of emerging versus developed markets.

Figure 2.12: Emerging equity valuations relative to global developed equity valuations



Source: Refinitiv Datastream, MSCI, Robeco. Each month we divide the bottom-up-derived valuation ratio of the MSCI Emerging Markets Index by the same valuation ratio for the MSCI World Index. The MSCI World only contains developed markets.

2.5.2 Summary

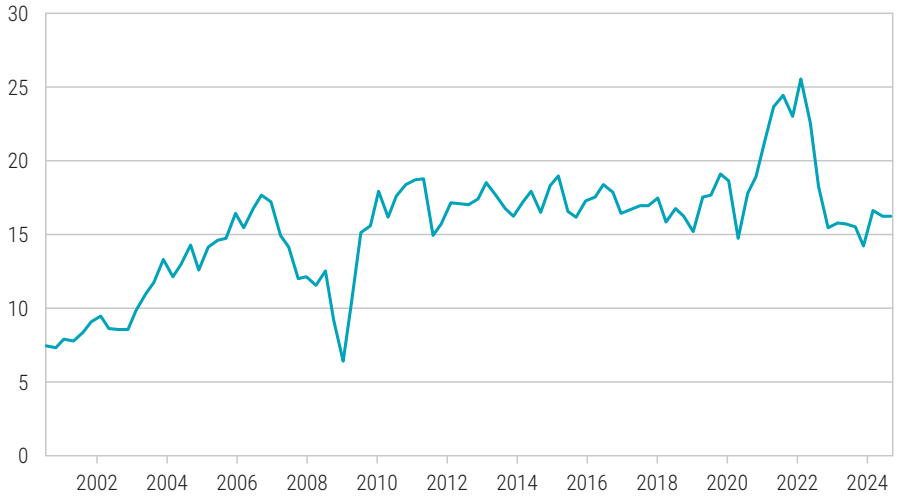
Emerging equities look attractively valued compared with developed markets at present.

2.6 Listed real estate

We compare listed real estate valuations with those of global equities. Although the CAPE ratio is admittedly not an ideal measure for assessing the valuations of real estate investment trusts, it is one of the best available. The CAPE ratio of global real estate is currently 13.7, which is well below its average of 19.4 since 2000. The CAPE of global equities is more than twice as high at 30.1, and also well below that of European (21.2) and emerging market equities (17.6). As such, real estate looks relatively cheap according to this valuation measure.

A valuation measure commonly applied to real estate investment trusts involves comparing their price with their funds from operation (FFO). The FFO is calculated as net income plus depreciation and amortization minus gains on sales of properties. In the US, the price-to-FFO is reported at the market level. See Seok, Cho, and Ryu (2020) for more information about the reaction of US REIT prices to FFO announcements. They conclude that the market reacts more to FFO announcements than to other announcements, such as about net income.

Figure 2.13: REIT-specific valuation ratio for US REITs



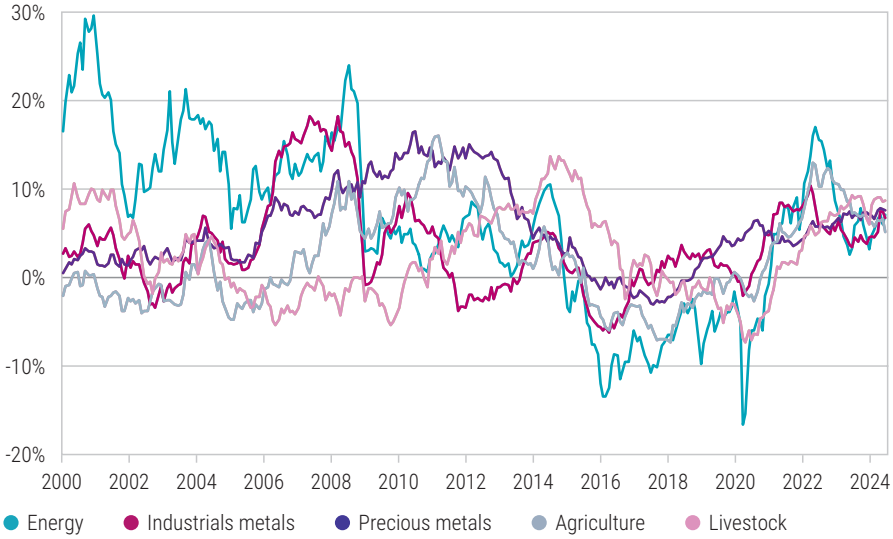
Source: S&P Global Market Intelligence, Nareit T-Tracker, Robeco. The valuation ratio specific to US Real Estate Investment Trusts is the price (P) divided by the funds from operation (FFO).

Figure 2.13 shows this valuation ratio up to the second quarter of 2024. In the third quarter of 2022 this measure fell from its record high at the end of 2021 of 25.6 to 15.5. Since then, it has remained relatively constant, with a level of 16.2 in the second quarter of 2024. It is difficult to determine what a 'normal' ratio is given that this measure has only been available since 2000. Based on the limited data series available to us it appears that, according to this measure, real estate is neutrally valued compared with its past levels. Based on real estate's relatively low CAPE, suggesting that it is cheap, and its neutral price-to-FFO ratio, we conclude that real estate is slightly cheaply valued.

2.7 Commodities

Here we use the definition of commodity valuation presented by Asness, Moskowitz and Pedersen (2013). This involves comparing the current spot price with the average spot price from 4.5-5.5 years ago. The idea is to use the price five years ago, but averaging ensures that temporary outliers do not affect the valuation signal too much. Instead of calculating the valuation of each traded commodity separately, we consider the five main commodity categories: energy, industrial metals, precious metals, agriculture and livestock. If the commodity price is the same as five years ago, the signal would stand at 0% and suggest a neutral valuation. A level above zero means that the current price is higher than five years ago and indicates that the commodity group is expensive.

Figure 2.14: Valuation signals for the various commodity categories



Source: Refinitiv Datastream, S&P GSCI, Robeco. The figure shows the natural logarithm of the commodity category price index divided by the natural logarithm of the average of the same price index from 5.5 to 4.5 years ago, minus one. Monthly data in US dollars.

Figure 2.14 shows that energy commodities were in general overvalued from 2000 to 2014 as their price had increased relative to five years previously. In 2015 and 2020, however, they were more than 10% undervalued. They recovered strongly after the Covid-19 crisis and the war in Ukraine, such that they were more than 15% overvalued by the middle of 2022. But since then, energy prices have fallen, with their overvaluation having dropped to 7% by the end of June 2024.

All other commodity categories are overvalued by a similar amount. We therefore deem commodities to be slightly expensive overall at present. ●

EXPECTED RETURNS 2025-2029

3. Climate

The climate change discussion seems to have shifted from debating the impact of carbon emissions on global warming to the most effective policies to limit climate change. Even though there is considerable political resistance against carbon pricing across the globe, the evidence from Europe suggests it may be one of the most effective ways to achieve decarbonization.

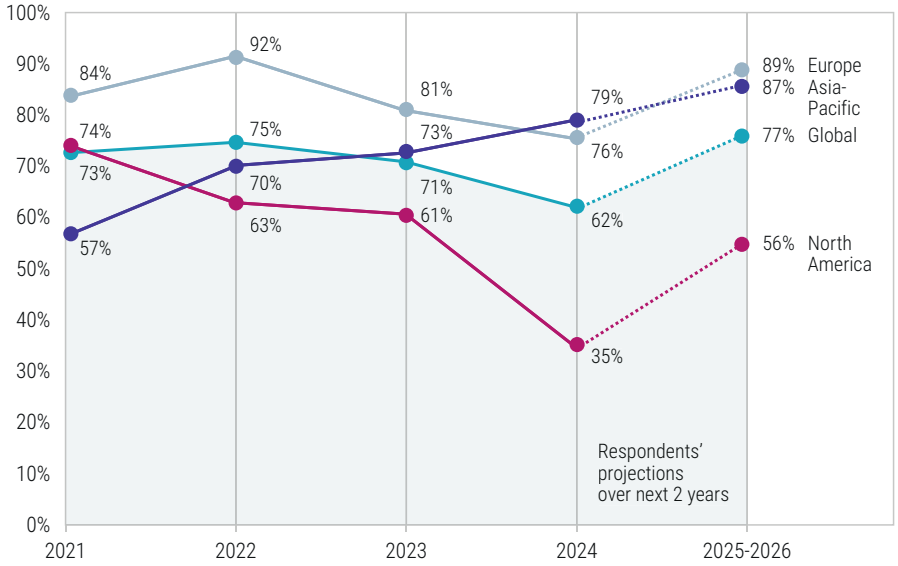
The role of investors is to finance the energy transition and use their voices to accelerate it, but sustainable investors cannot achieve global decarbonization on their own. Investors rely on effective policies such that firms have the incentive to innovate and transition, consumers have fair choices between polluting and clean options, and citizens across the world can afford to support these policies.

3.1 What do institutional investors say about climate change risk?

Robeco's Global Climate Investing Survey 2024 shows that the importance of climate change for investors is declining a little in Europe, but especially in the US, while it is growing in the Asia-Pacific region. This may have important implications for the pricing of climate change risks across global asset classes.

Figure 3.1: The importance of climate change for investors

How would you describe the importance of climate change to your organization's investment policy 2 years ago, today, and in the next 2 years?

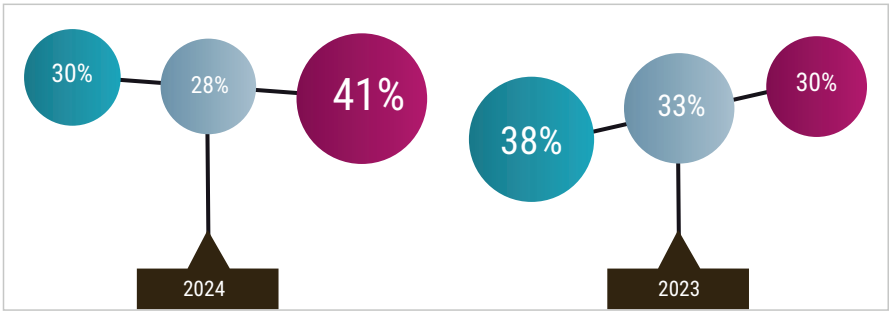


Source: Robeco Global Climate Investing Survey 2024.

At the same time, investors have become more pessimistic about achieving the Paris goal to limit global warming to 2 °C. This may have to do with the still increasing amount of global carbon emissions and the little progress that has been made in carbon pricing worldwide. However, there are indications that carbon pricing may accelerate in the coming years.

Figure 3.2: Doubt increases whether progress made on Paris goals currently suffices

Q *Is the Paris Agreement target to limit global warming to well below 2 °C still achievable?*



Source: Robeco Global Climate Investing Survey 2024.

3.2 Pricing carbon risks in equity markets

A key question for climate finance is whether investors consider climate change-related risks when making investment decisions. These risks can be of physical nature, i.e. stemming from damages of severe weather circumstances such as floods or droughts, or related to the required energy transition, such as increased carbon taxes or emissions quotas. Both types of risks may affect the amount of cash flows that companies can pay to investors and the riskiness of these cash flows. In addition, investor behavior (such as exclusions) toward fossil fuel companies may affect asset prices as well. Several pathbreaking papers have recently been published on the pricing of climate transition risk through analyzing how stock prices of companies that emit more carbon are different from those that emit less carbon. The challenge of these papers is the short sample period for which data of high quality is available, which reduces the power of statistical tests. In this section, we replicate and extend several of these important studies while taking the perspective of an institutional investor.

Prior literature

Bolton and Kacperczyk (2021, 2023) find that firms with high absolute emission levels – those that are targeted by investors who are Climate Action 100+ signatories – have earned higher returns over the period 2005 to 2017/2018 in the US and in the rest of the world, respectively. Interestingly, they find no evidence that companies with higher carbon intensity, i.e. the amount of carbon emitted per unit of revenues, earn different returns from those that have lower carbon intensity. This is particularly puzzling, as they also document that carbon intensity (or footprint) is a metric that investors seem to use to evaluate whether a company is polluting or not.

The positive excess returns earned by brown companies documented by Bolton and Kacperczyk (2021, 2023) are challenged by Aswani et al. (2024) and Zhang (2024). They report that the positive carbon premiums are only present for estimated carbon data, but not for reported carbon data, because there is a look-ahead bias in estimated carbon data if no appropriate time lag is used. How this works can be seen in the formula below:

$$EstimatedEmissions = Intensity \times Revenues$$

Carbon emissions are typically estimated using a model calculating carbon intensity[1] (carbon emissions divided by revenues) times the company's revenues. Without sufficient data lagging, sorting firms on total estimated carbon emissions levels implies sorting firms on future revenues. For instance, when considering portfolio construction in January

1. These intensities can be based on other companies' reported emissions, academic studies, or scientific studies from organizations like IPCC.

2023, using emissions figures over 2023, the revenues of the entire year 2023 (which are typically published in the spring of 2024) are implicitly used. Not surprisingly, future revenues are positively correlated with future stock returns. This also explains why there is no premium for carbon intensity because there is simply no revenue component present in the modeled carbon intensity.

Interestingly, Pástor et al. (2022) find that when stocks are weighted by their greenness (based on environmental scores multiplied with the importance of environmental issues for a certain sector), there is a significant raw and factor-adjusted excess return of green over brown firms ranging between 6% to 8% per annum over the period 2012 to 2020. This finding crucially depends on industry tilts in the ranking variable and reduces to an insignificant return difference of about 1% per annum.

Summarizing, some academics find that brown stocks outperformed green, some find no performance difference, and some find that green stocks outperformed brown. These inconclusive results make it even more relevant for us to perform our own analysis taking the perspective of an institutional investor.

Our own empirical results

For our own analysis, we take a global perspective, meaning that we take the constituents of the MSCI World Investable Market Index consisting of about 5,500 stocks from developed markets. At each point in time, we sort these stocks on their carbon intensity (carbon emissions Scope 1 & 2) divided by revenues. To avoid the mistake by Bolton and Kacperczyk (2021, 2023), we lag the data until it is publicly available to investors. For example, a company reports its emissions over a given fiscal year 2022, which ends in July 2022. However, the emissions over fiscal year 2022 are not directly known in August 2022. In practice, we see substantial delays in the reporting. The median delay is estimated between nine and 12 months (Zhang, 2024). To be on the conservative side, we choose 12 months. Thus, we use the fiscal year 2022 carbon footprint data from August 2023 until July 2024.

Our carbon intensity measure is not the same as in Pástor et al. (2022), but we do not have the variables available that they use to calculate corporate greenness. However, our measure is highly correlated to theirs.[2] We then take the 33% of stocks with the lowest carbon intensities, label them as the 'green portfolio' and calculate the market capitalization-weighted returns for the next month. We do the same for the 33% of stocks with the highest carbon emissions, and call that the 'brown portfolio'. Then we take the differences between the green and brown portfolio returns to create a 'green minus brown' factor. The cumulative returns of this factor are displayed in Figure 3.3.

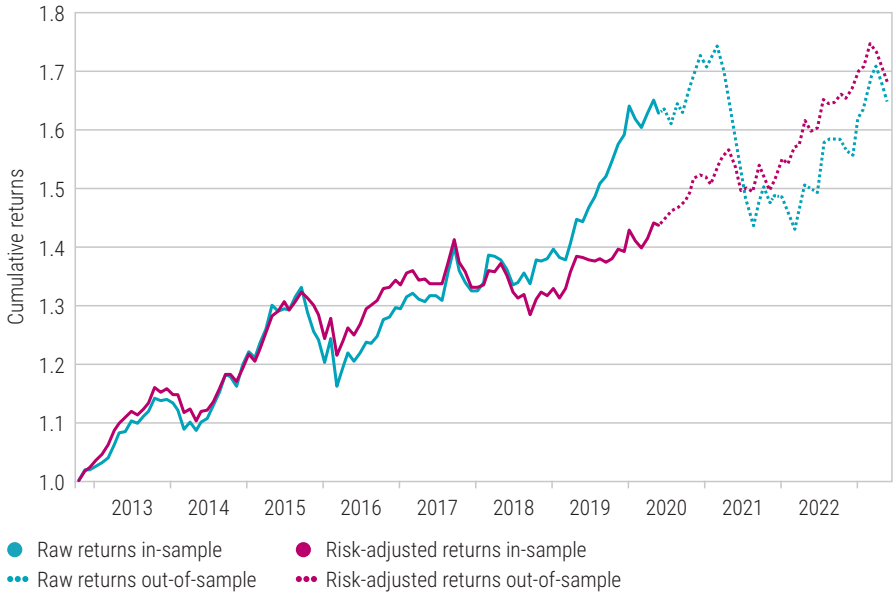
2. When we limit our sample to only US stocks, we find a correlation of 0.75 between the monthly returns on our green minus brown factor and the one of Pástor et al. (2022).

The original in-sample period of Pástor et al. (2022) is displayed in the solid magenta line. The dotted magenta line is the period after they wrote their paper, the so-called 'out-of-sample' period. The raw return drops severely, as stocks from the energy sector did very well during the energy crisis following the war in Ukraine. However, when we take out common factor returns from the Kenneth French online data library, we see that these adjusted returns keep going up as strongly as in the in-sample period, with about 4% per year. If we would have sorted the portfolios on absolute carbon emissions, the in-sample results would look very similar to our sort of stocks on carbon intensities. However, the drop in the green-minus-brown factor in 2021 would be so severe that the overall return of the factor would be close to zero over the entire sample period.

Therefore, we conclude that with appropriate lagging of carbon data, and focusing on carbon intensity rather than absolute carbon emissions, green firms have outperformed brown firms over this sample period. Or, the realized carbon premium has been negative,

with about 4% per year. This may be partially due to higher expected earnings growth of green firms over this period, as well as an increased cost of capital for brown firms. These results do not mean that going forward the carbon emissions premium has to remain negative. If carbon emissions are indeed a risk factor, one would expect that the sign will reverse, and brown firms will start to outperform green firms. But this would be the reversal of a trend that we have seen over the past decade.

Figure 3.3: Cumulative returns of the 'green minus brown' portfolio



Source: Robeco.

3.3 The price of carbon emissions

The concept of negative 'externalities' refers to the negative impacts that are borne not solely by those who produce or consume a good, but that are instead inflicted on wider society. When it comes to carbon emissions, negative externalities arise because the production and consumption of goods and services that emit greenhouse gases contribute to climate change, which has far-reaching and detrimental effects for society. Economists such as Arthur Pigou have long argued that we should 'internalize' these externalities by making producers and consumers pay for the carbon emissions they are responsible for. Some governments and regulators have introduced taxes on carbon emissions or developed carbon emissions trading systems. Taxes involve the advantage of the price of carbon emissions being fixed, but it is unclear how much emissions will reduce as a result of them. Emissions trading systems typically fix the total amount of emissions that are permitted, with the consequence that the price of carbon emissions can fluctuate because of changes in demand. A recently published meta study on the effectiveness of carbon pricing concludes that in 17 out of 21 carbon pricing schemes, there have been immediate and substantial reductions in carbon emissions ranging between 4% and 15%.[3] Since most corporate executives and shareholders prioritize profitability over sustainability, the most likely route to decarbonization is to internalize the negative externalities. More often than not, incentives work.

Today, around 22.5% of global emissions are priced, either via a carbon tax or emissions trading scheme. Said otherwise, 77.5% of global carbon emissions are free. The global average price of carbon is currently slightly below USD 6 per tonne.[4] It is believed that the global price of carbon needs to increase to USD 100 for externalities to be priced in

3. See Döbbeling-Hildebrandt, N., Miersch, K., Khanna, T.M. et al (2024).

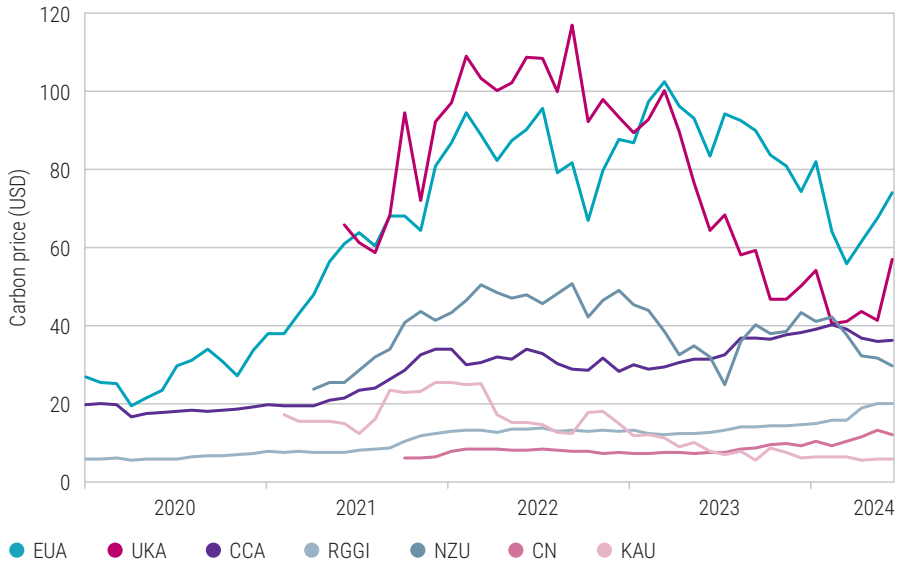
4. Source: Real Carbon Price Index: https://www.realcarbonindex.org/

appropriately. Azlen, Gostlow and Child (2022) collected global carbon price predictions for 2030 from several climate models and report a wide range, from USD 55 to USD 249, with a median of USD 125.

Figure 3.4 shows the price variation of the most important emissions trading schemes. The carbon prices are substantially lower than their all-time highs. This may be partially due to the energy transition to low-carbon alternatives, but could also be due to higher supply because of the war in Ukraine, and expectations of lower economic growth. Despite the decline in Europe, the carbon price in other parts of the world has been increasing. The price in China has increased from USD 8.5 to USD 13.6 since the start of 2022. And despite the controversy about climate in the US, the price of emissions in both carbon allowance markets in the US has increased. The northeast (RGGI) carbon price has increased from USD 6.3 to USD 21.8 since 2020, and the California (CCA) carbon price even to USD 39.2 (from USD 21.5 at the start of 2020). There are reasonably liquid derivatives markets that allows investors to take positions on price developments in the EU, UK, CCA, and RGGI.[5]

5. See Swinkels and Yang (2023).

Figure 3.4: Carbon prices of major emissions trading schemes across the world



Source: Robeco, Bloomberg, LSEG. Futures prices for European (EUA), United Kingdom (UKA), California (CCA), Northeast US (RGGI), New Zealand (NZU), China (CN), and Korea (KAU).

The European Union (EU) has introduced the Carbon Border Adjustment Mechanism (CBAM), which assigns a fair cost to the carbon emissions produced during the manufacturing of carbon-intensive goods imported into the EU. Exporters from outside the EU should purchase carbon certificates priced similarly to the EU carbon allowances to create a level playing field between companies inside and outside the EU. To avoid paying this tax, exporting countries can impose a similar price on carbon emissions to the EU. Planned to start on 1 January 2026 for the most carbon-intensive imports, this policy may spur other countries to start pricing carbon emissions. As a result, the global price of carbon is expected to increase. There are already plans to create carbon pricing in Brazil, India, Chile, Colombia, and Turkey.[6]

6. See Penn (2024).

In addition to the regulated compliance markets described above, there is also a voluntary carbon market. Some companies use these to offset hard-to-abate carbon emissions. For example, voluntary carbon credits can be bought when purchasing an airline ticket or when investing in one of Robeco's climate mutual funds. Many voluntary carbon credits turned

out to be of low quality, meaning that they avoided fewer carbon emissions as claimed. This led to strong downward price pressure. Whereas in 2022 nature-based carbon credits were valued above USD 10, some of them trade below USD 1 today.

3.4 How should we measure climate risk?

Later in this chapter we provide tables showing various measures of climate change risk, including physical climate risk (the risk of damage resulting from extreme weather events) and transition risk (risks linked to the switch from fossil fuels to renewable energy). Transition risks may be spurred by higher carbon prices. Of course, the risk is symmetric, meaning that a delay in expected carbon pricing or reduction of green subsidies are likely to be negative for green companies. How can we measure how these two sources of climate risk are already embedded in asset prices?

One straightforward method to measure carbon risk is to examine businesses' past carbon emissions. In doing so it is common to use direct emissions (Scope 1) and the emissions from energy purchases (Scope 2). More recently, the emissions associated with the entire value chain of a product have been used to determine carbon emissions, including the raw materials and inputs involved in producing it (Scope 3 upstream) and the emissions related to its use and disposal (Scope 3 downstream). Inevitably, this leads to double counting of emissions, and some energy companies have gone to court to challenge their responsibility for those emissions. However, including Scope 3 encourages companies to innovate such that carbon emissions along the value chain are reduced to zero. Since not all companies report greenhouse gas emissions accurately themselves, data providers may have to estimate carbon emissions. These days, data providers provide quite uniform figures for Scope 1 and 2 emissions for equities, but there can be substantial differences for fixed income portfolios and for Scope 3 (especially downstream) emissions.[7]

7. See Markwat and Swinkels (2024).

The major disadvantage of using carbon emissions as a measure of carbon risk is that they are backward-looking. Therefore, data providers and asset managers like Robeco have come up with forward-looking estimates of climate change risks and opportunities. In addition to current emissions, a company's transition plans and their credibility are extremely important. We explain this in more detail in the special topic 'What is climate transition finance and why bother?' in this report.

More recently, alternative measures have been suggested. For example, one could create stock portfolios of companies with high and low carbon emissions and refer to the difference in investment returns of the two portfolios as a carbon factor. An asset's exposure, often referred to as a beta, to such a carbon factor would determine its carbon risk.[8] Others suggest creating a climate risk factor by measuring the amount of newspapers' climate change coverage and forming portfolios based on stocks that perform poorly or well in response to bad news about climate change.[9] The difference in the returns of these two portfolios could be viewed as a climate risk factor, and companies' exposures to this factor can then be estimated and viewed as a measure of climate risk. Advances in neurolinguistic programming (NLP) make it possible for algorithms to quickly scan newspapers for climate-related news and categorize it as positive or negative. Such techniques can also be used to detect whether climate risk comes up as a topic during quarterly corporate earnings calls. A corporate climate change risk measure has already been developed using this kind of automated assessment.[10]

8. See Huij, Laurs, Stork, and Zwinkels (2024), Bauer, Huber, Rudebusch, and Wilms (2022), and Hsu, Li, and Tsou (2023).

9. See Engel, Giglio, Kelly, Lee, and Stroebel (2020) and Ardia, Bluteau, Boudt, and Inghelbrecht (2023).

10. See Sautner, Van Lent, Vilkov, and Zhang (2023).

This overview shows that exposure to climate change risk is a multifaceted concept and can be measured in different ways. As this is still a developing area, it is unclear which metrics are most useful in managing a portfolio's climate risks. We therefore show several complementary measures of climate risk to gauge climate risk at the asset class level.

3.5 The impact of climate change on asset classes

Even though measuring climate change risk is difficult, it may affect expected returns at the asset class level, and therefore needs to be considered by asset allocators. In this section, we examine the climate change risks which the main asset classes are exposed to and the implications for their expected returns.

To estimate the cost of climate change, many assumptions need to be made about whether temperature increases lead to tipping points, how temperature increases translate into severe weather events, how much damage these severe weather events cause, and how costly it is to adapt to climate change, including geopolitical tensions due to mass migration away from less habitable parts of the world. These expected costs of no action must be offset against the cost of enacting effective climate policies. Both options are costly, so we expect that economic growth will be lower over the coming decades than when carbon emissions were deemed to be harmless and were cost-free. Many researchers believe that reducing carbon emissions fast will on balance be cheaper than taking no action.[11]

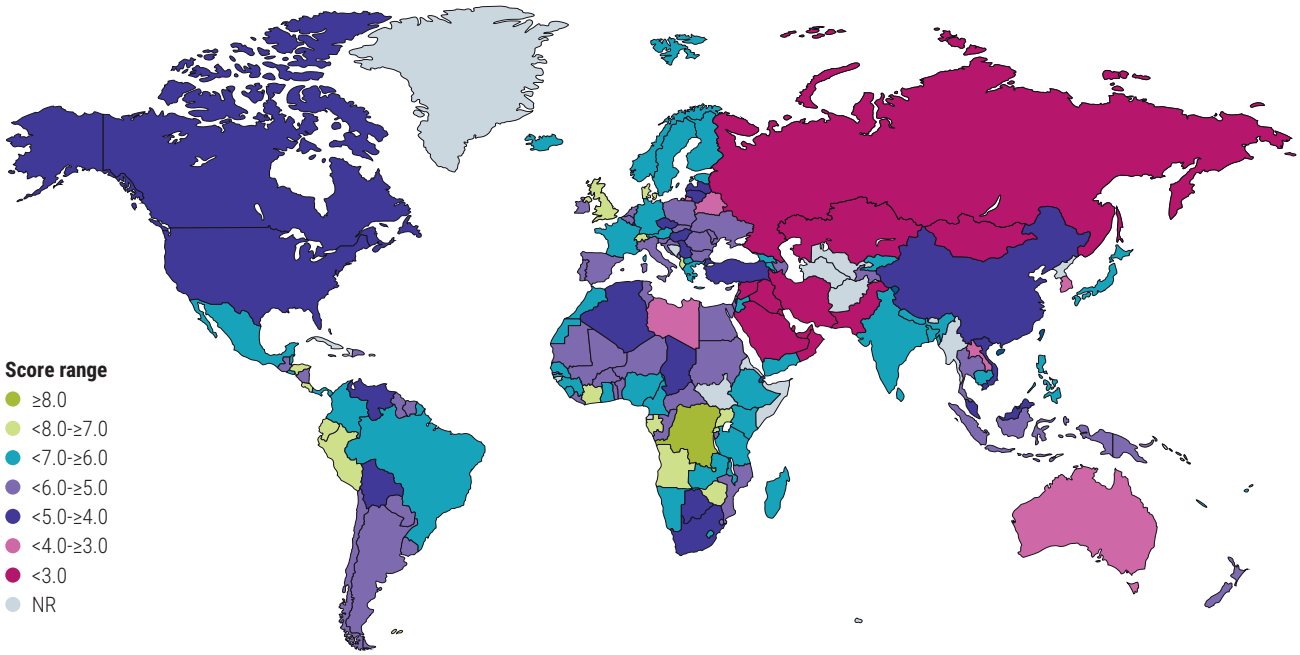
11. See Rebonato, Kainth, and Melin (2022).

3.5.1 Government bonds

We expect that economic growth will be 25 bps per year lower than it would have been without climate change, although this estimate is still surrounded by considerable uncertainty and varies considerably across regions.

Government bond yields in developed markets tend to be lower when economic growth is lower, but higher when inflation (uncertainty) is higher. Since the energy transition is costly, it reduces economic growth, but at the same time volatile energy prices make inflation management by central banks more difficult. On balance, therefore, we believe that climate change will have a neutral overall impact on the returns of developed market government bonds.

Figure 3.5: Robeco's country climate and energy scores



Source: Robeco. Scores range from 1 (worst) to 10 (best). Scores as of April 2024.

It is difficult to separate climate change risk from other factors that impact government bond yields, especially for emerging markets where government bond yields are often not considered to be risk-free. Nevertheless, several studies claim that there is a positive relationship between the two.[12]

12. See Beirne, Renzhi and Volz (2021) and Boehm (2022).

Not every government is equally vulnerable to physical climate risk and energy transition risk. Therefore, Robeco's Country Sustainability Ranking contains a 'climate and energy' sub-score[13], which we show in Figure 3.5. It is based on indicators such as a country's carbon efficiency, the proportion of renewable energy in its energy mix, and various climate risk indicators. The weighted average score of the largest developed markets is 5.3, dragged down by relatively poor scores for the US and Canada.[14] The weighted average score for emerging markets is a little lower at 5.1.[15] China, Malaysia and the Czech Republic are the worst performers, while Brazil and Peru score highest. These scores suggest there is little difference in the climate change risk embedded in developed and emerging government bonds. However, emerging markets have less access to foreign capital markets to deal with the negative impacts of climate change risk. As such, we expect their spreads relative to developed markets to increase somewhat over the coming five years, at least from a climate risk perspective. This means there is a negative climate signal for emerging market government debt.

13. More information on our Country Sustainability Ranking can be found on the Robeco website.

14. Country weights from the Bloomberg Global G7 Treasury Index at the end of May 2024.

15. Country weights from the JP Morgan GB-EM Broad Diversified Index at the end of May 2024.

3.5.2 Corporate credit

We collect several climate change risk measures, and a biodiversity footprint measure, for investment grade and high yield bonds.

Table 3.1: Climate change risk metrics for corporate bonds

	Index weight (%)		Carbon footprint		Climate Value at Risk (%)		Implied temperature rise		Biodiversity footprint	
Sector	IG	HY	IG	HY	IG	HY	IG	HY	IG	HY
Index	**100.0**	**100.0**	**64.7**	**131.0**	**-15.4**	**-29.2**	**2.3**	**3.0**	**4,031**	**5,468**
Banking	26.5	4.8	0.2	0.8	-5.1	-6.0	2.5	2.5	9	2
Basic industry	2.9	6.6	315.6	452.8	-56.8	-71.7	3.3	3.7	468	1,166
Brokerage etc.	1.6	0.8	0.7	4.6	-3.2	-5.8	2.5	2.4	0	0
Capital goods	4.9	9.3	114.9	144.9	-8.3	-22.0	2.7	3.1	129	380
Communications	7.3	14.2	8.1	9.3	-13.7	-15.5	1.6	1.8	16	52
Consumer cyclical	7.9	19.5	18.7	53.2	-12.9	-38.1	2.0	2.3	82	410
Consumer non-cyclical	13.4	12.0	15.8	31.5	-16.7	-22.1	1.9	2.5	730	1,658
Electric	7.1	2.7	359.8	1,179.3	-23.2	-22.6	1.8	4.0	1,736	788
Energy	5.8	9.5	217.5	199.8	-63.5	-57.8	2.8	4.5	386	640
Finance companies	1.0	2.7	2.4	2.4	-6.1	-3.7	2.8	1.7	2	3
Financial other	1.4	2.7	6.3	16.3	-13.7	-14.9	2.6	3.1	2	7
Industrial other	0.6	1.6	27.1	27.2	-37.3	-26.3	2.6	2.5	21	73
Insurance	5.9	2.1	4.4	1.8	-12.1	-13.4	1.8	1.7	5	1
Natural gas	1.3	0.1	145.7	184.2	-35.6	-60.4	1.8	2.6	70	6
REITs	2.6	1.8	5.2	13.4	-6.4	-23.1	2.5	2.8	26	46
Technology	6.4	6.0	7.5	9.8	-3.7	-6.2	2.0	2.2	14	23
Transportation	2.9	3.1	130.2	526.2	-37.9	-61.9	1.9	2.5	75	171
Utility other	0.6	0.4	146.7	446.9	-29.8	-39.3	2.5	2.6	261	42

Source: Robeco, LSEG Datastream, MSCI, TruCost, MSCI ESG Research, Clarity AI. The data was obtained in June 2024. Certain information ©2024 MSCI ESG Research LLC. Reproduced with permission. Trucost Carbon footprint is measured in tons of CO2 equivalent per USD 1 million invested. MSCI Climate VaR is a percentage change in company value. MSCI Implied Temperature Rise is the expected degree increase in temperature relative to the pre-industrial area if all companies in the world were to follow the decarbonization plans of the companies in the (sub-)index. The biodiversity footprint measures the impact of the (sub-)index on biodiversity, where a high score means the companies impacts are worse.

Table 3.1 shows the various risk measures at the market index level and for each sector.[16] The carbon footprint is represented by carbon emissions divided by enterprise value including cash, which has become the default measure of carbon footprints in Europe.[17] The investment grade universe has a substantially lower carbon footprint (64.7 tons of CO2e per USD million invested) than the high yield index (131.0). However, this measure is purely backward-looking. The climate value at risk measure provides a forward-looking, returns-based assessment of the climate-related risks and opportunities an investment portfolio is exposed to. At the market index level, it also suggests that investment grade is less exposed to climate change risk than high yield, with a value at risk of -15.4% for investment grade compared with -29.2% for high yield. The implied temperature rise reflects a company's future emissions plans and translates them into a projected global temperature rise should every company follow the same emissions path.

16. We do not address differences in climate risk across maturities, nor the increased incentives to decarbonize that investors can provide to companies by investing in short-dated bonds; see Koekkoek and Swinkels (2023).

17. Due to data quality issues this is currently limited to Scope 1 and 2, but in the future it will also include Scope 3 emissions. Robeco has started including upstream Scope 3 emissions in its reporting during 2024.

The figure we show here is the aggregate-implied temperature rise at the portfolio level. The energy and basic industry sectors are primarily responsible for the implied temperature rise at the index level, which is why decarbonization efforts are likely to have the greatest impact by focusing on those sectors. Again, high yield has a substantially larger implied rise than investment grade. Robeco uses its proprietary traffic light system to assess forward-looking climate change risk, as explained in the special topic on transition finance in this publication. The implied temperature rise for investment grade credit is around 2.3 degrees, which is not too far off the targets of the Paris Agreement but is at 3.0 degrees for high yield.

We source corporate biodiversity data from tech platform Clarity AI, with its main measure the 'potentially disappeared fraction' representing the potential extinction of global species caused by a company's impact on nature. A higher number indicates a worse biodiversity footprint. Investors in corporate bonds are exposed to the relatively safe part of the capital structure, so even if companies are exposed to some climate change risks, safer corporate bonds are less likely to suffer than equities. Therefore, we assign investment grade credit a neutral climate signal. Since each of the climate change risk measures for the high yield universe is worse, it gets a negative climate signal.

3.5.3 Equities

The key questions for equity investors to consider is how climate change will affect companies' ability to generate the cashflow and the cost of capital of the typical company in their assessment of net present value. Future cashflows might fall as a result of physical risk, such as when droughts or floods damage a company's production facilities, or due to transition risk, such as clean technology investments or higher prices of carbon emissions. Companies involved in developing innovations in support of the energy transition may actually benefit from climate change risk. The other side of the coin is that policy changes delaying the energy transition may be hurting the profitability of green companies.

In the long run, one would expect earnings growth to equal long-run economic output growth. If growth in GDP is structurally impaired by climate change, there could also be repercussions for companies' long-term earnings growth potential. We stated earlier that a reduction in global economic growth due to climate change of 25 bps per year is plausible. Since GDP and corporate earnings have similar growth rates in the long term, we would expect earnings growth to be 25 bps lower per year than it would otherwise have been. This is clearly bad news for equity investors. However, it is not only growth in cashflows that matters, but also the rate at which they are discounted.

Uncertainty about temperature shocks is associated with increases in the cost of equity.[18] Over the long run, this would mean the equity risk premium should rise. Over the medium term, as more equity investors scrutinize the downside risks of climate change, an increasing cost of capital due to a higher climate risk premium would be a negative signal for equity markets.

18. See Balvers, Du and Zhao (2016).

We assess the climate change risks of the broad developed and emerging equity markets and for each sector within them, using the same metrics as for the corporate bond market. The carbon footprint of developed markets is down from 42.8 last year to 40.9 this year. The climate value at risk figure is -11.2%, down from -11.7% last year. The three equity sectors with the worst footprints and highest climate value at risk are utilities, energy, and materials. The implied temperature rise for developed equity markets is 2.5, considerably above the Paris Agreement target. The biodiversity footprint of the developed markets index is 2,324, about half of the biodiversity footprint of investment grade credit. According to this measure, the consumer staples sector has a particularly detrimental impact on biodiversity compared to its climate change risk.

Table 3.2 shows that climate risk metrics are generally worse for emerging markets than for developed markets. The carbon footprint of emerging market equities is 171.3, more than four times higher than the 40.9 for developed markets. Emerging equities' climate value at risk (-28.0%) is more than twice as high as for developed markets (-11.2%). And the implied temperature rise of emerging markets is almost half a degree above that of developed markets. An important reason for these findings is that on average production processes in emerging markets are less clean than those in developed markets.

The biodiversity footprint of emerging markets is also worse at 3,294, compared with 2,324 for developed markets. However, it is much lower than for the corporate credit markets where it is 4,031 for investment grade and even 5,468 for high yield.

Climate risk as measured by the carbon footprint and climate value at risk of developed equity markets is lower than for investment grade credit. However, we expect the impact of climate risks to be higher for equity returns than for corporate bond returns as equities are the first assets to suffer when risks materialize. As such, we expect a negative impact on developed equity returns from the repricing of climate risk over the next five years. As most of these metrics suggest that emerging market equities are more vulnerable to climate change risk than developed markets, we assign a negative climate signal for emerging markets relative to developed markets.

Table 3.2: Climate change risk metrics for equities

	Index weight (%)		Carbon footprint		Climate Value at Risk (%)		Implied temperature rise		Biodiversity footprint	
Sector	DM	EM	DM	EM	DM	EM	DM	EM	DM	EM
Index	**100.0**	**100.0**	**40.9**	**171.3**	**-11.2**	**-28.0**	**2.5**	**2.9**	**2,324**	**3,294**
Communication services	7.7	9.1	3.1	16.0	-6.8	-11.9	1.5	1.8	11	148
Consumer discretionary	10.1	12.8	15.3	24.6	-7.2	-22.8	2.0	2.6	91	105
Consumer staples	6.6	5.3	21.9	54.7	-22.1	-31.4	2.2	2.8	373	273
Energy	4.3	5.3	213.4	536.2	-72.4	-94.5	3.5	3.7	295	541
Financials	15.3	22.0	5.2	3.4	-5.8	-15.7	2.3	2.5	15	5
Health care	11.8	3.2	3.3	19.1	-8.4	-12.6	1.7	1.9	28	21
Industrials	11.0	7.1	33.8	143.2	-6.0	-32.0	2.7	2.6	122	265
Information technology	24.5	23.3	3.2	43.4	-1.1	-16.4	1.8	2.7	25	249
Materials	3.9	7.2	298.4	856.2	-42.7	-67.3	3.0	3.1	531	1,264
Real estate	2.1	1.5	6.5	11.3	-10.0	-23.1	2.4	2.7	25	3
Utilities	2.6	3.1	425.4	1,657.5	-27.3	-68.9	2.0	2.5	808	420

Source: Robeco, LSEG Datastream, MSCI, TruCost, MSCI ESG Research, Clarity AI. The data was obtained in June 2023. Certain information ©2023 MSCI ESG Research LLC. Reproduced with permission. See Table 3.1 for more information on the climate change risk measures.

3.5.4 Real estate

The carbon footprint of real estate is relatively low, as we can see in Table 3.2. Note that this only includes Scope 1 and 2 emissions, and Scope 3 is not included. However, carbon footprint may not be the best measure to evaluate the climate change risk that real estate is exposed to. There are two other reasons why real estate may be vulnerable to climate change. First, real estate may be negatively impacted by the estimated 25 bps per year reduction in global economic growth resulting from climate change, just like other asset classes. Second, physical climate risks are also high for real estate, with the potential for extreme weather events such as flooding to directly impact buildings. There has been limited research on the impact of climate change on real estate. That said, several papers have found that properties in coastal or hurricane-prone areas have fallen substantially in value recently, although some of these falls reversed after the implementation of credible plans to prevent or deal with future disasters.[19]

19. See Clayton, Devaney, Sayce and Van de Wetering (2021).

The climate change risk that real estate is exposed to, is in large part dependent on the exact location of the properties in question. Nevertheless, we assign the same climate signal to global real estate as we do to equities. This is because lots of valuable properties are located in areas threatened by climate change.

3.5.5 Commodities

Climate change seems to be a double-edged sword for commodities. On the one hand, demand for commodities is likely to decrease as global economic activity slows. On the other, increased physical risks resulting from climate change could result in more frequent negative supply shocks hitting commodities, especially agricultural commodities. The overall impact on expected commodity returns under a business-as-usual scenario could therefore be neutral.

However, if progress is made toward the Paris climate targets and the green energy transition, the commodity intensity of economic activity could increase. This is because the battle against climate change is resulting in increased demand for certain commodities used to produce wind turbines, solar panels and batteries. This rise implies that a greener economy could, at least in the medium term, be beneficial for commodity prices. We realize that short-run demand and supply shocks may create excessive volatility in these transition commodities.

On balance, we assign a positive climate signal to commodity markets as we expect the battle against climate change to exert upward pressure on commodity prices. ●

Special topics

Long-term investors generally face long-term challenges. In this section, however, we address three topics that institutional investors may very well be facing right now or in the near future.

SPECIAL TOPIC | CLIMATE TRANSITION

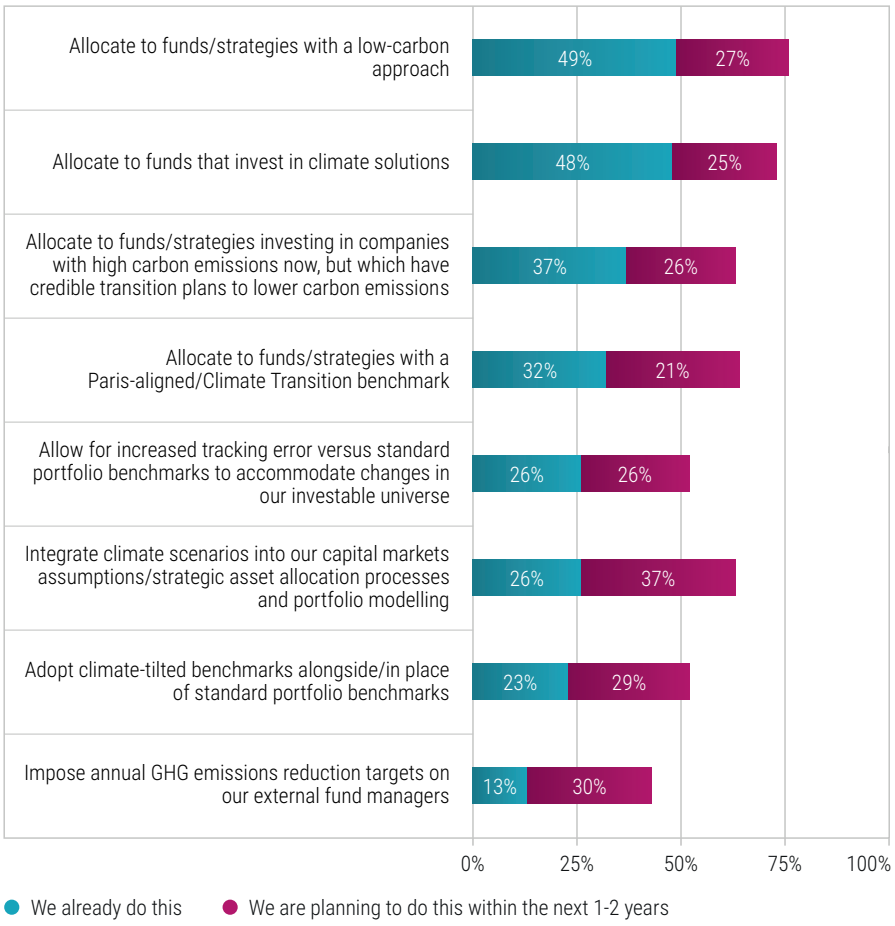
What is climate transition finance and why bother?

Our latest global survey among 300 institutional and wholesale investors provides fascinating insights into the state of play of climate investing.[1] Globally, 62% of investors see climate change as central to their investment policies, and 69% have a net-zero commitment or are in the process of making one. Investors' commitment holds strong in spite of a widespread realization that the policy momentum is weakening: 49% of investors think that the climate transition will be 'too little, too late', and 41% believe that the goals of the Paris agreement are no longer achievable.

1. 2024 Global Climate Investing Survey

This may appear as a contradiction, but when looking at investors' plans for capital allocation it starts to make more sense (see Figure 1). Traditionally, allocations to low-carbon strategies and climate solutions have dominated the approach to climate investing. But there is a new kid on the block: 63% of investors are (or will be) allocating capital to transition strategies, focusing on high-emitting companies with credible plans to lower those emissions.

Figure 1: Investors' capital allocation to climate investing strategies



Source: Robeco 2024 Global Climate Investing Survey.

Historically, policies on transition financing differed from region to region, leading to inconsistent definitions and unclear labels for investments. This meant that it was safest to focus on financed emissions as a core metric in portfolios. But as Goodhart's law states, "when a measure becomes a target, it ceases to be a good measure." It led many institutional investors to steer away from carbon-intensive industries. This reduced accounted emissions in portfolios, but not necessarily real-world emissions. Despite massive commitments to net zero from governments, industry and investors worldwide (equivalent to 92% of global GDP[2]), real-world emissions have continued to rise in the past years. So while net zero continues to be the horizon, the immediate job at hand is to support and accelerate climate action by high-emitting companies. Ergo: climate transition finance.

2. Net Zero Tracker, https://zerotracker.net/

How do we measure climate transition finance?

The need to define transition finance was addressed during Indonesian G20 presidency from 2021 to 2022, with a report highlighting 22 high-level principles for transition finance.[3] This enabled jurisdictions such as the Monetary Authority of Singapore to launch the Singapore-Asia Taxonomy, first in the world to include a transition category that accounts for the capital needs of carbon-intensive sectors. Standard-setters such as ICMA also updated its Climate Transition Finance Handbook to include guidance for issuers in the 'hard-to-abate' sectors and extend the existing Green, Social and Sustainable Bond framework to facilitate transition financing.

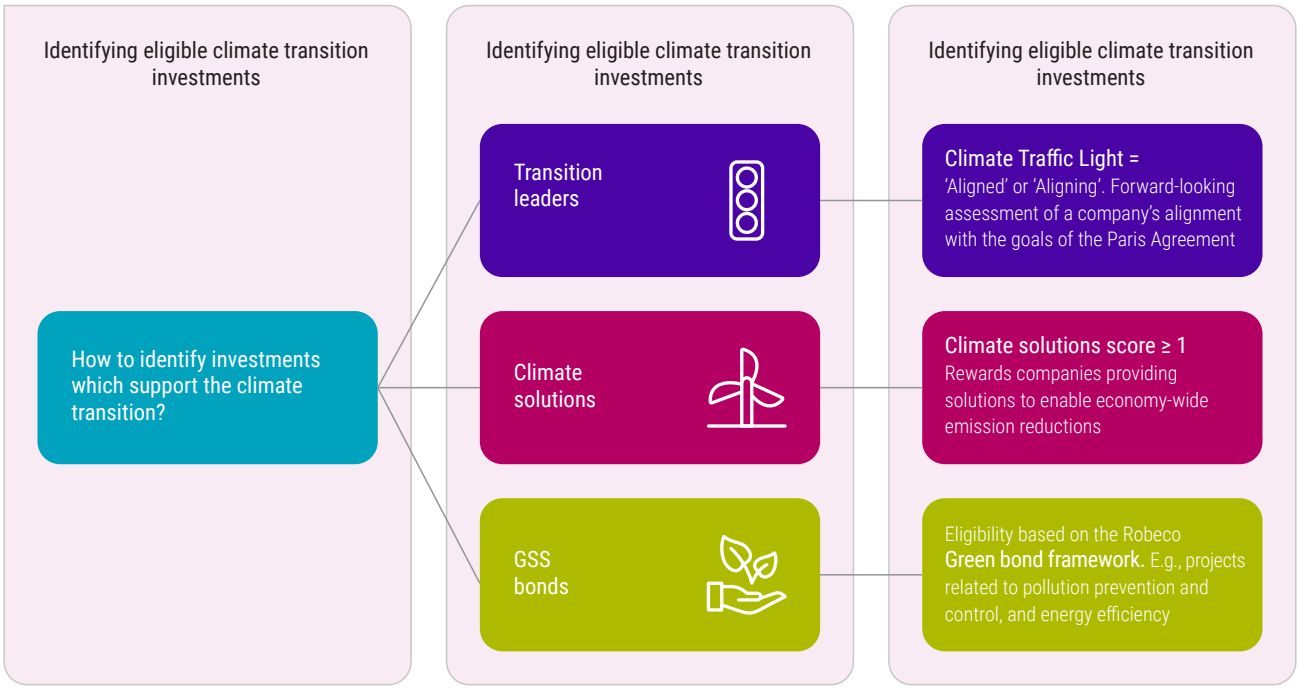
3. https://g20sfwg.org/wp-content/uploads/2022/10/2022-G20-Sustainable-Finance-Report-2.pdf

This guidance is critical because transition finance comes along with significant risk of greenwashing. After all, the idea is to finance high emitters, while labeling it as climate action. The guidance from authorities and market standards emphasizes the need for robust measurement of the ambition, intentionality and credibility of company transition plans. At Robeco, we have operationalized this in three measures which help to identify eligible investments supporting the climate transition:

1. **Climate transition leaders**: Companies that are aligning or already aligned with the Paris Agreement, based on our Climate Traffic Light assessment which evaluates the ambition and credibility of a company's targets with its sector decarbonization pathway.
2. **Climate solutions providers**: Companies that are investing and generating revenues from climate solutions. These are economic activities which enable significant reduction in economy-wide carbon emissions while being compatible with a well-below 2 °C world in 2050.
3. **Green, social and sustainable bonds (GSS)**: Use-of-proceed bonds of companies that are earmarked for the climate transition.

Below we describe the metrics and reasoning behind them in more detail.

Figure 2: Robeco metrics for climate transition finance



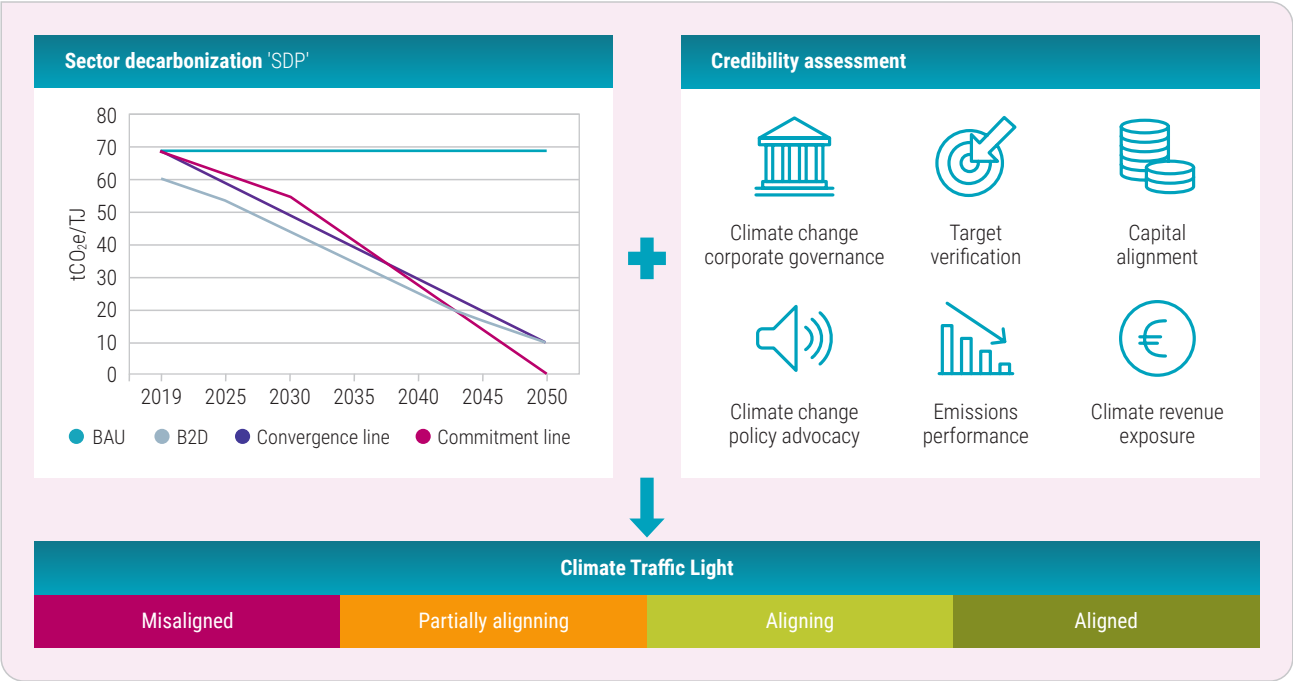
Source: Robeco, 2024.

Climate transition leaders

We identify transition leaders through our Climate Traffic Light. This is our assessment of a company's degree of alignment with the goals of the Paris Agreement, taking into consideration the common but differentiated responsibilities of different nations. The degree of alignment is determined by assessing two questions:

1. Are the company's projected emissions in line with its required sector decarbonization pathway under a well below 2 °C scenario (regionally adjusted where needed)?
2. Does the company have verified targets and a credible plan for achieving its emission-reduction plans?

Figure 3: Robeco Climate Traffic Light



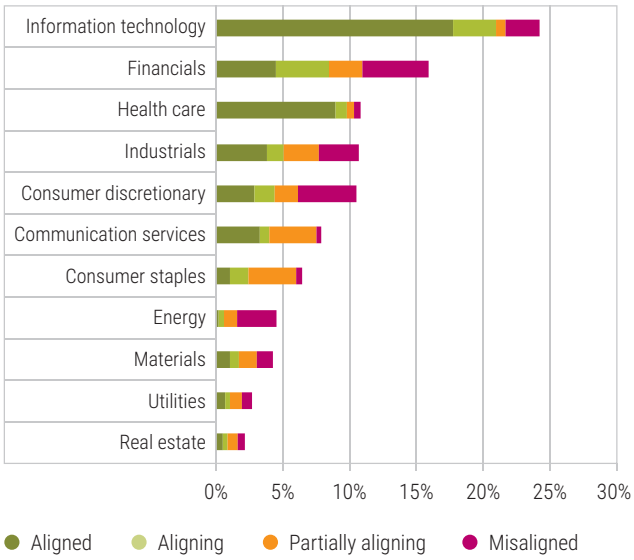
Alignment category	Simple interpretation	Approximate global warming equivalence[1]
Misaligned	Laggard. Not on track to align with the goals of the Paris Agreement due to lack of ambition or lack of credibility of targets.	If all companies had a similar lack of ambition, then the world can be thought of as being on track for a warming of > 2.4 ˚C.
Partially aligning	Some progress toward being aligned with the goals of the Paris Agreement but ambition of targets still too weak or targets lack credibility.	If all companies had a similar ambition, then the world can be thought of as being on track for a warming of 2-2.4 ˚C.
Aligning	Good progress toward being aligned with the goals of the Paris Agreement. Targets still need strengthening to be fully aligned.	If all companies had a similar ambition, then the world can be thought of as being on track for a warming of 1.7-2 ˚C.
Aligned	Leader. Fully aligned with the goals of the Paris Agreement thanks to ambitious and credible targets or to an emissions intensity which is already consistent with that required in 2025.	If all companies had a similar ambition, then the world can be thought of as being on track for a warming of < 1.7 ˚C.

Source: Robeco, 2024.

Below we show the traffic light distribution in a global equity index (MSCI ACWI) and a global bond index (Bloomberg Global Aggregate Bond). Figure 4a shows the traffic light distribution per sector based on its market weight in the MSCI ACWI. From this perspective, a large part of the index appears well in line with the Paris Agreement (i.e. largely green).

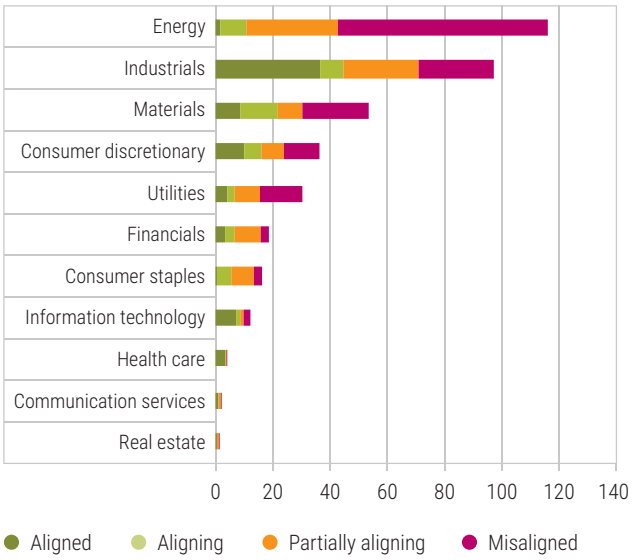
But what matters for the climate transition are the carbon-intensive sectors. Therefore, Figure 4b depicts the same numbers, but now presented per sector weighted by carbon footprint. From this visual it becomes very clear that misaligned and partially aligned companies are dominating the index in terms of climate impact. They are concentrated in the high-emission sectors and an increased effort should be made to bring these into alignment. Figures 4c and 4d illustrate the same for the bond index, with the same outcome.

Figure 4a: Sectoral distribution of the Climate Traffic Light by market weight (MSCI ACWI)



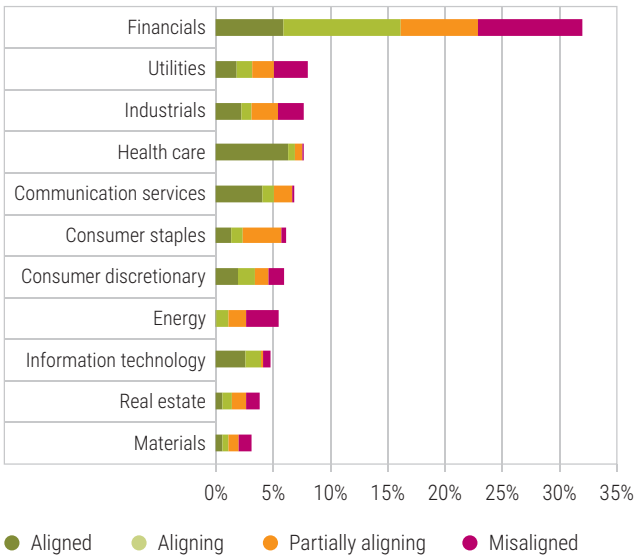
Source: Robeco, 2024.

Figure 4b: Sectoral distribution of the Climate Traffic Light by carbon footprint (MSCI ACWI)



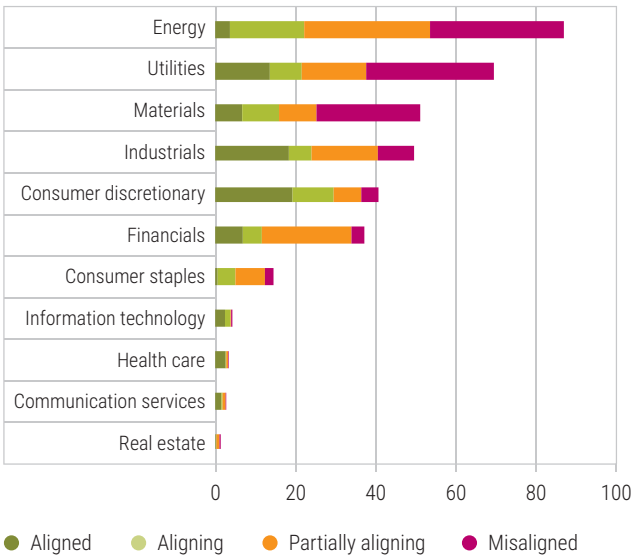
Source: Robeco, 2024. Note: Carbon footprint data for Financials may be artificially low, due to a lack of data availability for some issuers.

Figure 4c: Sector distribution of the Climate Traffic Light by market weight (BBG Global Aggregate)



Source: Robeco, 2024.

Figure 4d: Sectoral distribution of the Climate Traffic Light by carbon footprint (BBG Global Aggregate)



Source: Robeco, 2024. Note: Carbon footprint data for Financials may be artificially low, due to a lack of data availability for some issuers.

Climate solution providers

Companies providing solutions to enable climate change mitigation are often in industrial sectors and therefore may have reasonably high carbon-intensive processes. The IPCC and IEA both provide lists of which technologies, activities and services can substantially contribute to mitigating climate change and thus constitute climate solutions. Jurisdictions like the EU and Singapore establish taxonomies to identify activities which they see as contributing significantly to climate change mitigation and adaptation, both of which can be considered climate solutions.

Based on these definitions in policy and science, we identify climate solution providers by determining whether a company receives a significant share of revenues from these climate solutions. We use specific thresholds based on the level of maturity of an activity. For example, the threshold for revenues from electric vehicle sales are lower than the threshold from renewable energy generation. The thresholds are ratcheted up over time as the net-zero transition unfolds. Table 1 provides some examples of activities that are considered climate solutions and the associated threshold for a given sector.

Table 1: Examples of thresholds for identifying climate solution providers

Sector	Activity	Revenue thresholds & associated climate solutions score
Automotive suppliers	Manufacturing vehicle batteries	19.9% -> +1 29.9% -> +2
Building materials and products excluding cement	Insulation	32.9% -> +2
Energy exploration and production	Wind energy equipment	64.9% -> +1
Metals and mining	Lithium mining	32.9% -> +1 65.9% -> +2
Utilities	Renewabele energy generation	32.9% -> +1 65.9% -> +2

Source: Robeco, 2024.

Green, social and sustainable bonds

For fixed income, various instruments and types exist which help finance the transition. And for the climate transition, our focus is on green bonds where the proceeds will be exclusively applied to finance eligible climate projects. A GSS bond is not a legally protected term. Any firm can claim it issues a GSS bond. Robeco has developed a proprietary five-step analysis to properly conduct selection and monitoring of GSS bonds. The analysis is designed to ensure that only those GSS bonds that adhere to internationally accepted principles and which truly have an impact are eligible for the portfolio. The analysis is in line with the most recent regulatory developments on sustainable finance and applies to both corporate and government bonds.

How does the IP help us generate alpha?

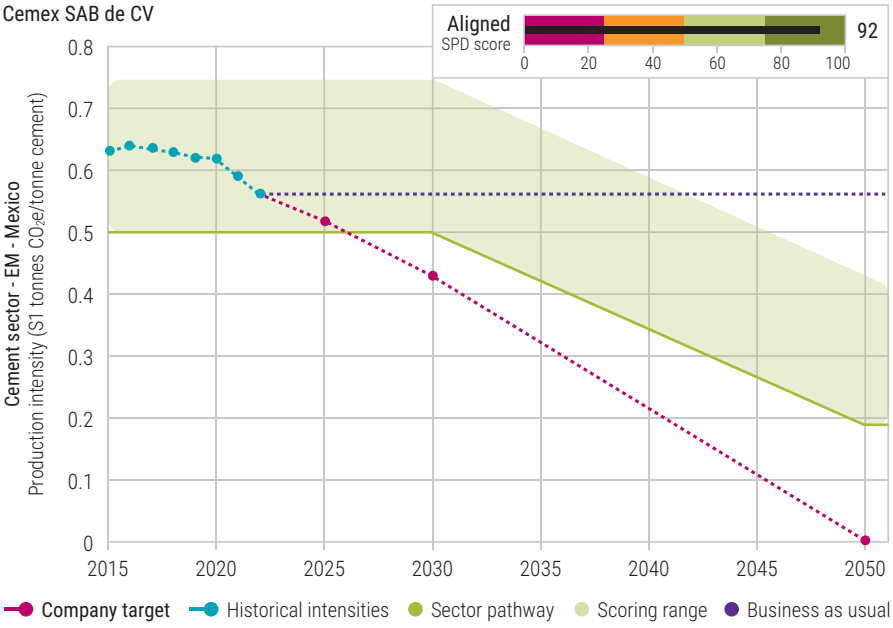
A key differentiator of any portfolio manager is the ability to generate alpha by navigating changing investment landscapes and using research to plug information gaps. As with all changing landscapes, the more angles and information at one's disposal, the better informed the decisions.

It seems clear that regions with high growth rates and high carbon-intensity industries are not transitioning at the pace required. We seek opportunities to impact these sectors by financing solution providers who will benefit from growth, and transition leaders who will benefit from moving from misalignment toward alignment. This forward-looking assessment helps us identify opportunities that go beyond current GHG emission levels toward those who may lead their sector in the future. This type of analysis allows us to project the capex and opex costs and the impact on the company's financial metrics, enabling better evaluation of risk and return against market expectations.

For example, we have observed the impact of capex commitment and issuance of green and sustainable bonds from an auto company impacting its business mix a few years down the line, moving the company from amber to green on our traffic light assessment.

Another example is a cement company that we identified as a transition leader with a high sector decarbonization score and credibility assessment. This was reflected by robust capex and product development plans that led to decarbonizing concrete production and offering low- or zero-carbon cement options. We cannot attribute the company's spread performance against its peers to its own credible decarbonization plans. However, companies who understand their business's sustainability challenges and have a well defined action plan are also strategically well-positioned and are less likely to be caught by nasty surprises, and thus are viewed as higher quality.

Figure 5: Decarbonization trajectory of a cement company

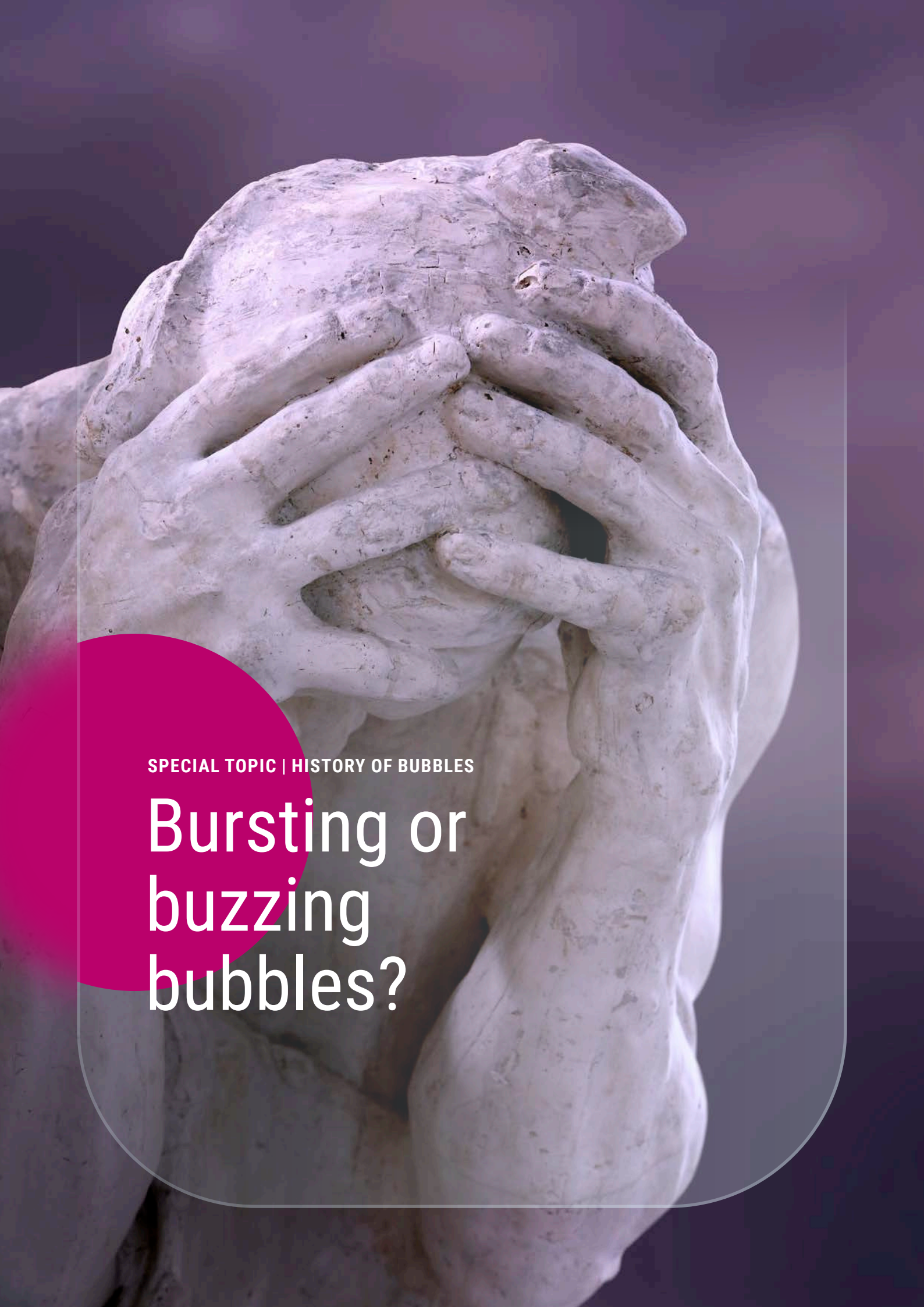


Source: Robeco, 2024.

Transition opportunities are not exclusively in the leader category. Many companies are setting steps to transition their business models toward low carbon, but may lack in ambition or in delivery (i.e. amber traffic light). We believe that transition strategies should also selectively invest in these companies, combined with active engagement to accelerate and enhance the company's transition plan. Our stewardship strategy focuses on material sustainability issues, which provides additional insights for portfolio construction. It's a win-win: aiding organizations in adopting good transition practices while deepening our understanding of each industry's unique challenges and opportunities. Engaging with public and private entities and with policymakers on their transition plans keeps us at the forefront of this changing landscape. This in turn provides us with information to refine our assessments and generate alpha. Our approach to transition brings insight and foresight; incorporating these into our portfolios should bring impact and returns.

In conclusion

Over time, investing in transition companies should result in real-world decarbonization and, indirectly, in portfolio decarbonization. That is the promise of transition finance, and it will need to be proven over time. Through attribution analysis, investors can discern the underlying drivers of portfolio decarbonization to differentiate between the effects of transactions (more exposure to carbon-efficient stocks or sectors) and the effects of real emission reduction by the investee companies. Similarly, when sufficient data is made available throughout time, the contribution of transition stock selection to alpha generation can be discerned. In a near-future edition of the five-year outlook, we hope to report on that again. ●



SPECIAL TOPIC | HISTORY OF BUBBLES

Bursting or buzzing bubbles?

The stocks of the Magnificent Seven (Apple, Amazon, Alphabet, Microsoft, Meta Platforms, Nvidia, and Tesla) have substantially outperformed the rest of the stock market since the start of 2023. While their stock prices increased, their earnings and earnings expectations have grown considerably as well, nuancing the elevated valuations somewhat in contrast to the internet bubble during late 1990s.

But what goes up must come down, right? After the Magnificent Seven outperformed the S&P 500 by about 80% since large language models took center stage in early 2023, these strong stock price increases and high valuation levels may have investors starting to worry about investing into a bubble. Is there a bubble that is going to burst in the coming years, or is this a bubble that keeps buzzing?

Introduction

Identifying bubbles in financial markets is no easy task. A 'bubble' refers to asset prices that have increased a lot over a relatively short period of time, often coinciding with good sentiment around the asset, leading to expensive valuation ratios. These bubbles can be entirely rational, because investors correctly anticipate extraordinary growth in earnings, potentially due to a paradigm shift in the real economy.[1] These are the 'buzzing bubbles' from the title of this piece. Some people would not call these bubbles, because the strong price increases, high valuations, and exuberance are largely justified. Classic bubbles are irrational by nature, as typically investors optimistically overestimate future earnings growth or simply buy assets due to a fear of missing out. These are often followed by a substantial price correction when it becomes clear that the fundamentals of the asset do not correspond to its price. These are the bursting bubbles.

1. The history of financial bubbles is described in more detail in, e.g., O'Hara (2008), Goetzmann (2016), Engsted (2016), and Quinn and Turner (2023).

Kindleberger (1978) defines several stages that determine a cycle that is going to burst. Initially, there is a fundamental disequilibrium at the dawn of a new technology that is promising to disrupt the existing economic structure. Yet, the impact of this promising new technology is still difficult to grasp for the public. Leading companies in the field demand high valuations as early entrants generate large profits. As positive spillovers from the technology start to spread with more firms competing to grab a piece of the pie, the economic change from this new technology adoption becomes more appealing. Investor sentiment surges with subsequent capital flows directed toward the new technology. Stock prices rise further, creating a self-reinforcing loop where the rising stock prices of leading companies also fuel the narrative. Even informed investors with private knowledge that might contrast the popular narrative keep following the crowd as they expect the bubble has further to run.

This behavioral phenomenon is well-documented in various strands of academic literature. It fits anthropologist Girard's (1965) mimetic theory in which individual desires are evoked because of others desiring the same object. Keynes (1936) called this chasing of stocks that already surged a "beauty contest"; we find things beautiful that others deem beautiful. Latecomers to the rally are often using leverage to catch up with peers, fear of missing out is skyrocketing. In the second phase, there is a Minsky moment – the collective realization that the rally is overextended, and stocks have become massively overvalued, often at a point in time when there is little or no news to keep the animal spirits going. This realization ushers in the panic phase where the knowledge of mutual fear of other investors now prone to sell stampedes toward the exit. The market crashes, creating havoc for leveraged investors and financial institutions. What follows is a phase of clean-up and cyclical stagnation, leaving despondency (a general feeling that an age of progress has ended) and increasing demand for regulation.

Not every bubble is created equal. Even bursting bubbles have their merits. As Morck (2022) points out, the social return on capital from innovations that lead to bursting bubbles often exceeds investor returns. He therefore observes that these Kindleberger cycles remain a fundamental advantage, rather than a troubling flaw of free market economies: *"Until economic selection finds something better, leading economies are likely to be those that permit Kindleberger cycles."*

To understand better the current situation we are in, with elevated valuations for some large US companies, we go back and examine historical bubbles. We start with an investigation of stock price run-ups in US industries since the 1920s. We then complement this view with sectoral valuation ratios since the 1980s. We conclude with aligning these insights to comment on the current situation on US equity markets. Is the bubble about to burst, or more likely to keep buzzing?

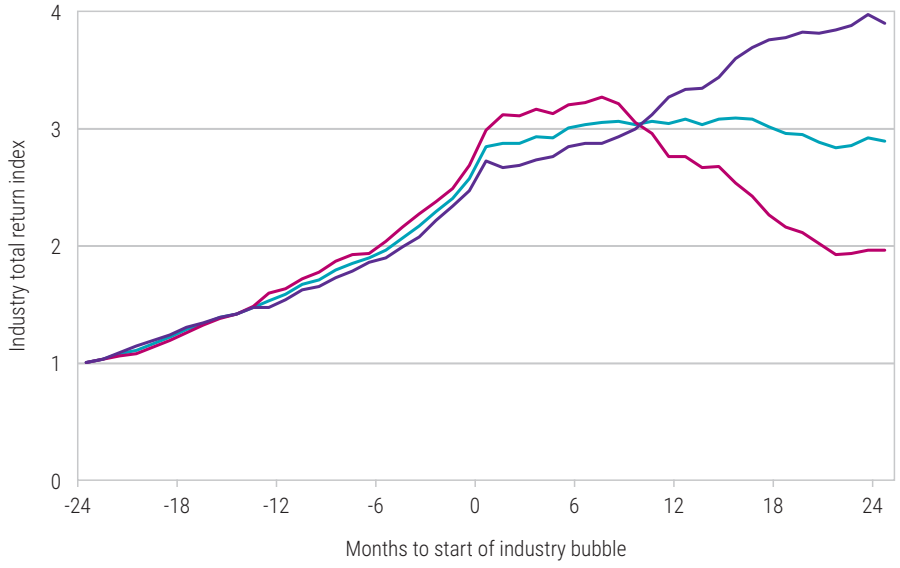
Price run-ups at the industry level

Often crashes are preceded by price run-ups and expensive valuations, but it would be a mistake to take this evidence and conclude that most price run-ups lead to crashes. For that, we need to first identify all run-ups that have taken place and examine what happened afterwards. We replicate and extend Greenwood, Shleifer, and You (2019), and stick to their subjective definitions of what a price run-up and a crash are. They define a price run-up, i.e. a bubble, by a price that has gone up by 100% and has had an outperformance relative to the broad stock market index with 100%, both over the past two years. To avoid counting rebounding prices, they require that the five-year return is above 50%. To avoid company-specific news, they require that the industry consists of at least 10 companies.

We start in July 1926, when the Kenneth French online data library starts. It has a subdivision of the US stock market in 49 industries. We check each month for each industry whether it is in a bubble. We require at least five years in between when an industry can again be in a bubble. We then calculate the returns for these industries in the following two years. If there is a maximum drawdown of more than 40% during this period, we label this as a bursting bubble. If no such large drawdown happens, we label this as a buzzing bubble.

This algorithm leads to 51 bubbles over the period 1926 to 2024. Examples are utilities (1929), gold (1980), software (1999), and steel (2007). Figure 1 shows that about half of these bubbles burst, while the other half kept buzzing. The first two years in this graph contain the price run-up, which is on average 180%. After the run-up, the average return remains constant. However, when we split the results into buzzing (purple) and bursting (magenta) bubbles, we observe that the run-ups of bursting bubbles tend to be slightly more pronounced (200% versus 160%). Nothing much happens during the first nine months after the bubble started. If anything, they continue to grow. The momentum effect at full power. However, after those nine months, there is a clear distinction between buzzing and bursting bubbles. The purple line ends up with another 50% positive return. The magenta line shows a negative return of about 30% over this two-year period (during which the maximum drawdown is at least 40%).

Figure 1: Industry price run-ups and subsequent performance

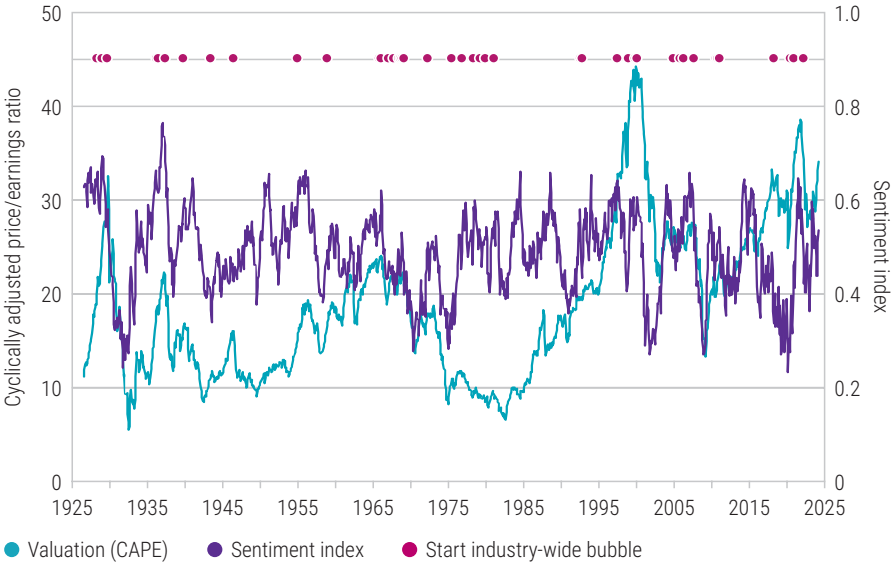


Source: Robeco, Kenneth French Data Library, Greenwood, Shleifer, and You (2019). Average rebased price index of 51 detected industry-wide bubbles (blue), of which 23 in the subsequent two years saw a maximum drawdown of at least 40% (magenta), and 28 that did not experience such drawdown (purple). US industries, sample period 1926-2024.

At industry bubble points, the NYT market sentiment index is above the median, at around 64% of the distribution.[2] For buzzing bubbles, the market sentiment index is only slightly above the median value (53%), indicating average sentiment. On the other hand, for bursting bubbles, the sentiment index is at 77% on average. The general sentiment is clearly very good when bubbles appear that subsequently burst.

2. Source for the NYT sentiment index: https://www.hakholm.com/nyt-sentiment-index

Figure 2: Sentiment and valuation of US equity market



Source: Robeco, Robert Shiller's online data library, NYT, Håkon Magne Holmen. US market valuation and sentiment. The red dots indicate starting points of the 51 detected industry-wide bubbles.

At the same time, bubbles appear when market-wide valuations are expensive. The cyclically adjusted price/earnings (CAPE) ratio is 22.5 on average when a bubble appears, versus 18.8 on average since 1926. For bursting bubbles, the CAPE is higher at 23.5, while for buzzing bubbles at 21.6.[3]

3. The same reasoning would hold for the market-wide CAPEY: median 3.4%, for bubbles 3.0%, for those bursting 2.3%, and for those buzzing 3.6%.

The probability of a 40% drawdown for an industry within a two-year period is about 13%. This probability more than triples to 45% when a bubble starts. Even though bubbles have little explanatory power for average future returns, as the average return over the next two years is close to zero, they do predict increased riskiness!

The role of sector-level valuations

The market-wide valuation ratios suggest that bubbles are more likely when the market is highly valued. However, valuations at the sector-level may be even more informative.[4] If bubbles predict increased riskiness, is this increased riskiness traceable to higher starting valuations during bubbles at the sectoral level?

4. Bunn et al. (2014) uses the CAPE as a valuation indicator for a US sector rotation strategy.

Our preferred valuation measure is the excess earnings yield (so-called CAPEY) which is defined as the inverse of the Shiller CAPE ratio minus the average real bond yield. This relative valuation metric is a proxy for the equity risk premium that the market demands for taking equity risk. Using data since 1973, we calculate the excess CAPEY for the 12 main sectors in the US. We divide these into three groups: below 2%, between 2% and 4%, and above 4%. We display the average five-year excess return for each sector in each bucket. To capture riskiness, we look at the probability of a negative return relative to cash and the average magnitude of the negative return over the following five years. In addition, Table 1 also contains the *current* CAPEY for each sector, and where that number is in the distribution of past CAPEY for that specific sector.

Table 1 shows that all US sectors except energy and financials exhibit a negative correlation between the level of CAPEY and subsequent downside risk. For example, for the 320 months that the CAPEY for the technology sector was below 2%, the equity premium relative to cash was negative during the following five years in 31.3% of the cases. The average of these negative five-year returns was -31.5%. When the CAPEY was above 2%, there were no five-year periods with negative excess return for the technology sector. The higher downside risk is not compensated by higher future returns. The final row, with the average across all sectors, confirms that when sectoral bubbles inflate stock prices relative to their fundamental value, the probability of a subsequent sell-off as well as its magnitude are increasing, while the average return is not.

The current CAPEY for the technology sector is 0.30%, so this fits in the bucket of CAPEY below 2%. It is, however, important to note that the technology sector is often relatively expensive, and that the current CAPEY of 0.30% means that in 37% of the months since 1983, the technology sector has been more expensive than today. Our analysis extends the work of Van Vliet (2021), who found that a lower CAPEY at the overall stock market level is associated with increased downside risk. Our results show that this finding also holds at the sector level.

Table 1: Valuation and downside risk at the sector level

	CAPEY current		CAPEY < 2				CAPEY 2-4				CAPEY > 4			
	Level	Perc	Obs	Avg (5Y)	Prob loss	Avg loss	Obs	Avg (5Y)	Prob loss	Avg loss	Obs	Avg (5Y)	Prob loss	Avg loss
Basic materials	2.27	52%	240	45.2%	13.8%	-16.0%	133	53.0%	3.8%	-6.9%	63	73.8%	0.0%	-
Consumer discr	1.16	48%	291	61.6%	15.1%	-16.0%	121	79.3%	6.6%	-8.9%	24	97.3%	0.0%	-
Consumer staples	2.54	67%	295	83.1%	7.1%	-11.8%	118	54.8%	0.0%	-	23	85.6%	0.0%	-
Energy	3.01	51%	173	64.2%	7.5%	-12.3%	139	65.1%	5.0%	-11.4%	124	16.9%	33.9%	-24.2%
Financials	3.13	57%	214	76.3%	11.2%	-35.7%	111	32.4%	32.4%	-42.8%	111	81.2%	8.1%	-23.5%
Health care	1.42	59%	324	82.2%	12.3%	-9.5%	90	85.7%	2.2%	-6.4%	22	117.7%	0.0%	-
Industrials	1.38	46%	278	66.3%	19.4%	-11.8%	125	69.7%	5.6%	-9.4%	33	104.5%	0.0%	-
Insurance	2.55	54%	238	69.8%	10.9%	-32.9%	78	30.7%	39.7%	-34.1%	120	76.9%	5.8%	-16.8%
Real estate	1.70	60%	331	57.5%	19.0%	-25.4%	93	63.4%	8.6%	-15.1%	12	92.7%	0.0%	-
Technology	0.30	37%	320	95.7%	31.3%	-31.5%	102	130.3%	0.0%	-	14	121.8%	0.0%	-
Telecom	4.31	73%	189	48.9%	32.3%	-49.4%	142	55.7%	9.2%	-8.9%	105	44.5%	15.2%	-7.2%
Utilities	2.62	18%	43	10.0%	51.2%	-18.6%	196	47.8%	8.2%	-12.0%	197	59.2%	0.0%	-
Average			**245**	**63.4%**	**19.3%**	**-22.6%**	**121**	**64.0%**	**10.1%**	**-15.6%**	**71**	**81.0%**	**5.3%**	**-17.9%**

Source: Robeco, LSEG Datastream. First two columns contain the current CAPEY (the inverse of the CAPE ratio, minus the real bond yield) and the percentile in the distribution at the sector level. The next set of columns contains the number of months the CAPEY is in a certain bucket, the average five-year future return in excess of short-term Treasury bills, the probability of a five-year subsequent negative excess return, and the average loss during these negative five-year periods. Datastream US sector indices. Period 1973-2024. Since CAPEY requires 10 years of data, first classification starts in 1983. Since we need five-year future returns, last signal is from April 2019.

Are we in a bubble now?

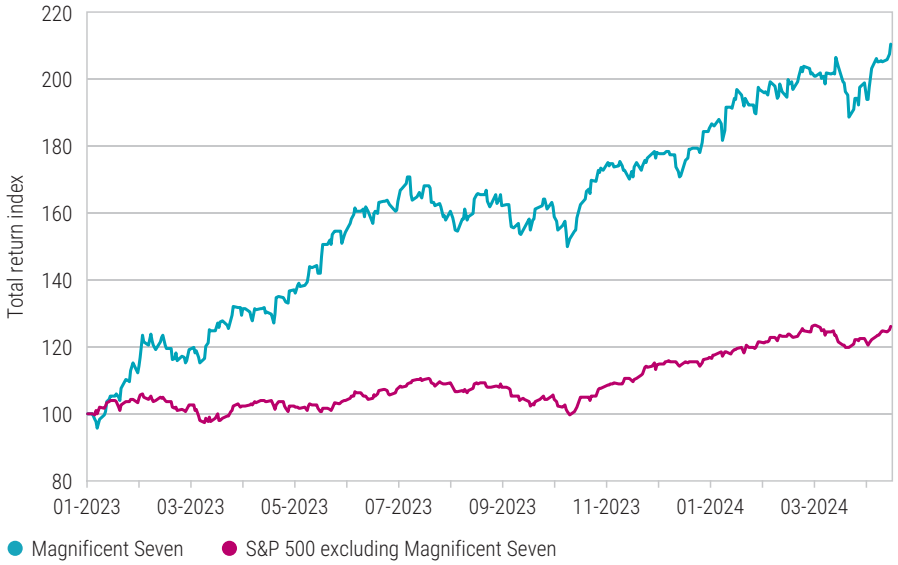
From January 2023, when the ChatGPT story gained traction, the Magnificent Seven stocks have rallied more than 100%, as can be seen in Figure 3.[5] This would be one of the bubble criteria that we highlighted before. The same stocks also outperformed the rest of the US stock market with about 80%, adding to the evidence for a bubble, even though it is still below the 100% threshold that we used in our analysis.

5. There is some look-ahead bias in the basket of stocks known as the Magnificent Seven. Over the past couple of years, acronyms such as FANG, FAANG, FAAMG, MAMAA, each containing somewhat different groups of stocks, have been coined depending on their recent past performance. For example, the N in FANG has conveniently been switched from Netflix to Nvidia.

But is this more likely to be a rational or irrational bubble? The average two-year run-up return of bursting bubbles was close to 200%, far higher than we have observed today. The valuation of the US tech sector is expensive, with a CAPEY of 0.30%. This is on the expensive side, but not exceptionally expensive. The NYT sentiment index is around 0.60, close to peaks just before the burst of the internet bubble and the Global Financial Crisis. Figure 4 shows that the news sentiment for the information technology sector is substantially above the market average, but not more than usual. Even though US consumer sentiment has increased over the past two years, it is not at an elevated level.[6] Hence, it does not really point to all-in euphoria.

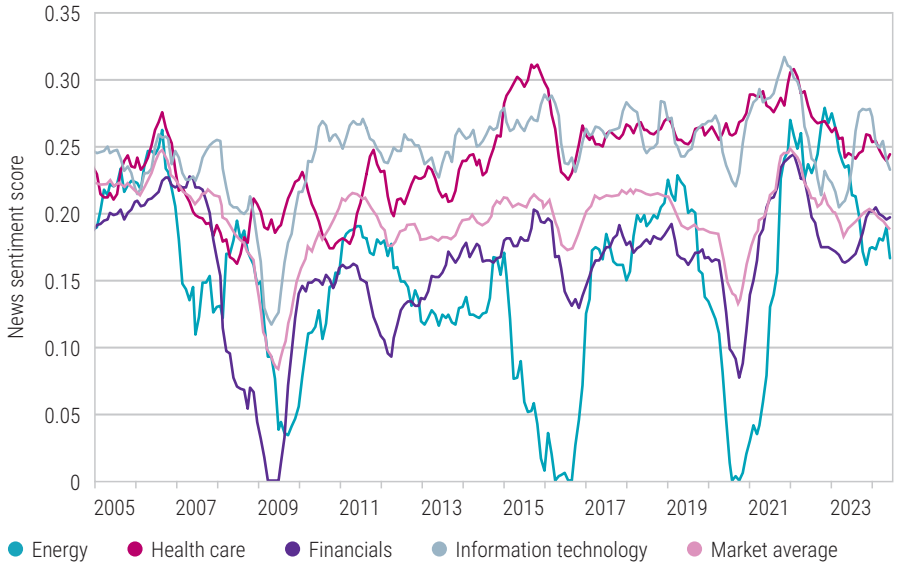
6. Source: https://fred.stlouisfed.org/series/UMCSENT

Figure 3: Performance of the Magnificent Seven versus the rest of the market



Source: Robeco, LSEG Datastream, S&P 500. Rebased price index of Magnificent Seven and the S&P 500 index, excluding the Magnificent Seven.

Figure 4: News sentiment by global sector



Source: Robeco, Ravenpack. Market-cap-weighted average news sentiment score over the past six months for selected GICS sectors and the equally-weighted average across all 11 sectors ('Market average').

Ultimately, while there are definitely signs that we are currently in a bubble with an increased risk of a sell-off in the medium term, it is by no means a certainty that we are in a bursting bubble when it comes to technology stocks. But what can investors do in such circumstance? One way to keep broad equity market exposure but reduce the probability and severity of a drawdown is to allocate to low-risk assets, preferably those with good momentum, high quality, and attractive valuations. This may come at the cost of missing out on a bubble that keeps on buzzing but will likely reduce the pain in case of a correction. ●

SPECIAL TOPIC | EMERGING MARKETS

Japanification of China?

Japan's economy in the late 1980s was characterized by rapid growth and high levels of investment. All the way up until 1989, investors worldwide were astonished at how the Japanese Nikkei index hit a new all-time high on a nearly daily basis. Accounting differences were a catchall to explain the apparent overvaluation of the Japanese equity market that reached a weight of 40% in the MSCI World Index. But within a year, the bubble had burst, and it took the Nikkei 225 nearly 35 years to surpass the December 1989 high. The bursting of the asset price bubble brought about the Lost Decade of economic stagnation and deflation. Land prices bottomed out only in 2005 and the Japanese stock market didn't even hit rock bottom until 2012.

Is history repeating itself in China now? Some parallels are becoming increasingly apparent. In 2017, China was projected to become nearly 50% of the global emerging markets benchmark as more and more of the vibrant A-share market became accessible to foreign investors. The market lost its mojo though after the government clamped down on the all too powerful position of the internet giants that culminated in the cancellation of Ant Financial's (Alibaba's financial arm) IPO in 2020. China now has 'just' a 24% weight in the MSCI Emerging Markets Index. Although it is still the largest, the index level has been cut in half since peaking in 2021.

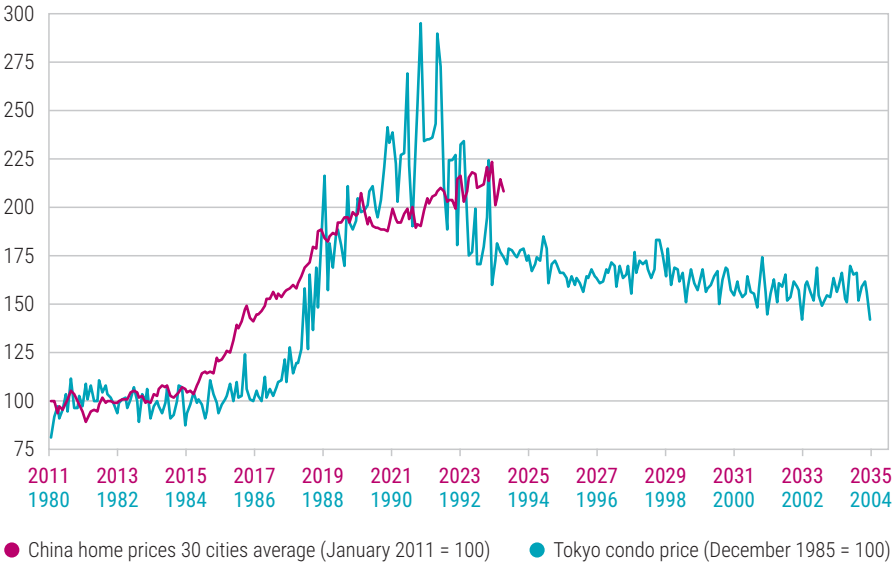
There are also similar problems with the inflated property market and accompanying leverage. China and Japan are both facing aging demographics, while confronted with the dangers of deflation. These experiences warn investors to be wary about countries with outsized index weights. Can China regain its former luster or will it go the way of Japan with a lost generation for the economy and investors? Are we now seeing a Japanification of China?

In both countries, property has always been the key store of value. This is a deeply rooted mentality that is prevalent in most of Asia. Many Chinese investors' philosophy is like this: 'property for the long run, bonds for the medium term to provide income, and equity for the short run'. Asian banks also mostly practice asset-based lending. Unlike in the West, most Asian banks today will still ask a company to put assets as collateral for a loan rather than ask for a growth and cash flow outlook. To get a loan, a company puts down a property that it does not plan to sell anyway.

In 1980s Japan, companies used property and land to lever up and buy more commercial property or expand into other economically unviable projects (Hawaii golf courses, anyone?). In Japan, average land prices rose 20% for five years in a row. This may not even sound like that much, but in the late 1980s the lot on which the Tokyo Imperial Palace stands (3.4 square kilometers) was worth more than the land mass of the entire US state of California (400,000 square kilometers). A bidding war took place between large Japanese corporations financed by cheap capital from banks looking for growth. When it all came down, the corporates and the banks carried the weight of the downturn.

If a bubble in China exists, it lies in residential property, not in commercial. Local Chinese governments have been selling plots of land at ever-increasing prices and recycled the money to finance their infrastructure investments and support economic growth targets. Through property developers, this was paid for by middle-class consumers in the end. Many Chinese families own several properties as an investment or retirement nest egg. In many cases they do not lease out these properties, instead just expect capital gains.

Figure 1: China home prices: Never really bubbly



Source: CEIC, National Bureau of Statistics, Nomura Research Institute.

China is aware of the risks involved in such practices and has already acted to deflate any bubble in the making since 2017. Hence, prices have never gone up as much as during the land speculation frenzy in Japan in the 1980s. According to average residential sales prices per square meter from China's National Bureau of Statistics, there has been a 7.3% annual rise in residential prices. Yes, there have been brief periods of 20-30% annual price increases (in 2004-2007 mostly, also in 2009 and 2018) but these were followed by corrections. In big cities like Beijing and Shanghai, scarcity and speculation have also driven faster appreciation up to 9%. But still, increases of 7-9% are well below the increase in nominal GDP of about 12% over that same period. In Tokyo, home prices grew 13% annually, well above nominal GDP growth of about 8% in the 1980s.

Also, Chinese residential property is financed very conservatively with downpayments of at least 30% on first homes and often up to 50% on second homes. There may just be too many of these apartment blocks, especially if Chinese culture suddenly no longer believes property is the best long-term asset. It is unlikely that will happen, but clearly it undermines consumer sentiment if nest eggs are seen to be falling in value: an obvious wealth effect but not a threat of a downward spiral.

Demographics, debt and deflation

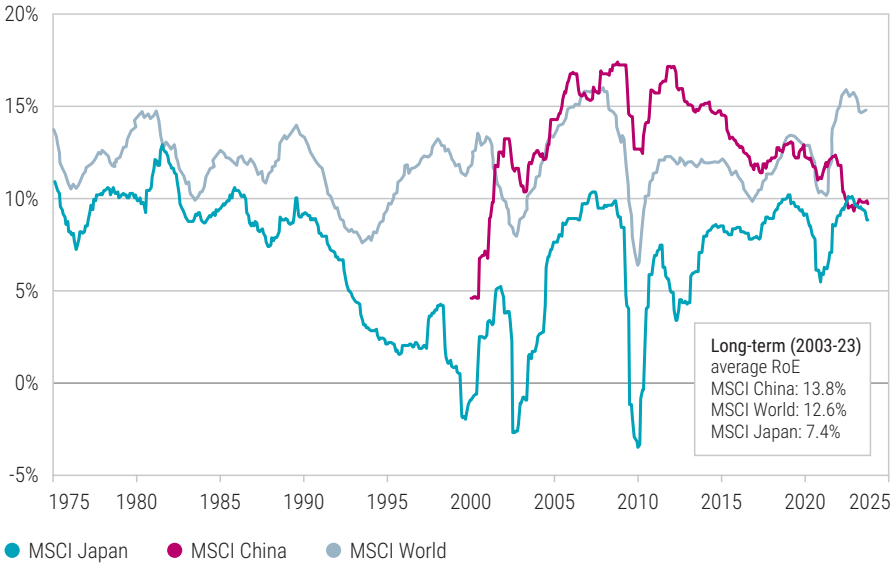
Weak demographics and a zealous belief in growth are also shared traits of Japan and China. Japan's population spiked during the 70s and 80s but started to flatten in the 1990s. It peaked twenty years after the bubble burst in 2010 at 128 million and stood at 123 million in 2023. In comparison, China's population grew 1-2% in the 80s and 90s, peaked in 2021 at 1,412 million and began to shrink slowly since then. This demographic challenge affects the housing market, as demand should start to recede albeit with an extended lag. When policymakers zero in on growth, overinvestment and misallocation of capital can occur. As demand lags behind supply growth, oversupply pushes down the prices of goods. Subsequent deflation increases the real value of debt, especially with high leverage, necessitating policy to create inflation to keep this manageable. If there ever was a time for easy monetary policy in China, it is now. Japan is generally seen as having erred in keeping monetary policy tight for too long during the early 1990s.

While China's household debt is low, corporate debt is high in both China and Japan. This has been the result of decades of supply-side economics. At the first sign of economic weakness, China tends to respond with a build-it-and-they-will-come solution, leading to first-world infrastructure but also a lot of overcapacity. Even today, with a big move toward investment in green transition capacity and infrastructure, China apparently overdoes its efforts to become a world leader. This results in a lack of pricing power and a severe risk of deflation.

Consumers hold the key to future growth. In order to get them to reduce savings they need comfort that property prices won't fall any further. However the government has been loath to provide that comfort out of fear of reigniting another speculative wave of property buying.

China has a better starting position to deal with leverage than Japan had, since even though its population is already in decline, it has more growth runway ahead than Japan at that time. Per capita income in Japan at the end of its economic miracle was 120% that of the US, while in China it stands at 16% now. Economic growth at about 5% driven by productivity gains means China can grow out of its problems far more easily.

Figure 2: Better RoEs in China than in Japan



Source: MSCI, Morgan Stanley research.

China's pragmatic nature of policy is generally admirable, but less so today. Over the last few years, there is a worrisome trend that technocrats and open-minded policymakers have disappeared and have been replaced by yes-men. Dogmatic decisionmakers are taking over from pragmatists. In a country where the leader is not a trained economist and clearly has too much power and too few critics around him, the risk of severe capital misallocation is real. This needs to be monitored as it can result in more debt and more deflation in China.

Exchange rate implications

In Japan, the property bubble burst due to the largest global economic powerhouses' efforts to reduce the value of the US dollar. The 1985 Plaza Accord came after trade friction between Japan and the US, where Japanese car makers were swamping the US market with cheap cars driven by an artificially cheap currency, which resembles current allegations between the US and China. The Plaza Accord succeeded in strengthening the Japanese yen, from more than 250 yen per dollar in 1985 via 150 at the peak of the bubble to below 100 by 1995. The yen became an expensive currency depressing profit margins for exporters. Also, a stronger exchange rate makes imports cheaper at a time inflation was sorely needed.

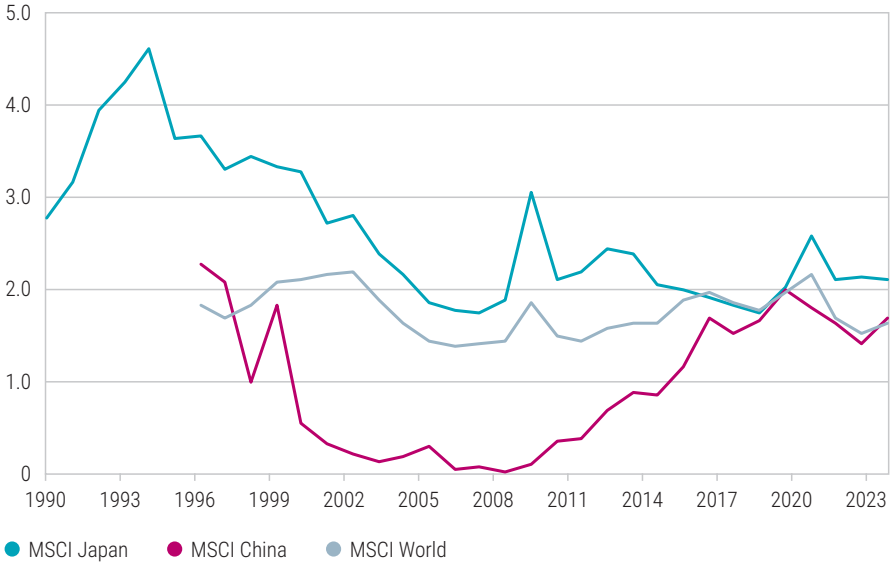
US politicians would like to claim the yuan is cheap today, but real effective exchange rates calculations show it is actually a little expensive. China is unlikely to devalue its currency in order to boost the export sector, as that would undermine its ambition to become a global currency. Even at today's rate, the country is super-competitive and generates a trade surplus of about USD 1 trillion annually. China will not have to fight imported deflation from a rising currency. On the other hand, a weaker currency is likely to further boost capital outflows. Its interest will be best served by currency stability and the yuan is unlikely to move a lot over the next five years.

RoEs and equity markets

For long-term equity investors, return on equity (RoE) is a crucial yardstick. When RoE is above its cost of equity (CoE), the company generates economic value added.[1] A company with RoE below CoE has no license to grow. As seen in Figure 2, Japan's RoEs were just around 10% even during the bubble years, only to fall to zero by the end of the century. It is only recently that RoEs have recovered toward 10%. Chinese RoEs have been well above 10% for over two decades.

1. Cost of equity equals the risk free rate plus the equity risk premium times the company's beta.

Figure 3: China vs Japan net debt/EBITDA (ex-financials)



Source: MSCI, Morgan Stanley research.

The property downturn in Japan first hit the corporate sector. This resulted in very risk-averse behavior from corporates. US-Taiwanese economist Richard Koo dubbed this phenomenon the 'balance sheet recession'. Having become increasingly risk-averse, Japanese companies looked to restore balance sheets and raised equity capital to get there. From 1998 until 2010 they issued equity at very dilutive prices to bring gearing down and solve their problems. Ever since then, many have been targeted by activist investors for having lazy balance sheets with not enough leverage. In capitalist thinking, debt is cheap and equity is expensive. Companies in need of money must take on more debt and only raise equity as a last resort.

Considering Chinese companies' balance sheets probably won't be affected by the fall in property prices, neither are they expected to show similar risk-averse behavior. There is a risk though that many industrial companies have overinvested and will need to deal with lower margins and potential write-downs of obsolete factories in the next five years. This could cause Chinese RoEs to fall further and would set the stage for lackluster equity market performance. Though gearing of listed companies has gone up in China (see Figure 3) over the past decade, it is quite average in an international comparison and balance sheets do not need repair via equity issuance. Instead, many private companies have done the capitalist thing to announce buybacks in response to the weakness in share prices: clear capitalist behavior that equity investors will appreciate.

Chinafication of Japan

Finally, we try to turn this story on its head: where can we see the scope for Chinafication of Japan? RoEs are the answer again. The Chinese corporates have been far better at profit generation in the early Chinese boom years. Now, Figure 2 shows Japan is improving while China is on a disturbing downtrend.

Investors must be aware that the link between economic growth and equity market performance is limited. With all the attention on potential economic trouble, investors would be well served to focus on corporate actions, and consult the index composition to confirm what you are actually buying. Over the last 30 years, the (USD) return on the

offshore MSCI China index has been barely positive to the tune of 1% per annum. This was burdened by a lot of primary activity at elevated prices. However, an investor in the local stock exchange has compounded at a nice 8% in Shanghai (with lots of financials in the index) and 10% for Shenzhen (where most of China's technology leaders are listed).

In Japan the comparable USD return over the 30-year period has been just 2%. RoEs matter more for investors than GDP growth data.

Conclusion

The similarities between Japan and China are obvious, yet the way forward will be different. There are three main reasons to assume China will not need to face the ordeal that Japan lived through. First, Chinese policy makers have been on top of any asset bubble appearing and have been able to contain it to a manageable level. There is far less leverage in the China property market than there was in Japan.

Second, China did not make the policy mistake of keeping monetary policy too tight. China can still grow its way out of the problem as there is plenty of room for productivity gains. Government policy makers will need to play their cards right though and the politically driven move from pragmatic to dogmatic decisions raises risks. Third, the reaction function from corporates in China is unlikely to be as risk-averse as Japan's. Japanese corporates were forced to take big write-downs on their balance sheet and de-levered very quickly, depressing RoE. Chinese corporates so far seem to better understand the cost of equity and also have not been shellshocked into a quick de-leverage.

Return on equity is far more important for equity investors than economic growth. Chinese companies must now demonstrate they can sustain RoEs in the face of overcapacity. If they can, the equity market is undervalued. Conversely, Japanese RoEs are on a decisive uptrend, and if they can reach the old Chinese levels, the equity market outlook for Japan will be bright. ●

EXPECTED RETURNS 2025-2029

4. Macro

In his March 2024 essay titled ‘Rethinking my economics’, Nobel Prize winner Angus Deaton confessed to having changed his mind, conceding that markets have proven to be less free and less liberalized than he and his peers had previously assumed. In fact, he said, “without an analysis of power, it is hard to understand inequality or much else in modern capitalism” (Deaton, 2024).

Today's economic landscape looks fragmented as the Washington consensus[1] is crumbling. Industrial policy and retaliatory tariffs are back. Export controls are surging. The theory of limited government has been abandoned and fiscal dominance seems to rule the day; the US government is still running a deficit of about 6% at a time that the number of job vacancies is 1.2 million higher than the number of unemployed people. Meanwhile, the labor market is not in equilibrium with capital markets judging by the fact that US labor productivity has outpaced growth in private sector wages since the late 1990s, such that there was a cumulative gap of almost 50% by 2023.

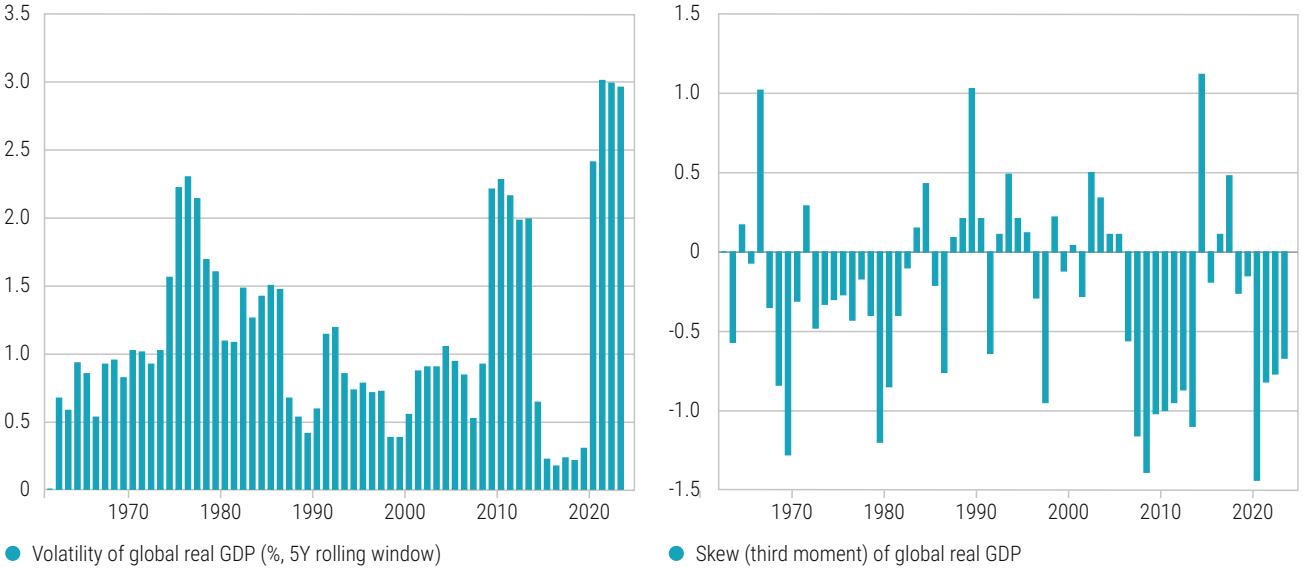
The hollowing out of the middle class, evidenced by rising economic inequality, has given rise to a wave of populism on both the right and left of the political spectrum in a busy year for elections around the world. Our theme last year describing a triple power play between capital and labor, fiscal and monetary authorities, and the haggling between the US and China for supremacy appears to be in full swing.

1 The Washington consensus, coined by economist John Williamson in 1989, proposes a set of policy rules based on free-market principles including a limited government, aiming for small fiscal deficits, trade liberalization, removing restrictions on FDI, deregulation and privatization.

IMF pessimistic about growth

The global economy's late-cycle expansion is persisting, still proving resilient to a maturing monetary policy tightening cycle. The post-Covid expansion has been unusually vibrant and long-lived, with the US largely defying the effects of higher real interest rates so far despite leading indicators with a proven track record (like an inverted US Treasury yield curve) suggesting otherwise. Reduced susceptibility to higher interest rates, partly thanks to a prolonged deleveraging cycle by US consumers during the Great Expansion from 2009-2019 and the terming out of debt in other regions, explains one part of this puzzle. Extraordinary pro-cyclical fiscal expansion by governments (notably the US) has also helped fuel the post-Covid expansion.

Figure 4.1: Recent GDP volatility illustrates high forecast uncertainty

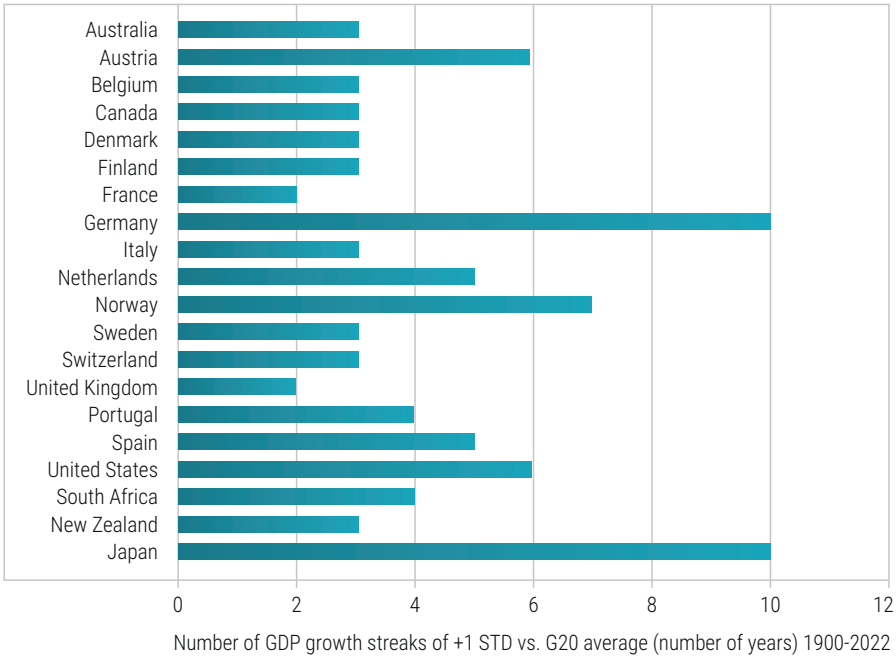


Source: LSEG Datastream, Robeco. As of July 2024.

The volatility of global economic growth is still historically elevated, highlighting an economic system that has suffered (and recovered) from frequent negative supply-side shocks over the past few years. The good news is that the downside risks to global growth have been weakening recently. But among official forecasters there is pessimism about the outlook for the next five years. The IMF expects global growth to average around 3.1% per year, its lowest forecast for global economic growth in decades. The institution sees a diverging global economy toward 2030, especially when taking into account the impact of AI, which should reinforce the US's outperformance given its technological lead in this field.

While there has been much talk about US exceptionalism, by historical standards the US's post-Covid performance hasn't been truly exceptional at all. Over the past five years, the US economy has outgrown its OECD peers by 50 bps per year in real GDP terms. We define exceptionalism as the ability to durably outperform peers by at least 1 standard deviation per year, and our analysis suggests that this requires 250 bps outperformance in real GDP terms on an annual basis. Based on analysis of 20 countries from 1900-2022, we find that on several occasions countries have managed to outperform their peers by at least 1 standard deviation (equating to 250 bps higher real GDP growth per year) for 10 consecutive years (Germany 1945-1954, Japan 1954-1963). From a historical perspective, the US has yet to prove its credentials.

Figure 4.2: US exceptionalism in perspective

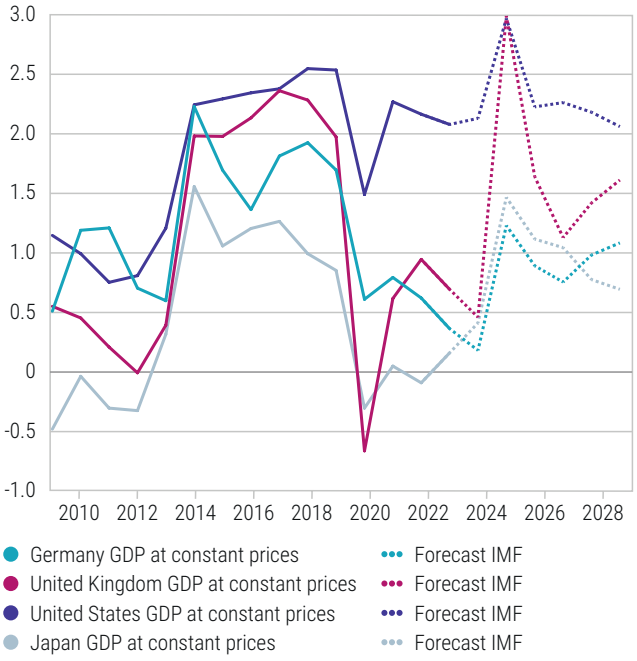


Source: Madisson database, calculations Robeco.

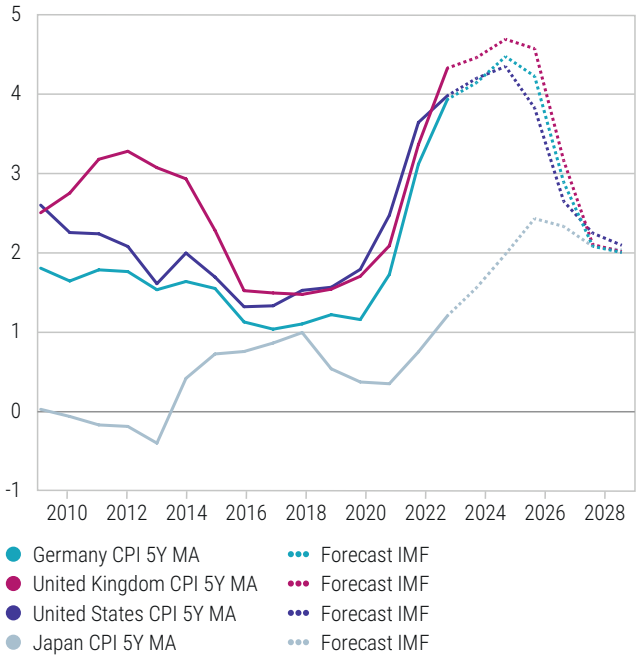
There are three reasons why the IMF has become more pessimistic, and they stem from a supply-side analysis of the global economy. First, it expects labor force growth to slow down. Second, it anticipates a slowing of capital formation. Third, it expects total factor productivity growth to slow down. The IMF expects US real GDP growth of close to its 2% per year long-run trend over the next five years. However, equity-market-derived indicators, like the Shiller CAPE and the implied equity market risk premium, are markedly more upbeat, suggesting that the US economy will grow by an average of 2.4–2.9% per year up to 2030. The Philadelphia survey of professional forecasters is in the middle, anticipating 2.2% US real GDP growth over the next 10 years.

Figure 4.3: Forecast IMF shows trend-like growth with smooth convergence of DM inflation toward target

DM growth peaks in 2025, back to LT around 2029



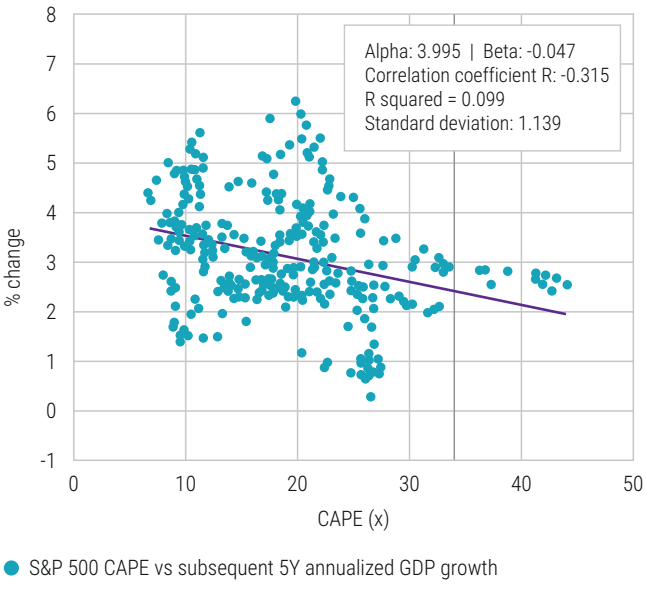
Inflation back to 2% target



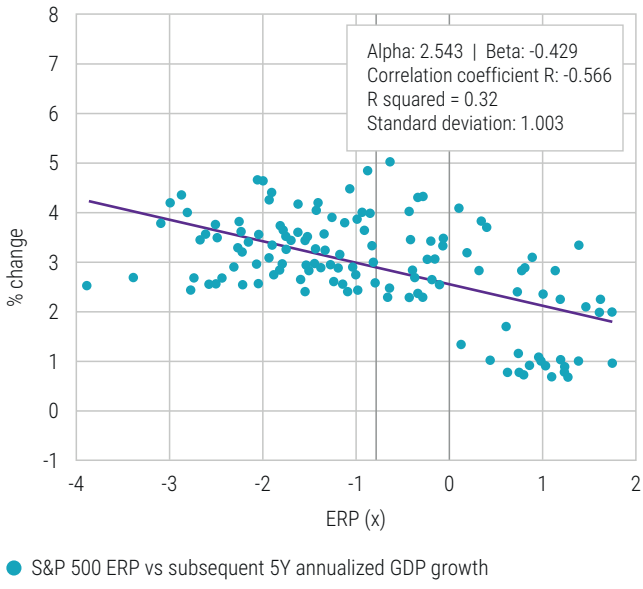
Source: LSEG Datastream, Robeco. As of July 2024.

Figure 4.4: Market-implied indicators for the US more optimistic compared to IMF, see 0.5-1% higher growth

Based on CAPE, US GDP to grow 2.4% CAGR in the next 5 years



Based on ERP, US GDP to grow 2.9% CAGR in the next 5 years



Source: LSEG Datastream, Robeco. As of July 2024.

Although there has been a relatively low degree of dispersion among long-term GDP forecasts recently (as can be seen in the narrowing gap between the 75th and 25th percentiles of GDP growth estimates among the Philadelphia survey of professional forecasters), we believe we live in 'the age of confusion'.[2] The many twists and turns in the forward guidance provided by the Fed, the inverted US yield curve that has not led to a US recession so far, historically low OECD unemployment rates persisting even while some

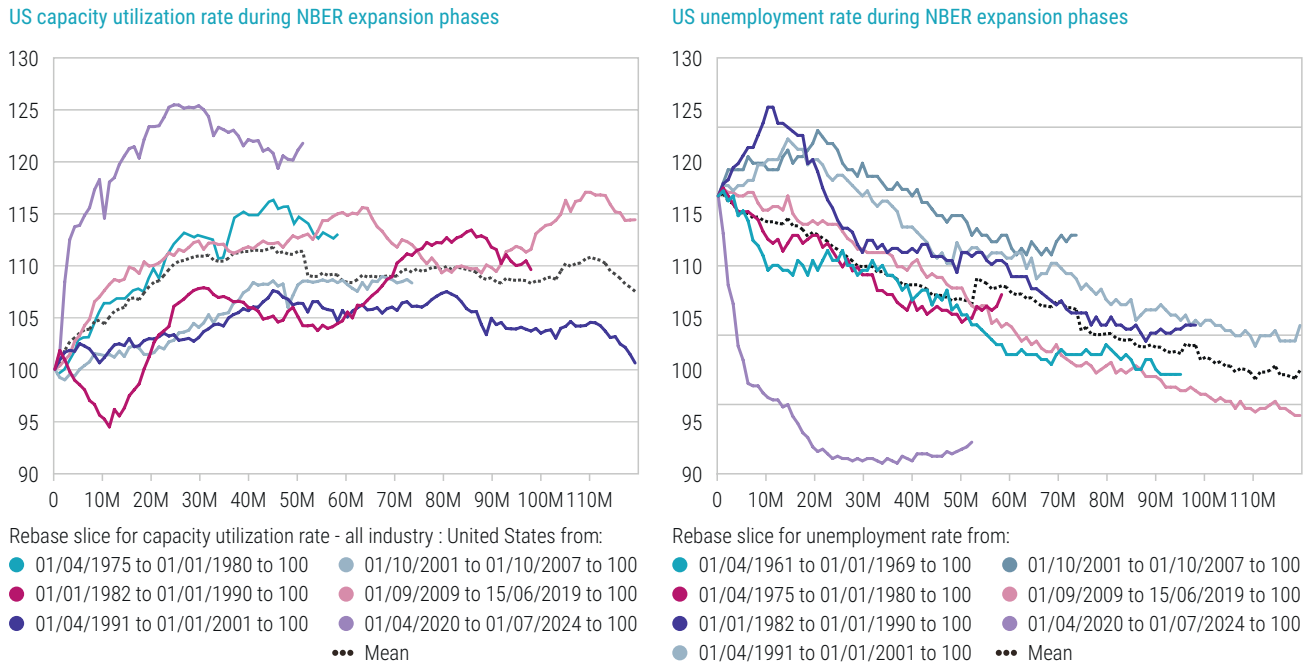
2. The title of our 5-year Expected Returns 2023-2027.

OECD countries have been in recession, and the US government running a 6% budget deficit with unemployment around 4% are just a few examples of how the nature of the post-Covid era feels radically different, making projections challenging.

Paradoxically, the narrowing margin between professional forecasts could belie the increased uncertainty about those forecasts.

The different nature of this post-Covid expansion becomes clear looking at the swift increase in capacity utilization since the pandemic recession ended in 2020 relative to the average economic expansion in history. Similarly, unemployment has dropped much more pronounced compared to the average drop in unemployment after the US economy historically moved from recession into an economic expansion.

Figure 4.5: A high-pressure expansion evidenced by capacity utilization 10% above average and the US labor market being about 45% stronger than in the average business cycle



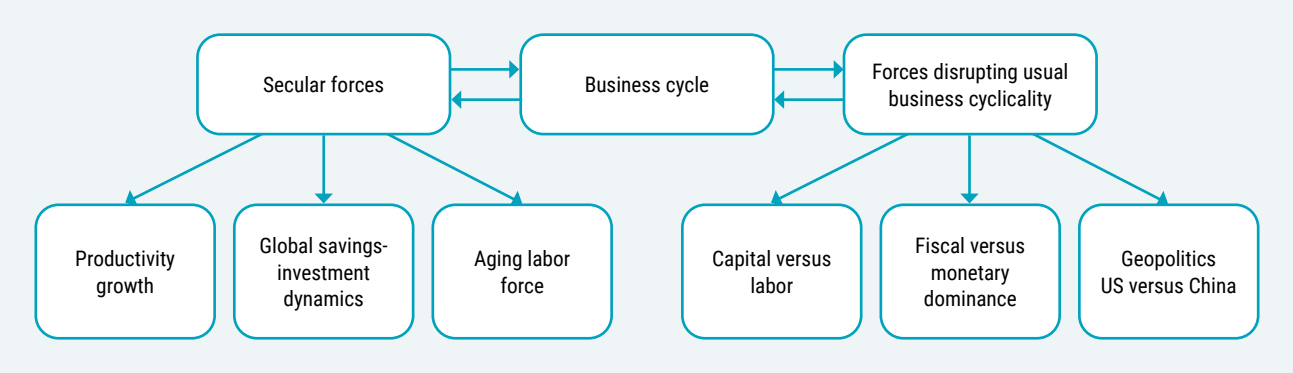
Source: LSEG Datastream, Robeco. As of July 2024.

4.1 Extending our macro framework

Given the elusive nature of this cycle, a change of perspective is needed. So, like Deaton, we have been rethinking our economics. Grasping the nature of this cycle is not about central banks navigating a soft or hard landing. Over the medium term the rugged surface of the airstrip (economic structure/supply side) should prove more significant than the luck or skill of the pilot (whether that be Jerome Powell, Christine Lagarde or Kazuo Ueda). Will the US really prove exceptional? Could inflation make a comeback? What is the impact of AI on the neutral rate? How much spare capacity is there for non-inflationary growth? Many of these questions require a view transcending business cyclicality, so this year we extend our triple power play framework by analyzing in more depth the secular forces that influence macroeconomic outcomes over a five-year horizon. Specifically, we discuss the three building blocks that determine the supply side of the economy: labor force growth, productivity growth and capital formation. Like a calm ocean wave, they are hardly noticeable until they are about to break on the beach, when their impact becomes visible. While the battle against inflation is currently going well, it is the supply side that will ultimately determine whether the war on inflation is won.

Figure 4.6: This year: Extending last year's Triple Power Play theme into Atlas Lifted

The building blocks of our scenario through a qualitative lens



Source: Robeco, July 2024.

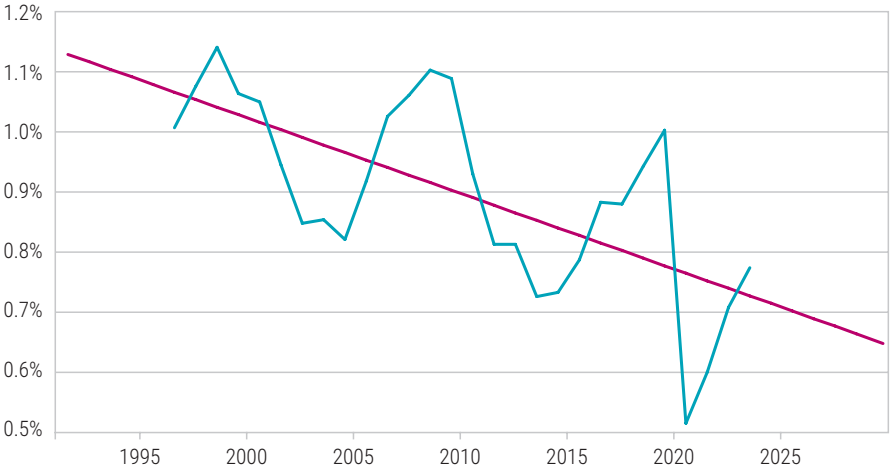
In the remainder of this chapter we discuss the six pillars shown in the graphic above; productivity growth, global savings-investment dynamics, an aging labor force, capital versus labor, fiscal versus monetary dominance and geopolitics. We use them to build our scenarios at the end of the chapter.

4.2: Pillar 1: An aging labor force

"Demographics is destiny", according to French philosopher and father of sociology Auguste Comte (1798-1857). Some 200 years later he still seems to be correct as demographics are determining the destiny of today's economy and financial markets. For instance, Ferreira and Shousha (2020) find that the decline in the working age share of the US population between 2005 and 2018 dragged down the US's neutral rate of interest, which serves as the beacon for monetary policy.[3] Our own research finds that the correlation between the 10-year growth rate of the civilian labor force in the US and long-dated Treasury yields from 1958-2024 was 86%. The cyclical trough in the labor force growth rate around the middle of 2020 coincided with the trough and subsequent trend reversal in longer-dated US Treasury yields since.

3. Note that the change in the labor force is primarily a function of population growth, changes in the labor force participation rate and net immigration.

Figure 4.7: OECD labor force growth is cyclically elevated



Source: LSEG Datastream, Robeco. As of July 2024.

There has been a cyclical rebound in labor force growth in OECD countries during the post-pandemic expansion thanks to higher pay, remote working and government support. However, the long-term downward trend looks to be intact as populations age. This is likely to result in labor force growth falling to 0.5-0.7% in our baseline scenario, modestly above IMF WEO 2024 projections of 0.5%.

US labor force growth could disappoint in the future if the US were to implement more stringent migration rules or even deport millions of people from the country as Donald Trump has proposed.[4] Net migration into the US has clearly eased labor market pressures. A Kansas Fed (2024) study shows that wage growth slowed by roughly 0.7 percentage points for every 1.0 percentage point increase in an industry's immigrant employment growth.

4. Donald Trump explains his militaristic plan to deport 15-20 million people | CNN Politics.

4.3: Pillar 2: Total factor productivity growth at the dawn of artificial general intelligence

1953 saw three major developments that would change the world: the discovery of DNA, the development of the first thermonuclear bomb and the digital computer.[5] This highlights how rapid technological change can emerge and coalesce in different fields that pursue a simultaneous quest for structure and sequence. Today, biology and technology might enjoy another joint evolutionary leap thanks to new insights into neural networks, with recent neural-network-enabled advances in protein folding just one example.[6] There may be rapid progress in this field later in the 2020s.

5. See Dyson (2012).

6. Artificial intelligence powers protein-folding predictions (nature.com).

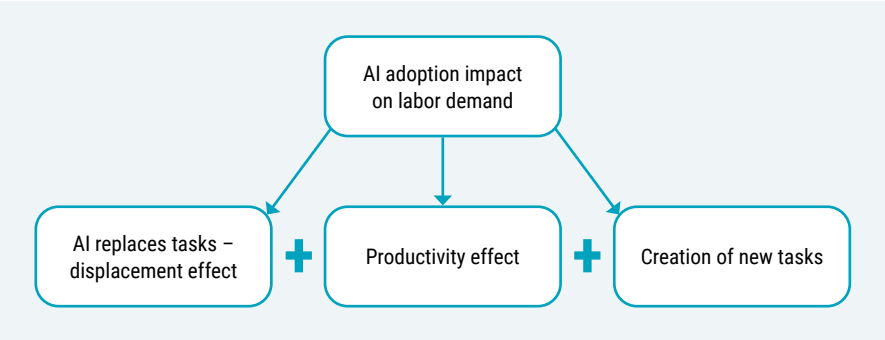
The pace of recent technological advances is reflected in the significant year-on-year changes in AI experts' views on when artificial general intelligence (AGI) will emerge. Grace (2024) shows in the 2023 ESPAI survey that experts in the field expect AGI (which accomplishes every task better and more cheaply than human workers) to appear in 2047. This is 13 years earlier than in the preceding 2022 ESPAI survey. Raymond Kurzweil, a prominent futurist, predicts that AGI will emerge around 2029.

The dawn of AGI and progress in AI in general will have major consequences for global productivity growth. Since the start of the industrial revolution, Western economies have enjoyed at least four long-wave productivity cycles that lasted on average 50 years. The current, fifth, wave, which started in the early 1990s, is based around information technology. Information is, by definition, the reduction of uncertainty, and is therefore all about distinguishing the signal from the noise. In enabling information gathering processes, productivity growth increases resulting from AI could arise for a variety of reasons.

First, automation could reduce the cost of performing certain tasks like data classification and summarizing text. Second, AI could be complementary to labor and increase labor productivity by enabling workers to specialize by outsourcing certain tasks to AI. Third, AI could create new tasks that boost real activity like AI trainers and prompt engineers. Fourth, AI could make existing technology more productive, for instance by enhancing the algorithms involved in automation. Estimates of how much AI will boost productivity vary greatly.

At the optimistic end of the spectrum Korinek and Suh (2024) forecast baseline GDP growth of 100% over the next 10 years with AGI just around the corner. The most bearish forecast, provided by Acemoglu (2024), only expects 0.07% total factor productivity growth over the next 10 years. Admittedly, Acemoglu only looks at AI's impact on automation on total factor productivity growth, not accounting for the three other ways in which AI may boost GDP per capita growth. McKinsey (2023) is a representative of a broader consensus, forecasting a 50-340 bps increase in annual GDP per capita growth over the next 10 years if AI is adopted along with other forms of automation.

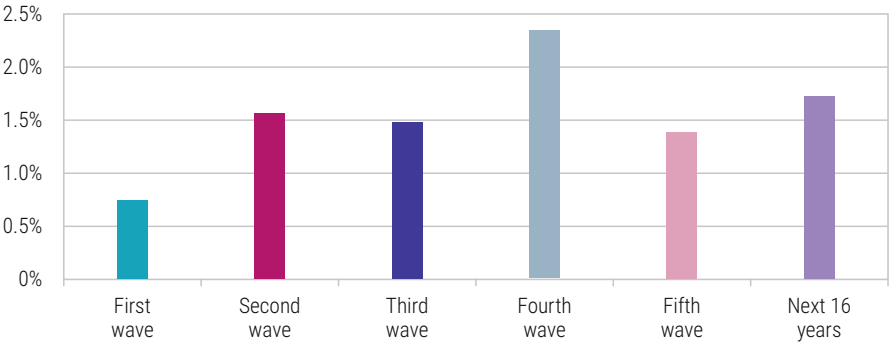
Figure 4.8: Dissecting AI's impact on labor demand



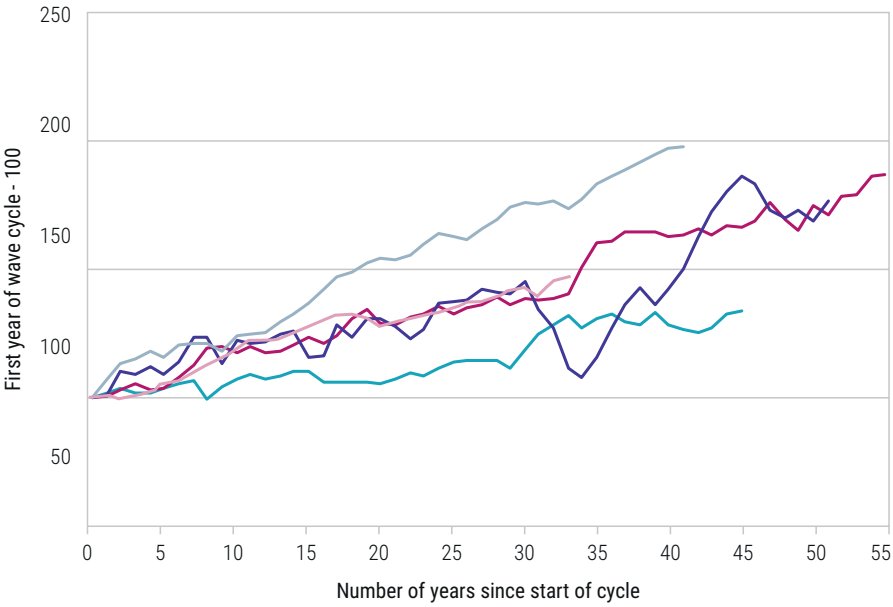
Source: Robeco, July 2024.

Our own analysis, based on GDP per capita growth trajectories over the past four innovation cycles, suggests that productivity growth could accelerate by 40 bps per year to a 1.75% compound average geometric rate over the next five years for the US as this would match the average annual growth rate of US GDP per capita during previous long-wave innovation cycles.

Figure 4.9: GDP per capita growth (geometric average growth rate during innovation wave)



Long-wave cycles and GDP per capita growth US



- **1st wave (1800-1845).** Learned on innovations such as water power, textiles and iron. The beginning of the industrial revolution.
- **2nd wave (1845-1900).** Involved the massive application of coal as a source of energy, mainly through the steam engine. This induced the development of rail transport systems, opening new markets and giving access to a wider array of resources.
- **3rd wave (1900-1950).** Electrification was a major economic change as it permitted the usage of a variety of machines and appliances and permitted the development of urban transit systems (subways and tramways).
- **4th wave (1950-1990).** The post World War II period represented significant industrial changes with new materials such as plastics (petrochemicals) and new sectors such as electronics (television). Development of jet engine in aviation.
- **5th wave (1990-?).** The current wave mainly relies on information systems, which have tremendously modified the transactional environment with new methods of communication and more efficient forms of management of production and distribution systems.

Source: Maddison Database, calculations by Robeco. As of July 2024.

Demand for electricity and the Jevons paradox

"Data! Data! Data! I can't make bricks without clay!" cried Arthur Conan Doyle's famous literary creation Sherlock Holmes, signifying that he needed information to form his hypotheses. An interesting aspect of increased adoption of AI is the rise in demand for electricity that it results in. AI data centers already account for 1% of global electricity demand as AI-related applications like Copilot or ChatGPT consume about 10 times more energy than a traditional Google search.[7] An IEA (2024) report expects electricity consumption by data centers to double by 2026. The level expected in 2026 (around 1,000 TWh) would be equivalent to the annual electricity consumption of Japan. A key question will therefore be whether future improvements in energy efficiency in modern data centers will keep up with the increase in data center energy demand. The Jevons paradox might apply here: the more energy-efficient that data centers become, the more demand there will be for these centers, with increased efficiency resulting in a net increase in electricity demand rather than a decrease. Rising electricity prices would raise the marginal cost of adopting AI, capping the technology's productivity growth benefits. This is why we are sticking to the lower end of the range of productivity growth forecasts as none of them take into account the impact of rising energy costs.

7. Powering Intelligence: Analyzing Artificial Intelligence and Data Center Energy Consumption (epri.com). See also Coskun (2024).

If productivity Trumps displacement, inflation and the neutral rate should rise

What are the possible consequences of adopting AI for the broader economy and central banks? First, if the productivity growth effect and new tasks generated by AI adoption outweighs job losses, net labor demand will increase. Second, if this new net labor demand from new tasks is concentrated in services (which tend to be more subject to sticky inflation), the non-accelerating inflation rate of unemployment (NAIRU) and potential output are likely to increase. Unemployment below this higher NAIRU level would therefore be inflationary. In short, there will be less spare capacity for non-inflationary growth. Third, higher trend growth thanks to productivity growth would probably also result in a somewhat higher neutral rate. However, there are several possibilities here. If the productivity effect Trumps the displacement effect then there is likely to be higher demand for desired capital relative to desired savings in the economy. However, if the displacement effect is stronger than the productivity effect, precautionary saving should increase due to rising job insecurity, which could lower the neutral rate of interest.

4.4: Pillar 3: Global savings and investment dynamics: a disappearing savings glut?

In 2005, former Fed president Ben Bernanke introduced the term 'global savings glut'. In his view, the high savings rates in emerging markets like China and oil-exporting countries had led to a surplus of capital seeking investment in developed economies. This influx of surplus capital into the US suppressed yields and fueled a stronger dollar and increased risk-taking behavior, culminating in financial imbalances, for instance in the US mortgage market around 2006/2007. Around 50% of US debt outstanding is held by foreign institutions, which have funded the rising US fiscal deficit. Even though China's foreign currency reserve managers have diversified away from US Treasuries over the years, the country still holds around USD 767 billion of US Treasuries. While creating imbalances, the so-called 'exorbitant privilege' of the US being home to the world's safe-haven currency despite being in deficit has helped it keep inflation down and provided it with a stable currency.[8]

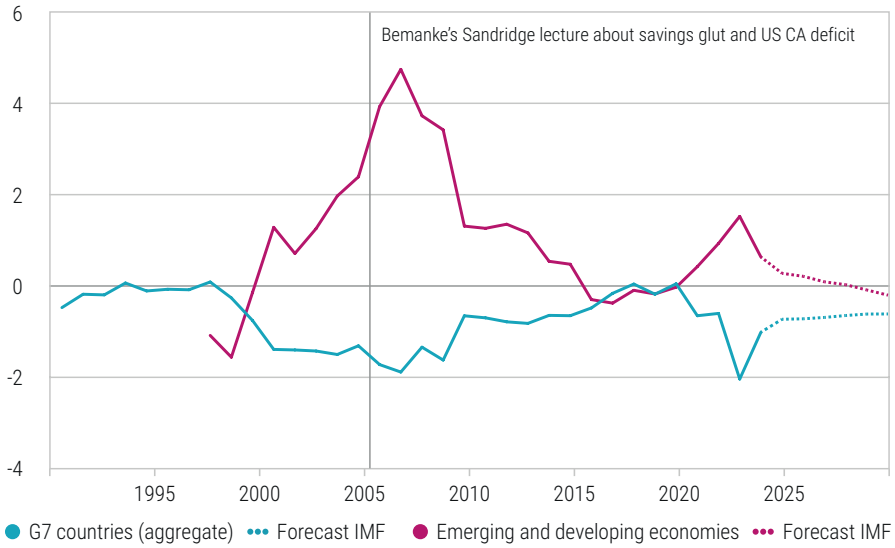
8. This term was coined in the 1960s by Valéry Giscard d'Estaing, then French Minister of Finance.

But privileges don't necessarily last forever. There are reasons to believe the global savings glut could start to decline or even vanish in the coming five years.

First, China could see higher domestic savings absorption (use of domestic savings for domestic investments) as it needs to step up investments in renewable energy and as it aspires to become the global leader in fields like cloud computing, biotechnology and AI. A more inward-looking macroeconomic strategy is also likely in other emerging countries

Figure 4.10: Expected decline emerging markets' current accounts, as projected by the IMF, will reduce excess saving

Current account balance – percent of GDP, including IMF forecast



Source: LSEG Datastream, Robeco. As of July 2024.

that have contributed to excess global savings in recent decades. Oil exporter Saudi Arabia, for example, now has to recycle fewer dollars as the US has become a net energy exporter itself and as it, like China, has big ambitions that require huge investments. Saudi's 'Vision 2030' plan aims to boost domestic investment in IT, chemicals, health care, infrastructure, real estate, transportation and logistics.

Second, China's contribution to global growth is likely to fall significantly over the next five years from 1% to 0.6%. Assuming a constant current account surplus to GDP ratio (which is a brave assumption in a world likely to be plagued by trade wars), China's contribution to global excess savings could decline accordingly.

Figure 4.11a: Correlation between Chinese CPI and global CPI has turned negative

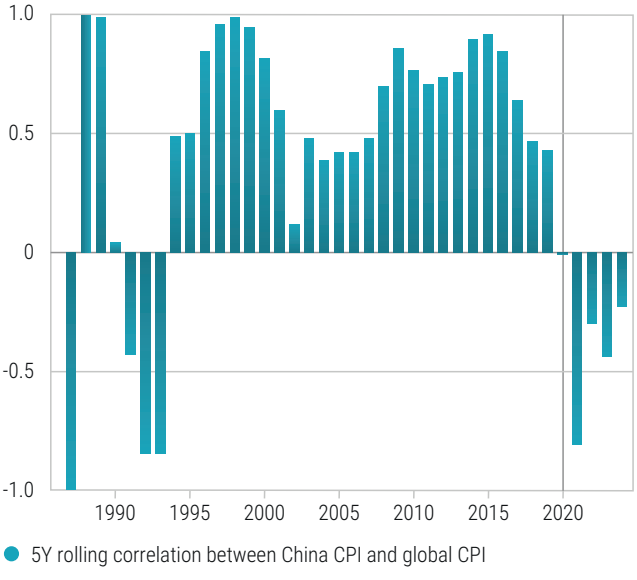
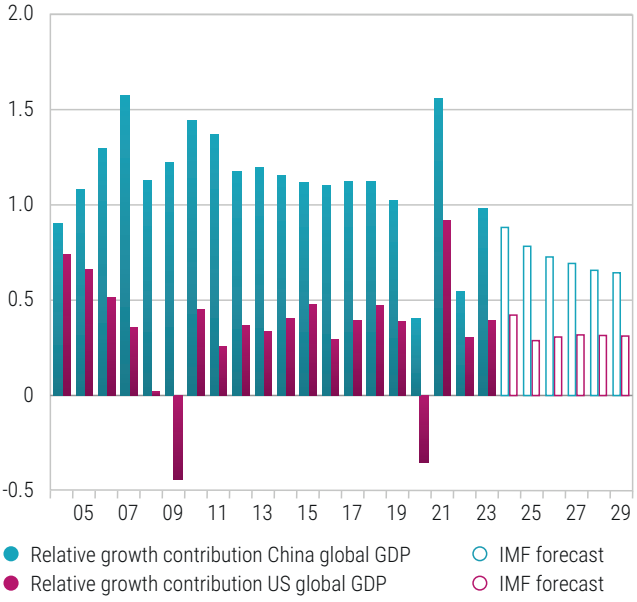


Figure 4.11b: Chinese contribution to global GDP growth set to fall

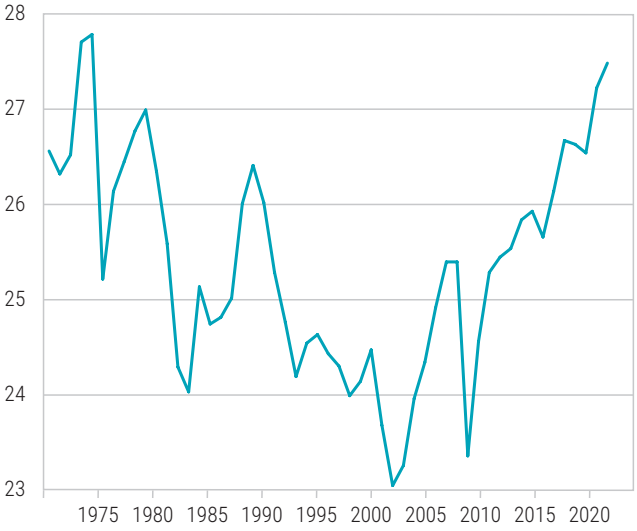


Source: LSEG Datastream, Robeco. As of July 2024.

Third, we are already eyeing the highest rate of global capital formation as a percentage of GDP according to World Bank data since the 1970s. As such, there is higher demand for savings. The 1970s also saw a housing and infrastructure boom, industrial expansion, technological upgrades and increased government spending against the backdrop of the Cold War. The 1970's list remains relevant today and can even be expanded by the focus on resilience investments (like dual sourcing, reshoring) and the green transition. The green transition alone requires capital investments equivalent to 8.8% of global GDP between 2026-2030 according to McKinsey in 2022. Various estimates suggest the total investment needed to achieve net zero by 2050 range between USD 215-275 trillion (more than twice the current global economic output).

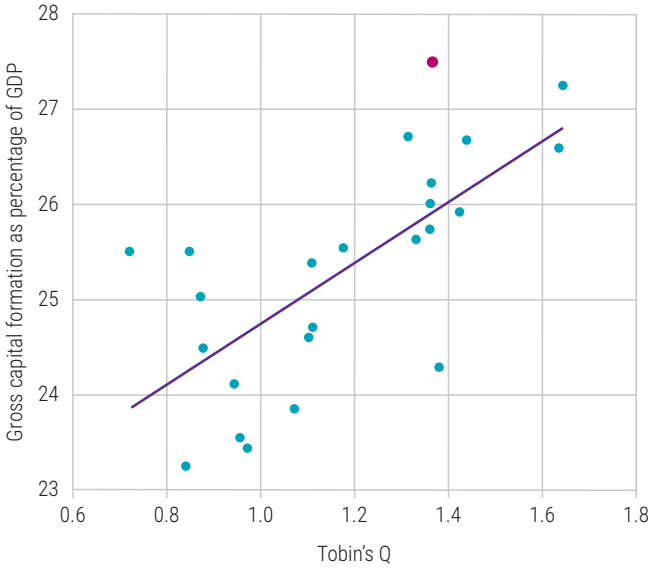
Figure 4.12: Global drivers behind capex demand

Global capital formation as % of GDP at its highest since the 1970s



Gross capital formation (% of GDP): global world international

US Tobin's Q>1 suggesting high capex demand



Tobin's Q vs gross capital formation as percentage of GDP

Source: LSEG Datastream, Robeco. As of July 2024.

Fourth, there is an argument to be made that great power competition (competition between US and China) reduces external investment supply. In the words of Mario Draghi, "most importantly, other regions are no longer playing by the rules and are actively devising policies to enhance their competitive position. At best, these policies are designed to redirect investment toward their own economies at the expense of ours; and at worst, they are designed to make us permanently dependent on them" (Draghi, 2024). Since the Global Financial Crisis, global inward FDI has halved. An ongoing erosion of trust is hollowing out willingness to invest overseas. Zak and Knack (2001) found that a 1% increase in trust results in investment increasing by 14 bps and GDP per capita growth by 6 bps. With trust falling or even morphing into outright distrust, a fragmenting global economy could result in reduced cross-border capital flows and a corresponding move toward autarky.[9] What's more, the US could pressure countries running surpluses to reduce their pile of excess savings by investing more domestically. Tight labor markets, solid GDP growth and the need to step up defense spending could result in greater savings absorption of US counterparts through capital deepening.

Fifth, population aging is also likely to lead to lower domestic savings from the lifecycle hypothesis point of view. The age-dependency ratio is set to increase to well above 20% in countries with excess savings – notably China – over the next five years.

9. The 2024 Edelman Trust Barometer Global Report shows that developed countries have moved into distrust territory. For instance, according to this survey 63% of the interviewed people in 28 countries think that government leaders are purposely trying to mislead people.

Sixth, as reported by the IMF, Tobin's Q, which is the market value of companies divided by their replacement value, has represented the largest net drag on global corporate expenditure since 2008. However, the ratio is now well above 1 as stock markets have rallied, so companies are increasingly incentivized to invest in the underlying capital goods rather than paying a high earnings multiple to acquire assets indirectly by initiating expensive takeovers.

A reduced savings glut could result in a weaker dollar

What are the implications of a reduced global savings glut? First, it would raise the global neutral real rate of interest. Ferreira and Shousha (2020) find that the accumulation of international reserves around the world since the 1990s reduced the net supply of these assets, which resulted in the neutral real rate of interest falling by 50 bps. Net supply should increase as more inward-looking countries pursue fiscal spending.

Second, it could weaken the dollar and lead to, from the US's perspective, a welcome rebalancing that disciplines US fiscal finances while generating increased domestic demand for domestic goods and services. This could onshore jobs and partly undo the hollowing out of the US middle class that accelerated during the heydays of globalization. The significant decline of labor's share of the US economy has been strongly correlated with increasing trade openness. It is therefore unsurprising that Donald Trump has been advocating a weaker dollar. And even though the Democrats have been quieter on this subject, it is obvious that a strong dollar has run counter to their objective to reinvigorate the Rust Belt states as well.

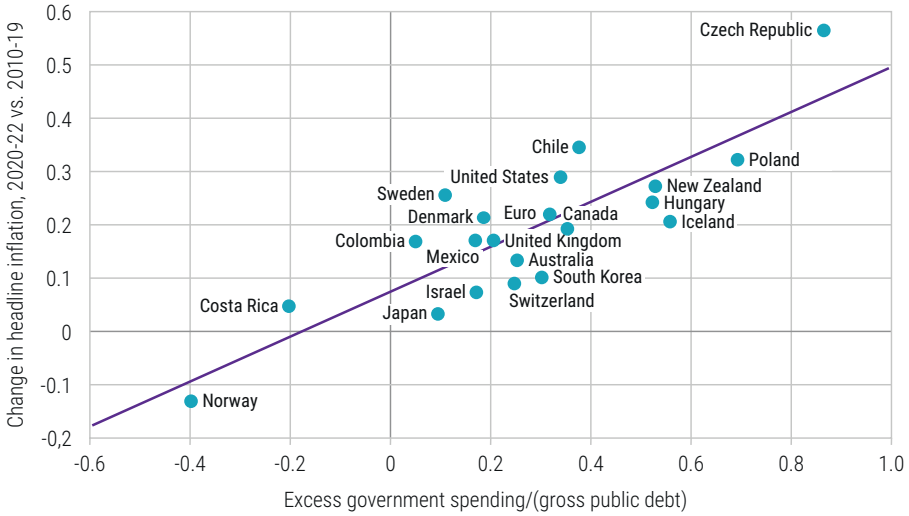
4.5: Pillar 4: Fiscal versus monetary dominance

Aware of the impact of a strong (and still overvalued) dollar on the US economy, policymakers could put more pressure on the Fed to ease policy, lower rate differentials with the rest of world and engineer a helpful depreciation of the dollar. With inflation now back to 2% in advanced economies and the risks between growth and inflation more symmetrical, central banks in general could become more susceptible to this political messaging. A weaker currency might lead to a bout of imported inflation, but domestic disinflation might initially offset the impact. The move from monetary dominance to fiscal dominance could strengthen as central banks declare victory over inflation. Ironically, this could lay the foundation for another wave of inflation in the second half of the 2020s. As Banerjee et al. (2023) show, a profligate fiscal policy in conjunction with a low monetary policy independence typically results in the highest subsequent inflationary impulse. By contrast, a strong, independent central bank is able to act as a counterbalance to even a profligate fiscal authority, with the result that there should only be marginal upward pressure on prices. In our Expected Returns 2021-2025 publication, released in September 2020, we said that "the ability of fiscal stimulus to induce inflation is a key element to watch in the next five years", based on the insights from the fiscal theory of inflation as developed by Cochrane (2009). In this fiscal theory, the price level adjusts so that the real value of government debt equals the present value of surpluses. So, when the government does not intend to cut spending or raise taxes in the future, inflation will rise to from an equilibrium with the lower real value of government debt.

Strong evidence for the fiscal theory of inflation

Barro and Bianchi (2023) find empirical support for the fiscal theory of inflation looking at OECD economies between 2020-2022. They found strong cross-regional evidence that excess fiscal spending during the pandemic has led to inflation above pre-Covid averages: "The point estimates of coefficients of 0.4-0.5 suggest that 40-50% of the extra spending was financed through inflation, whereas the remaining 50-60% was paid for through the more conventional method of intertemporal public finance that involves increases in current or prospective government revenue or cuts in prospective future spending."

Figure 4.13: Change in headline CPI inflation rate versus government spending



Source: Barro and Bianchi (2023). As of August 2024.

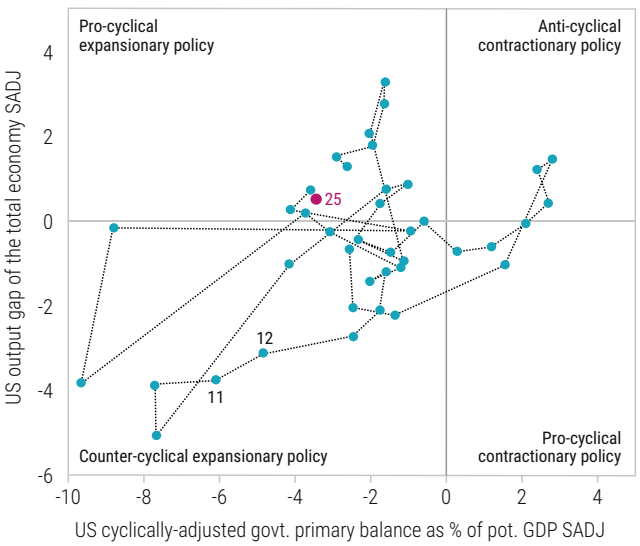
Fiscal dominance means inflation could rise

Central bankers have recently expressed confidence that they can declare victory over inflation. Consensus inflation forecasts have come down significantly, with inflation of 2.3% expected in the US by 2026. However, with fiscal dominance on the rise and recent experience showing that roughly half of excess government spending has been financed through inflation, the medium-term consensus inflation outlook could increase.

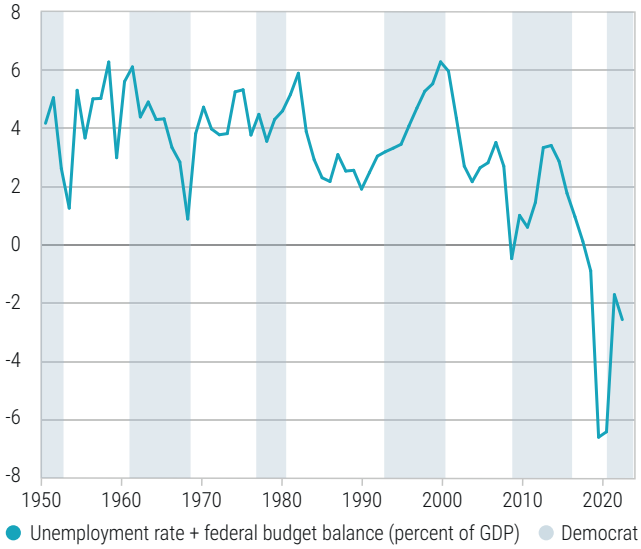
The US, like Japan, is still running a pro-cyclical expansionary fiscal policy given that its budget deficits are sizable at a time that its output gap is still positive. The magnitude of fiscal largesse matters here: US deficit spending has overshot the level that is warranted based on the prevailing US unemployment rate by a historic margin. Our work on debt sustainability for the US shows that in order to keep the sovereign US debt-to-GDP ratio around its current 112% while running a 5% budget deficit, financial repression (keeping interest costs artificially below 2%) and US nominal GDP growth above 6% are required.

Figure 4.14: Shift toward fiscal dominance

Procyclical stance shows fiscal dominance



US budget deficit overshooting level of unemployment



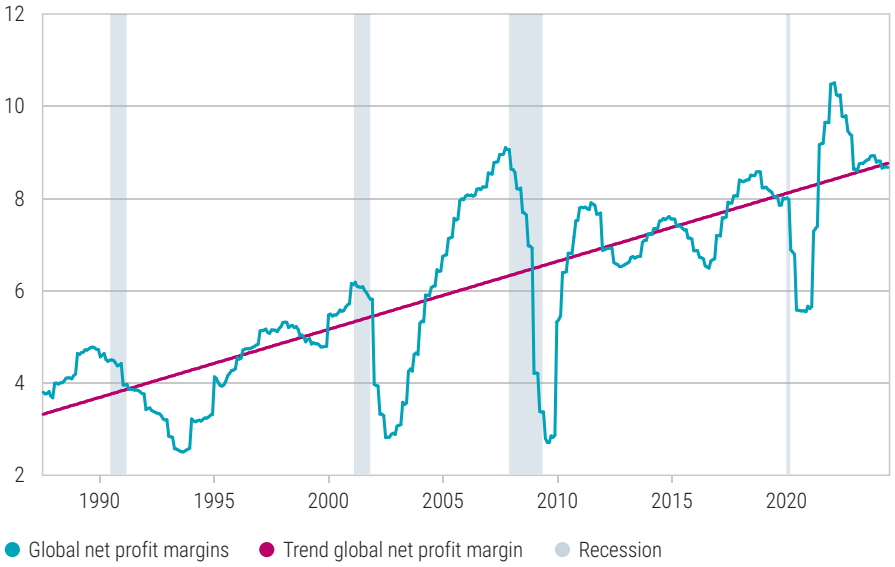
Source: LSEG Datastream, Robeco. As of July 2024.

4.6: Pillar 5: Capital versus labor

Capitalism hides a deep paradox. While in the 19th century Marx ominously described capital as a vampire "sucking living labor", Keynes was somewhat more nuanced: "Capitalism is the extraordinary belief that the nastiest of men, for the nastiest of reasons, will somehow work for the benefit of us all". The idea that capitalism works for the benefit of all is under attack.

For instance, looking at the US and UK, De Loecker et al. (2022) find that there has been increasing dispersion in wage and productivity growth, and that mark-ups and dispersion of mark-ups are increasing. They also found that there is increasing market concentration. This 'winner takes most' phenomenon is best captured by the leading technology companies, also known as the Magnificent Seven, which at the time of writing accounted for 31% of the S&P 500's market capitalization.

Figure 4.15: Global net profitability on a rising trend



Source: LSEG Datastream, Robeco. As of July 2024.

Well-managed adoption of AI pivotal for a transition to an optimal macroeconomic equilibrium

The good news is that the 2024 Edelman Trust Barometer Global Report finds that only if institutions mismanage innovation are people more inclined to say that capitalism as it exists today does more harm than good in the world. If innovations are well managed, capitalism doesn't come under question. This has big implications for the future implementation of AI. As long as AI adoption predominantly complements existing jobs rather than replacing labor, the broad public's perception of AI as a well-managed wave of innovation could persist. But if jobs are replaced by AI, the backlash against this technology and rising inequality could intensify. According to Eloundou et al. (2023), around 80% of the US workforce could have at least 10% of their work tasks affected by the introduction of large language models (LLMs), while about 19% of workers may see at least 50% of their tasks impacted by AI-based tools. Albanesi et al. (2023) calculate that 25% of jobs in the Eurozone are highly exposed to AI-enabled automation and another 30% have medium exposure. The impact could both provide an opportunity as well as a risk, depending on the substitutability of the tasks involved.

However, there are also studies that are less pessimistic about the prospect of jobs being lost as result of AI. Sheng and Zhang (2024) analyze 30 provinces in China from 2006-2020

and find that the overall impact of AI on employment is positive, with jobs being created rather than replaced. There is job creation instead of displacement. AI not only improves the efficiency of production, but also scale and capacity, resulting in increased demand for labor. In a similar vein, Sharma and Mishra (2022) analyze developed economies and find that there is no skill-biased impact on employment from the adoption of technology, which actually boosts overall employment. However, they do find differences with regard to firm size. Large domestic firms with in-house research and development capabilities experience a lower degree of job creation than smaller firms or those under foreign ownership.

Lower-than-expected elasticity of substitution might be a boon for workers

To gauge the odds of the production factor capital getting more regulatory pushback from policymakers trying to appease their electorates, it is important to look at the elasticity of substitution between labor and capital. This ratio measures how easily one factor of production (like labor) can be substituted for another (like capital) while maintaining the same level of output.

$$\text{Elasticity of substitution} = \frac{\partial \ln (K/L)}{\partial \ln (MPL/MPK)}$$

- (K/L): This represents the capital-to-labor ratio.
- (MPL/MPK): This is the ratio of the marginal product of labor to the marginal product of capital.
- $\partial \ln$: This denotes the partial derivative of the natural logarithm.

While most economists and macroeconometric models assume this ratio is close to 1 (which means capital is a perfect substitute for labor), Alvarez-Cuadrado, Van Long and Poschke (2018) find that the elasticity of substitution of capital-labor is higher in manufacturing than in services, leading to a larger decline in the labor share in manufacturing. Gechert et al. (2022) find that the elasticity of substitution between labor and capital is much lower than found in 121 previous studies (which on average report a ratio close to 1) when correcting for biases such as publication bias. The conditional elasticity is only 0.3, which implies a much lower ability to replace labor by capital deepening. This is somewhat reassuring as it means that the powerplay between capital and labor might not get out of hand in the medium term.

The baseline is that for the median worker, the complementary effect of adopting AI probably outweighs the displacement effect. A much lower capital-labor elasticity than typically assumed has potentially huge implications: labor markets could stay hot for longer, with services inflation therefore possibly proving stickier. In turn, this could result in a higher probability of a higher-inflation regime. Finally, as Gechert et al. (2022) point out, a lower elasticity of substitution between capital and labor reduces the effectiveness of monetary policy as firms cannot easily switch inputs. If borrowing becomes cheaper, firms might not increase their capital investments dramatically as they remain dependent on labor.

AGI likely to be disinflationary

But the dawn of AGI (which might take us much closer to the 2030s) is likely to see a rising elasticity of substitution between capital and labor. As such it is likely to be much more disinflationary as it will lead to more significant job displacement and technology-induced unemployment. If this happens, it will be important that policymakers do not overregulate the likes of the Magnificent Seven: as Milton Friedman once said, "A society that puts equality before freedom will get neither. A society that puts freedom before equality will get a high degree of both."

4.7: Pillar 6: the US versus China

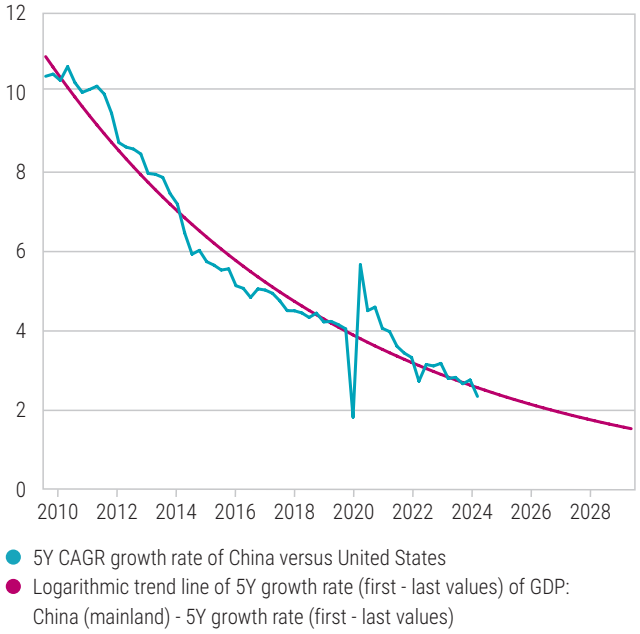
During the heydays of globalization, China had been outperforming the US real GDP growth by more than 10% on a 5-year compounded average growth rate. These days are gone and China's catch-up with the US has been slowing since 2010. If the trend continues China's growth rate by 2030 will only be 1.5% higher.

Figure 4.16: Speed of mean reversion of existing 5Y CAGR growth gaps

Eurozone and UK could see decent catch-up versus US

Speed of mean reversion	
Regression coefficient of existing 5Y CAGR GDP growth differential US (x) and subsequent 5Y fwd 5Y CAGR GDP growth differential (Y)	
	US
Eurozone	-0.4
United Kingdom	-0.5
Japan	-0.1
China	0.4

China-US GDP growth gap likely to converge to 1.5% by 2030



Source: LSEG Datastream, Robeco. As of July 2024.

A peace that is no peace

In a 1945 essay, George Orwell wrote about a "peace that is no peace" as he saw the dawn of the nuclear age and the potential for mutual assured destruction. Indeed, after Hiroshima a world would emerge of controlled aggression and repression rather than real peace. The fall of the Berlin Wall in 1989 seemingly sealed a genuine peace, and in response German defence expenditure fell below the 2% level required by NATO in 1990 and has stayed there ever since. There was a peace dividend amounting to hundreds of billions of dollars. Mayberry (2023) finds that demilitarization is associated with a 1% higher GDP per capita when compared to a counterfactual.

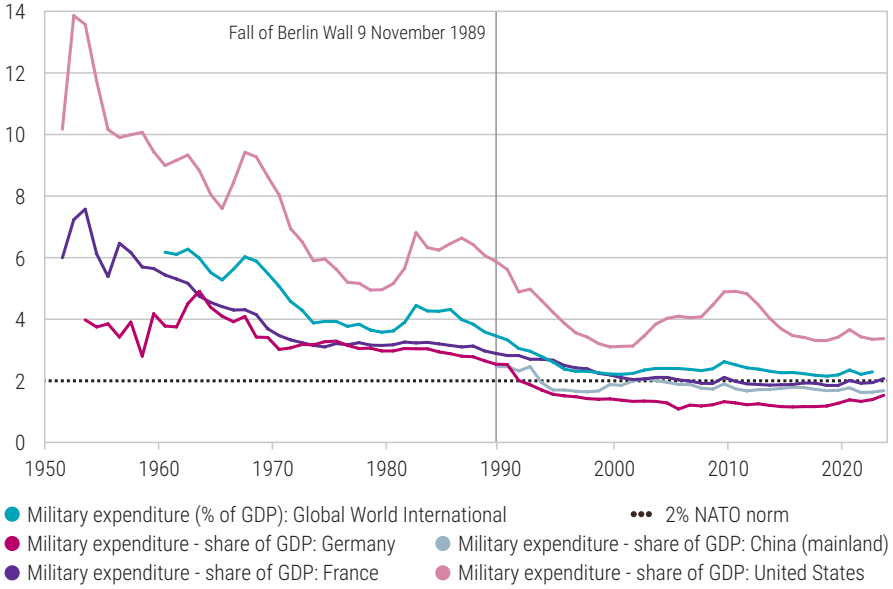
That peace dividend is now gone.[10] In July 2024, the newly appointed US Chief of Staff, CQ Brown, said there are five strategic areas of concern for the US armed forces: China, Russia, Iran, North Korea and violent extremism.[11] These areas of concern are increasingly becoming interlinked. His NATO counterpart Rob Bauer stated:[12] "This is about the rebalancing of power between the US and China. This is about tectonic plates of power that are shifting. If the tectonic plates of power shift you have wars and that's what we see."

10. Empirical evidence suggests that the peace dividend has been real after the fall of the Berlin Wall as well. For instance, Burchardi and Hassan (2013) find that a one standard deviation rise in the share of economic households with social ties to East Germany in 1989 is associated with a 4.7% percentage point rise in income per capita over six years.

11. LIVE: US General CQ Brown speaks at Aspen Security Forum - YouTube

12. NATO Military Chief on How Countries Can Prepare for War, a Second Trump Presidency and More | WSJ (youtube.com)

Figure 4.17: Military expenditure as a percentage of GDP



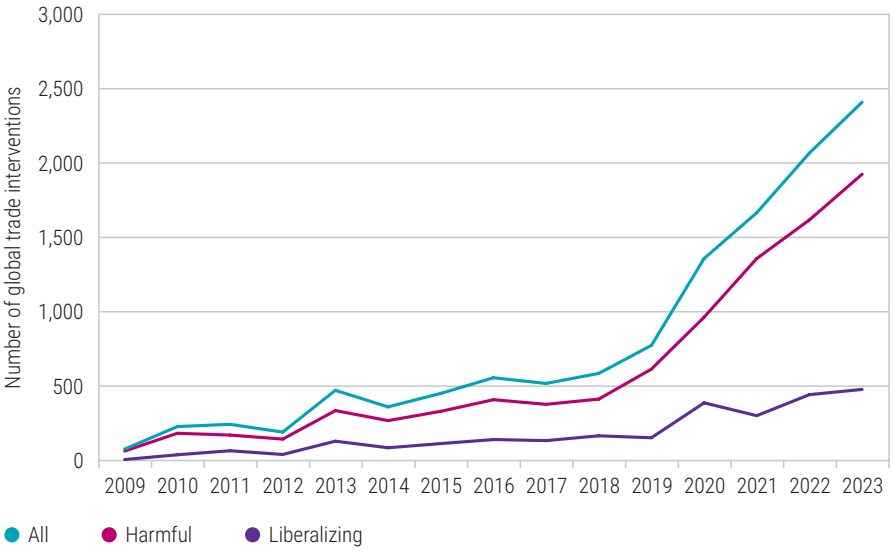
Source: LSEG Datastream, Robeco. As of July 2024.

Rapid change underway as peace dividend has vanished

With the peace dividend gone, we have entered an era of distrust in which national security considerations are in some cases starting to take prevalence over economic efficiency. This is reshaping global trade and international relations. As Mario Draghi put it in 2024: "In a benign international environment, we trusted the global level playing field and the rules-based international order, expecting that others would do the same. But now the world is changing rapidly and it has caught us by surprise."

This clearly matters for the supply side of the global economy. A fragmenting global economy is seeing technology spillovers diminish as restrictions on trade are mounting. Data from Global Trade Alert in 2024 shows that there were 306 more harmful interventions from governments in 2023 than in 2022.

Figure 4.18: A rising trend in harmful trade interventions



Source: Global Trade Alert 2024.

This rising trend is partly due to the WTO becoming less effective at solving trade disputes as the US has blocked new appointments to its Appellate Body, which is involved in settling disputes. The bulk of harmful interventions since the Global Financial Crisis have been subsidies (around 45% of all interventions), with tariffs still only accounting for 9%.

A truly multipolar world would hurt emerging markets the most

Even though tariff wars make for punchy headlines, what has really been going on is a subsidy war: the US Inflation Reduction Act, the EU Green Industrial Plan, Made in China 2025, India's Production Linked Incentive scheme and Australia's Modern Manufacturing Initiative are all examples of governments trying to gain competitive advantage by protecting their own industries. Goes and Bekkers (2022) show that full technological decoupling would result in losses of up to 12% of their GDP for emerging markets, reversing growth catch-up to the existing technological frontier. A move toward a truly multipolar world, with no trade between the China-Russia pole and the US-Europe pole, would permanently lower global GDP by 2.3%, according to Bolhuis et al. (2023).

If you want peace, prepare for war

The 'One China' policy formulated under President Nixon in 1972 is still in force. The US maintains its longstanding, deliberately ambiguous policy toward Taiwan – aiding Taiwan's defense efforts while opposing unilateral Taiwanese independence. However, tensions between the superpowers are increasing, partly because China is closing the military gap with the US. While the US should ultimately prevail, recent war games conducted by the CSIS (Center of Strategic and International Studies) suggest that the cost of a hot conflict over Taiwan would be extremely high for both sides, with the US losing half of its Navy.[13]

The hot war on the borders of Europe continues unabated. NATO claims there is increasing evidence that China, Iran and North Korea are supporting Russia's war efforts, calling China a 'decisive enabler' – a claim that China vehemently denies.[14] This accusation highlights the increased polarization on the world stage. Ukraine is receiving enough Western military support to sustain the current frontlines, but not enough to push the Russians back decisively. This is reflective of the Western powers walking a tightrope. On the one hand they are trying to avoid crossing Russia's red lines by providing overly aggressive support for Ukraine, but at the same time they must not become so cautious that Russia perceives the West to be weak. The Roman general Renatus's phrase, "If you want peace, prepare for war" has become the adage in NATO circles. Rob Bauer, NATO's chief of staff, has stated that we ought to rebuild our defense forces and take the corresponding inflation for granted.[15]

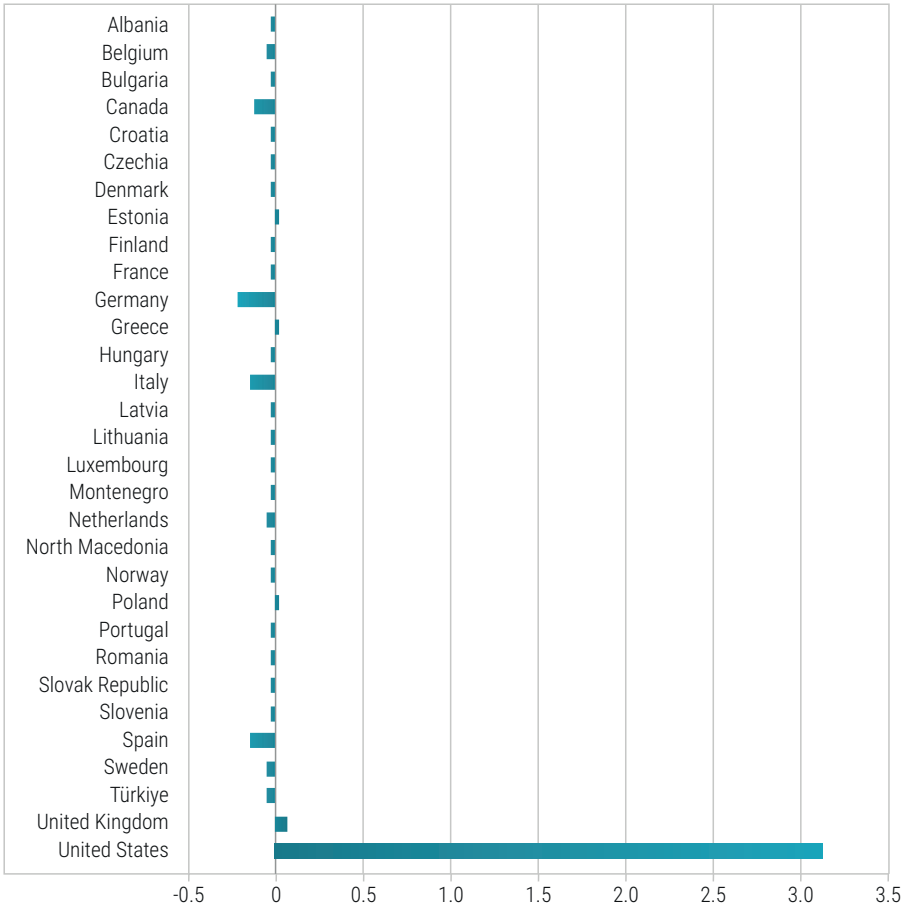
As of 2024, 24 of the 32 NATO member countries comply with the organization's minimum 2% of GDP spending on defense requirement. Given that the US has spent the most in previous decades, it will increasingly urge European countries to increase their defense spending beyond the required 2% to make good the USD 200 billion shortfall that has built up over the past decade. If they do, European government expenditure would see a declining overall fiscal multiplier as empirical evidence suggests the multiplier from each additional euro going toward defense spending only increases real activity by 60-80 eurocents. This is in contrast to non-defense spending, which typically results in multipliers above 1 over the following five years – see, for instance, van Gemert, Lieb, and Treibich (2022).

13. 230109_Cancian_FirstBattle_NextWar.pdf (csis-website-prod.s3.amazonaws.com)

14. NATO slams China over Russia support, backs full integration of Ukraine, draft communique says | Reuters

15. NATO Military Chief on How Countries Can Prepare for War, a Second Trump Presidency and More | WSJ (youtube.com)

Figure 4.19: Cumulative over/underspending of 2% of GDP NATO norm from 2014-2024
(in 2015 constant prices, trillions)



Source: NATO, Robeco calculations. As of July 2024.

Tariffs on technological goods weigh more heavily on consumers than tariffs on other goods

The tariff war under the first Trump presidency showcased the impact of higher tariffs on imported inflation. While Gopinath et al. (2019) found that even though the bulk of the higher tariffs is absorbed by US importers' margins, there is still a net inflationary impact on consumer prices. A 20% tariff resulted in the retail prices of affected household goods increasing by 0.9% and electronic goods by 1.4% after one year. An earlier study by Ghdosi et al. (2016) showed that more advanced technology goods have relatively low demand elasticity because substitutability is lower for such goods. This might explain the 50 bps difference found by Gopinath et al. All in all, another tariff war targeting advanced technology goods might weigh heavily on consumers and have an impact on inflation.

Whether tariffs ignite inflation depends on the elasticity of demand substitution

Former US Secretary of the Treasury Lawrence Summers forecasts the emergence of the "mother of all stagflations" if a future US president were to take a tariff war to the next level. He believes that in particular a plan to partially substitute revenue from income taxation with revenue from tariffs, as Donald Trump has proposed, could create havoc.[16] Mr. Trump wants to levy a 10% base tariff on all imported goods coming into the US and a special 60% tariff on those from China. While a full substitution between these two sources of revenue is practically infeasible (income taxation has a much larger tax base), this direction of travel would lead to higher prices as consumers would try to substitute

16. Bloomberg interview, 14 June 2024.

away from more expensive imported goods, driving up the prices of domestic alternatives. Such a substitution process is backed by empirical evidence as the study by Ghdosi we refer to above also finds that rich countries are able to substitute for other goods as import prices rise. Technically speaking, the elasticity of demand for imports is deeply negative. In the US, Ghdosi et al. (2016) found that a 1% increase in US import prices reduced demand for those goods by 1.5%. If a tariff reduces consumption by less than it raises demand for the cheaper alternatives produced at home, the result is inflation.

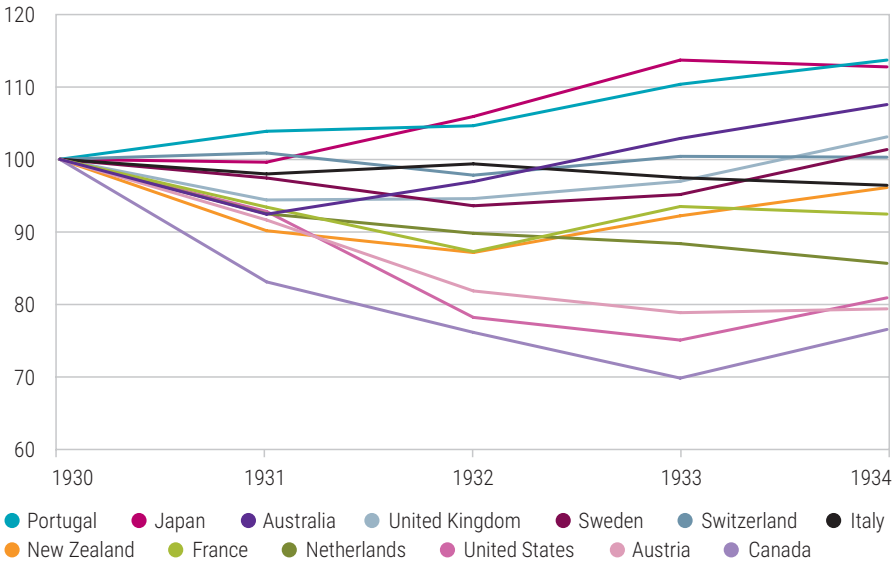
Currencies of exporters depreciate to offset tariff hit

A factor that could offset any imported inflation resulting from tariffs would be the currency of the importing country appreciating, reducing the prices of goods in the home currency. Such an appreciation in response to import tariffs can happen for two reasons. First, as demand for imported goods falls, so too does demand for foreign currency, raising the value of the home currency. Second, if inflation is imported, central banks are likely to respond by tightening monetary policy. With rate differentials increasing in favor of the importing country, the currency would be expected to appreciate. Jeanne and Son (2021) found that the first trade war between the US and China explained 20% of the appreciation of the dollar, indicating that imported inflation is partially offset by an appreciating domestic currency. The renminbi, by contrast, depreciated more notably over 2018-2019 to compensate for the decline in external competitiveness that US tariffs on its exports resulted in. They also find that a currency is much more sensitive to an export tariff than an import tariff of a similar level.

Stagflation looms larger than during the tariff war of the 1930s

Monetary tightening in response to a tariff war that creates domestic inflation would result in higher nominal yields, potentially triggering a recession. Our analysis of US GDP per capita growth after the implementation of the Smoot-Hawley tariffs in 1930 (they were enforced on 20,000 goods imported to the US) finds that the GDP of Western economies fell by an average of 1.3% per year over the subsequent five years as 25 countries reacted by imposing retaliatory tariffs on US imports. US GDP per capita was 20% lower by 1934 as the tariffs exacerbated the effects of the ongoing depression in demand by lowering global trade volumes.

Figure 4.20: GDP per capita growth evolution following Smoot-Hawley 1930 tariffs

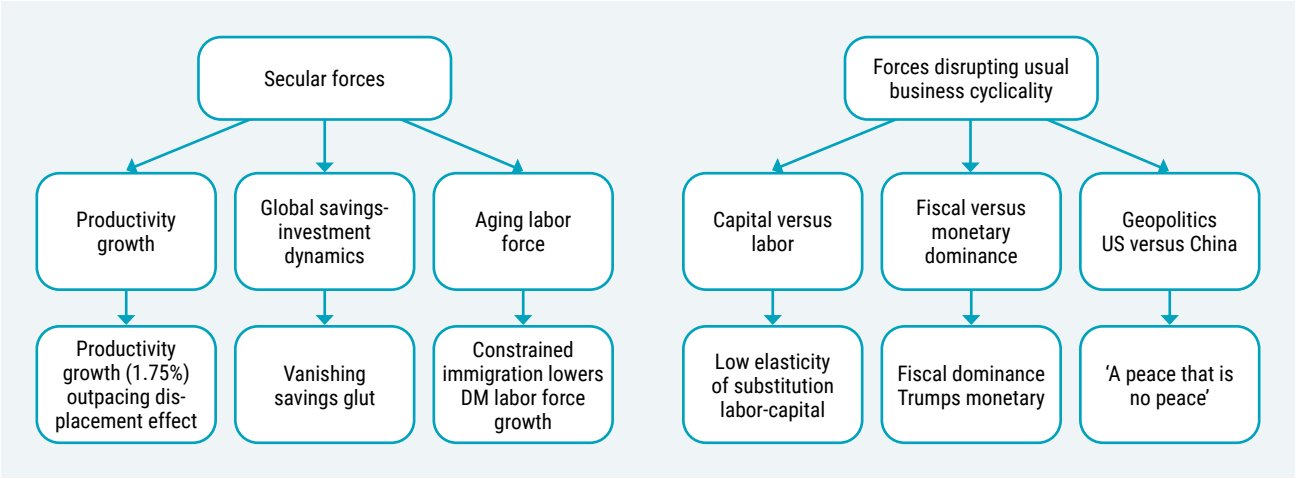


Source: Madisson database, calculations by Robeco. As of July 2024.

While the tariff war of the 1930s deepened the economic depression rather than creating stagflation, any future trade war might be more inflationary, even if it triggers a fairly deep recession toward the end of our projection period. Compared with the 1930s, output gaps in OECD economies are more positive overall, there are no constraints on money creation (the gold standard no longer applies), banks are better capitalized and central banks have scope to act by cutting interest rates. What's more, while commodity prices plunged in the 1930s as global trade collapsed, they might hold up better this time around, exerting less disinflationary pressure. That's because any global tariff war would be rooted in the powerplay between the US and China for global supremacy, and achieving and/or maintaining technological supremacy is vital for whoever wants to be the strongest power in the global economy. The quest for technological supremacy and the need for rare earth metals and energy to power data centers would probably offset any reduction in demand for commodities resulting from a tariff war.

Base case: Atlas Lifted

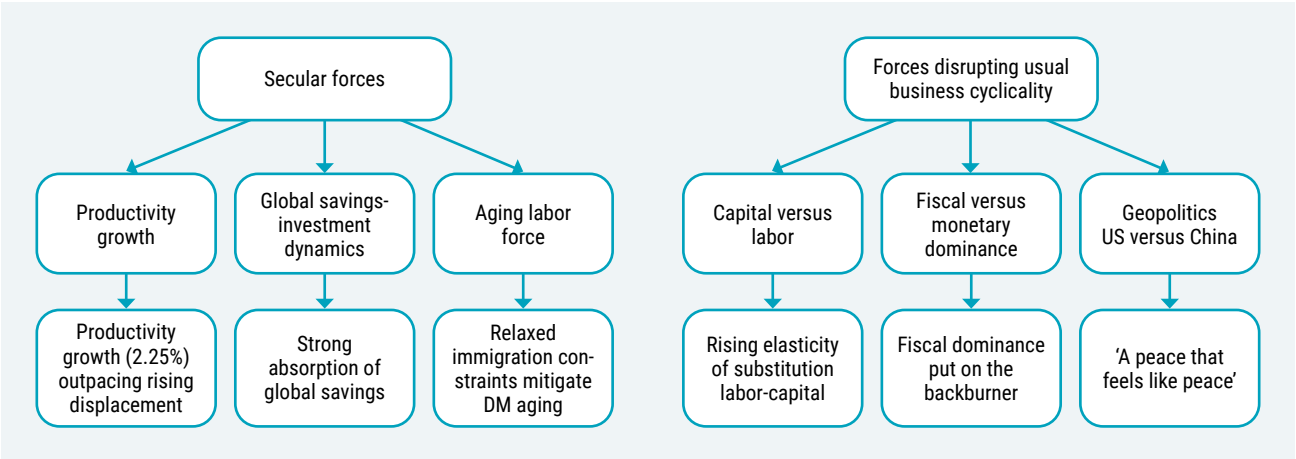
Figure 4.21: Scenario building blocks



Source: Robeco, July 2024.

Bull case: Atlas Connected

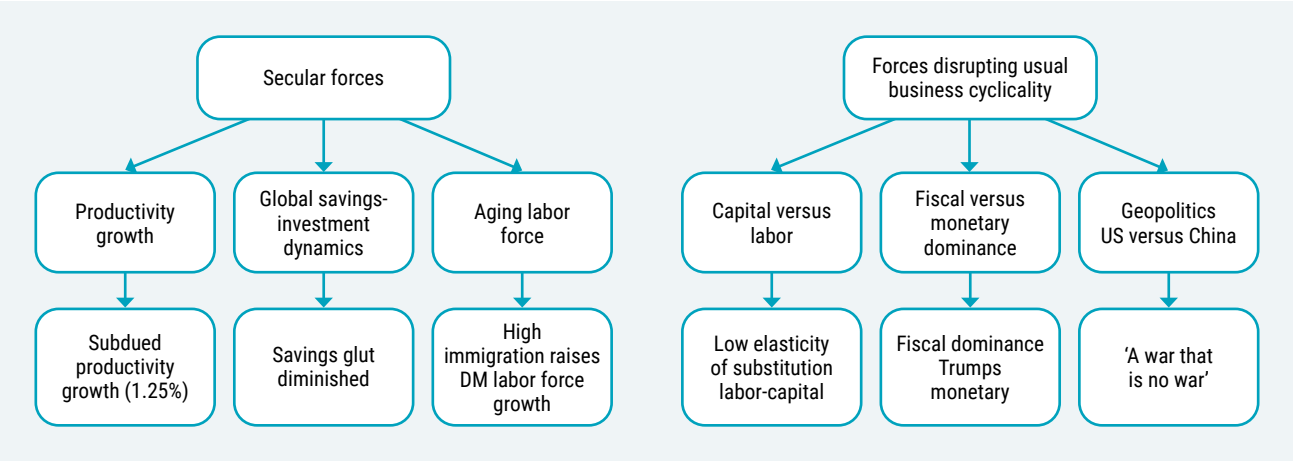
Figure 4.22: Scenario building blocks



Source: Robeco, July 2024.

Bear case: Atlas Adrift

Figure 4.23: Scenario building blocks



Source: Robeco, July 2024.

4.8: Scenarios

There is a lifted economic landscape ahead of us, with US exceptionalism becoming less obvious as other regions are catching up. Key factors to watch over the next five years include the move toward fiscal dominance and its scope to generate another wave of inflation; whether AI will be predominantly productivity-enhancing or labor-displacing; the impact of a declining global savings glut on the US dollar; and the tussle for supremacy between China and the US.

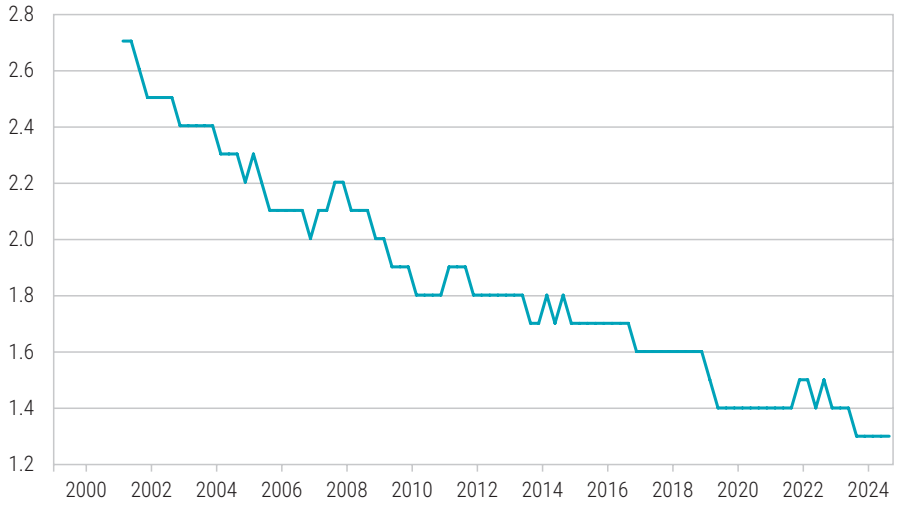
Table 4.1: Focus on the US consumer; model-based US consumption growth projections

US consumption growth scenarios	Atlas Connected	Atlas Lifted	Atlas Adrift
Increase in unemployment per annum in %	0.20	0.30	1.00
Consumer risk aversion	-2.5	4.0	5.0
Real annual consumption growth in %	3.13	1.92	1.05
Consumption growth Y = 2.9% + (-1.01* unemp%) + (-0.17* consumer risk aversion) Consumer risk aversion = Actual savings rate minus fair value savings rate based on S = T-bill + household leverage proxy			

Source: LSGE Datastream, Robeco. As of July 2024.

We don't share the IMF's pessimism about growth over the next five years, although we agree about the declining contribution made by China to the growth of the global economy with the country facing secular stagnation. While we agree that radical change is needed to halt the Eurozone's secular decline, we are less pessimistic than consensus about the Eurozone's growth potential. Our analysis suggests that labor force growth, productivity growth and capital formation in developed economies might all turn out to be higher than expected.

Figure 4.24: Eurozone needs radical change to reverse pessimism about growth



Source: LSEG Datastream. As of July 2024.

Base case scenario: Atlas Lifted (50% probability of occurring)

We foresee a bumpy road ahead, but overall real activity expanding close to or somewhat above trend in OECD economies on average. The US economy will post the highest growth, expanding by 2.4% per year on average, while the UK (2.0%) and Eurozone (1.7%) will close half of their growth gaps with the US. Japan will experience sustainable reflation, while China's housing market will stabilize by 2026. Emerging markets – especially India – will grow robustly. AI adoption will boost GDP per capita growth in OECD economies, while inflation will average 2.5% in advanced economies, with a temporary dip to 2% by 2025. Central banks will cut rates modestly, followed by a second tightening cycle in 2027. High deficits will address secular challenges, increasing global capital formation.

Bull case scenario: Atlas Connected (20%)

We see an AI-driven productivity miracle. Productivity growth will surge to 2.25% due to rapid adoption of AI and improved geopolitical stability. AI will become more accessible, leading to widespread adoption and capital deepening. Inflation will be lower than in our base case as the elasticity of substitution between expensive labor and capital is higher. Echoing the 1950s, real GDP growth will be close to 3% per year, with inflation around 2%. Central banks will keep policy rates around neutral as the Goldilocks scenario endures.

Bear case scenario: Atlas Adrift (30%)

Paying the piper for excessive fiscal spending. Excessive government spending and geopolitical turmoil lead to stagflation, with inflation peaking above 4%. Central banks force a hard landing around 2028 to contain inflation. Bond yields rise temporarily above 6% in the US, but central banks regain control of the yield curve by the end of the projection period. ●

EXPECTED RETURNS 2025-2029

5. Expected returns

Economist John Maynard Keynes once stated that “the expected never happens; it is the unexpected always.” The unpredictability of events and the limits of forecasting were made clear in early August 2024 when the VIX, a measure of the market’s expectations about the S&P 500 index’s volatility, spiked to 66, a level that has rarely been observed other than in tumultuous times such as the Global Financial Crisis and the onset of the Covid pandemic. The sudden increase in market volatility was an example of the unexpected happening as the market had been banking on so-called immaculate disinflation and a profitable yen carry trade continuing, along with an economic soft landing.

But Keynes might have overlooked a crucial point: the unexpected doesn't always happen. This can lead to the unexpected having an outsized impact, as we saw with the VIX's recent surge. Quite often things just pan out the way they were expected to, creating trends and momentum. Expected returns are generated by the return of the expected; the assumption that history often rhymes.

The market turmoil of early August also demonstrated an important point for strategic asset allocators: opportunities for diversification between major asset classes appeared to have returned. Having long been positive, the correlation between equities and bonds turned negative again, something that typically happens in the US when inflation falls below 3% and the Fed is about to embark on an easing cycle. In our base case scenario, inflation will remain in the twilight zone at 2.5% and therefore the correlation between equities and bonds could flip-flop between negative and positive in the next five years. As such, a standard 60/40 portfolio might still not offer its usual diversification. An important clue for the return of stable diversification can be gleaned from closely assessing the nature of forthcoming rate cuts at the very start of our projection period. Recession-induced rate cuts create significantly more downside risk for risky assets compared to non-recession-induced rate cuts like those observed during 1995 or 1984.

In this chapter we discuss our expected returns for the various asset classes over the next five years. There are some interesting points that may be relevant for strategic asset allocators.

In Table 5.1, we display our expected returns in four major currencies. While we have lifted most asset classes compared to last year's estimates, we expect asset returns in EUR to remain below their long-term historical averages over the coming five years, with the exception of emerging market debt in local currency, investment grade credits and commodities. As we hinted last year, we are gradually moving away from a low-risk-free rate, high risk premium world to a high risk-free, lower risk premium world. This year's exercise reinforces that observation.

Risk premiums for major asset classes have declined compared to last year, with the exception of emerging market debt in local currency which saw a 25 bps increase. This broad decline is mainly driven by our upgrade of the risk-free rate. For the first time in the history of this publication our cash return projection now equals our steady-state return for a euro-based investor at 3.5%, while having been consistently below its steady state in the last decade. That is not to suggest cash is king; other asset classes still see above steady-state returns in our base case. It does however project that we won't return to a pre-Covid level of neutral policy rates as well as that there is another round of policy

tightening to be expected in the second half of the 2020s. As the opportunity costs of holding cash are lower than in previous years, holding cash for buying opportunities that might arise in risky assets is reasonable.

The largest opportunities in the next five years from a risk-reward perspective may not be centered around US equity markets. This holds especially for a dollar-based investor as we expect the trade-weighted dollar to depreciate. While we have upgraded our developed equity market return to 6.5% for a euro-based investor, we stay skeptical about the continuity of US equity market exceptionalism, expecting a below-steady-state return for US equities. Our special on bubbles shows that not every bubble bursts but some bubbles just keep buzzing. Therefore, the magnificent rally in US technology stocks could have further to run. However, we do observe increased downside risk for US equities given historically elevated valuation levels on various metrics. Low volatility stocks in the US are an attractive hedge against this risk. We now expect a small negative equity premium for US equities versus US Treasury bonds of 50 bps for a dollar-based investor. This is quite rare, but has happened in the early 1900s, 1930s, late 1970s and early 2000s for instance. Harvesting yield is rewarded, notably at the shorter end of the curve, avoiding credit cycle refinancing risk. We find high yield less attractive given low starting spreads, a lower rates sensitivity and the anticipation of a default wave in 2-3 years. Also, we find German Bunds to be expensive.

The excess return for emerging market equities versus its developed counterparts has declined by 75 bps as forward consensus earnings growth is overly optimistic, risks around China's growth outlook linger while runner-up India has become even more expensive compared to US equities. Meanwhile returns for Europe and Japan have been upgraded compared to last year. Given increased cross-country variability of emerging market equity valuations, a focus on country selection could pay off. Sector allocation could prove to be rewarding especially using AI-driven allocation. Finally, we also see an above-steady-state return for commodities as it still pays to hedge against unexpected inflation.

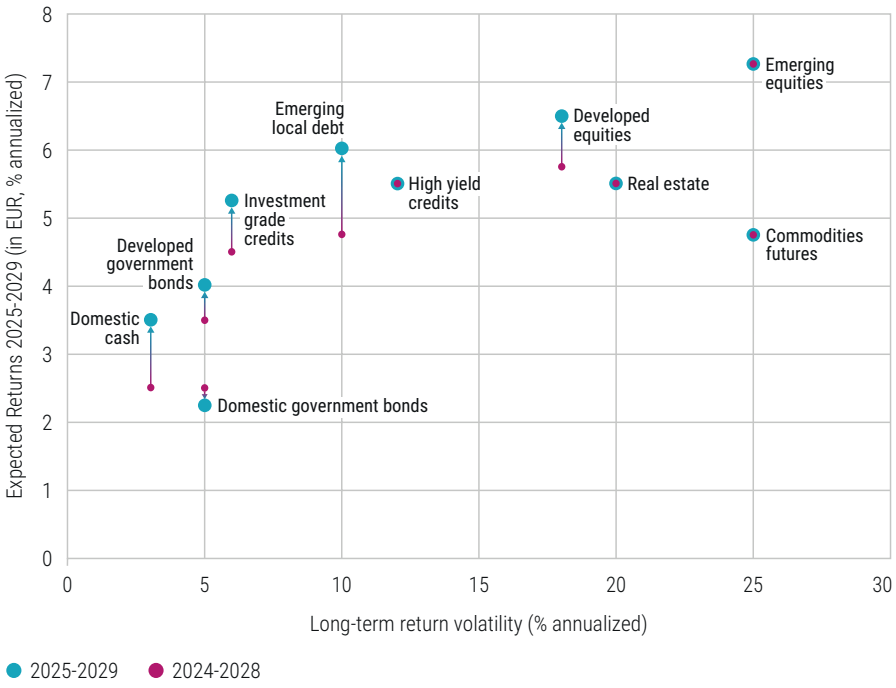
Table 5.1: Five-year return forecast for the main asset classes

	Long-term	Medium-term influences				Forecast in EUR			USD	JPY	GBP
	Returns	Valuation	Macro	Climate		2025-29	2024-28		2025-29	2025-29	2025-29
Fixed income											
Domestic cash	3.50%		0.00%		↑	3.50%	2.50%		4.00%	1.00%	4.00%
Domestic bonds	4.00%	-2.00%	0.25%	0.00%	↓	2.25%	2.50%		6.00%	0.25%	4.25%
Developed	4.25%	-0.50%	0.25%	0.00%	↑	4.00%	3.50%		4.50%	1.50%	4.50%
Emerging debt	5.75%	0.00%	0.50%	-0.25%	↑	6.00%	4.75%		7.00%	4.25%	6.75%
Corporate inv grade	5.00%	-0.75%	1.00%	0.00%	↑	5.25%	4.50%		5.75%	2.75%	5.75%
Corporate high yield	6.00%	-1.00%	0.75%	-0.25%	≈	5.50%	5.50%		6.00%	3.00%	6.00%
Equity											
Developed	7.00%	-1.75%	1.50%	-0.25%	↑	6.50%	5.75%		7.50%	4.75%	7.25%
Emerging	7.50%	0.00%	0.25%	-0.50%	≈	7.25%	7.25%		8.25%	5.50%	8.00%
Real estate	6.00%	0.25%	-0.50%	-0.25%	≈	5.50%	5.50%		6.50%	3.75%	6.25%
Commodities	4.00%	-0.25%	0.50%	0.50%	≈	4.75%	4.75%		5.75%	3.00%	5.50%
CPI											
Inflation	3.00%				≈	2.50%	2.50%		2.50%	1.50%	2.75%

Source: Robeco. September 2024. The medium-term influences correspond with our assessment of the valuation, climate and macro influences described in Chapters 2, 3 and 4. The expected returns are geometric and annualized. Bond returns are euro-hedged except for (local currency) emerging market debt. The value of your investments may fluctuate, and estimated performance is no guarantee of future results.

Figure 5.1 plots these expected returns against long-term volatility estimates for each asset class. Note that whereas the returns are projected for the next five years, the volatility figures are long-term estimates and are close to what has been observed historically over an extended period. Although it might be tempting to eyeball a mean-variance efficient frontier through the dots, this would be unwise because we have not considered correlations in our analysis. Assets with low correlations to other asset classes may still form part of a mean-variance efficient portfolio, even when their expected returns are low.

Figure 5.1: Five-year return forecast versus long-term volatility

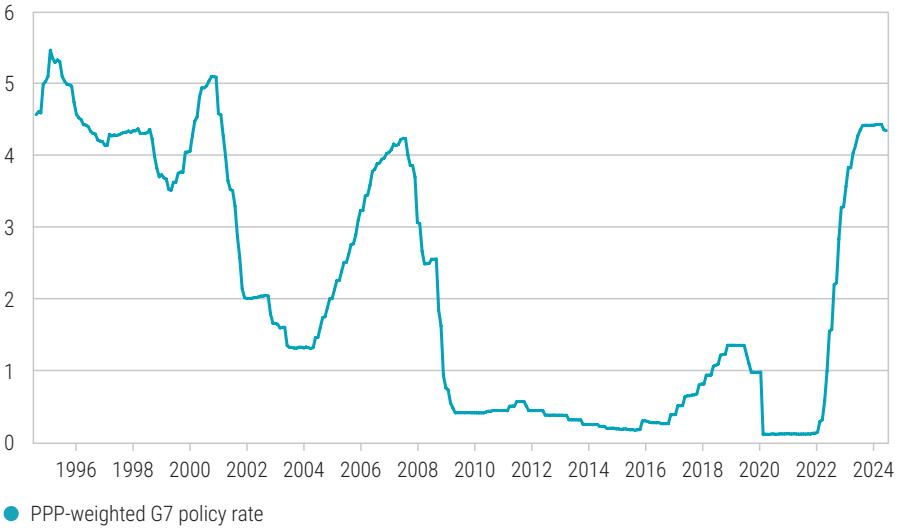


Source: Robeco. September 2024. Vertical axis contains the geometric annualized returns for a euro investor over the period 2024-2028 and 2025-2029. The horizontal axis is a proxy for the long-term return volatility of each asset class.

5.1 Cash

Cash is the linchpin of every portfolio. It functions as a source of liquidity and as a hedge against both inflation in the long term and volatility. Cash returns are ultimately dependent on the structural state of the economy and how central banks navigate the business cycle. A vibrant economy gives investors and CEOs more opportunities to generate returns in excess of cash, raising the desired level of investment relative to the desired level of savings. Spurred by the exuberance surrounding AI, the cash allocation among US retail investors is currently just 15%, which is close to cyclical lows.

Figure 5.2. An unusually stretched plateau during cyclical peak G7 policy rates



Source: LSEG Datastream, Robeco. August 2024.

At the time of writing, we have arrived at an inflection point in the monetary policy cycle. After raising policy rates by 425 bps on a purchasing power parity (PPP)-weighted basis between March 2022 and September 2023, G7 central banks have settled on a rates plateau that has lasted longer than those in previous tightening cycles due to the combination of stubborn services inflation and resilient economic growth. With most G7 central banks on hold, the Bank of Japan, by contrast, has moved in an entirely different direction, hiking policy rates. In the summer of 2024, the Bank of Canada and ECB made their first rate cuts of 25 bps, kicking off the descent of the PPP-weighted G7 policy rate. This shows that we are moving into the next stage of the current monetary policy cycle.

During the first stage in 2022 and 2023, central banks had a laser-like focus on combating inflation and preventing second-round effects from taking hold in wage setting. Central banks' mandates and credibility were at stake. In the second stage, inflation peaked before beginning to fall from very high levels. Relieved to see inflation normalizing, central bankers started paying more attention to the pace of rate hikes. In the third stage, which we have been in since the fourth quarter of 2023, the trade-off for central banks with a dual mandate of maintaining price stability and full employment has become more symmetric. In the US, core inflation is still running well above target, but the cooling of the labor market has also become more pronounced.

In the fourth stage, there are two possibilities. One is that consistent evidence of ongoing disinflation leads to higher conviction among central bankers that medium-term core inflation will durably converge toward target while concerns about the business cycle become immediate. If this is the case, the pay-off function becomes asymmetric again, with central banks seeing preventing a further slowdown by cutting interest rates as a higher priority than fighting inflation. The other possible outcome is much rarer from a historical perspective – it has previously only occurred in 1966, 1984 and 1995. Here, there is consistent evidence of ongoing disinflation coinciding with limited downside risk to the real economy as labor market cooling does not snowball into a steep rise in net job losses. In this second scenario, the nature of rate cuts is different from in the first; they are not recession-induced and therefore receive a different response from investors.

Financial markets have been widely anticipating the second, benign scenario in which getting inflation down to target is not particularly problematic in terms of the number of

job losses it results in. Anchored inflation expectations and limited catch-up of real wages with inflation have certainly contributed to a smooth process of disinflation (Bernanke and Blanchard, 2024). But further immaculate disinflation without rising unemployment would require the slope of the Phillips curve (which depicts the trade-off between inflation and unemployment) to remain almost vertical, even when inflation drops below 2.5%. This would be at odds with the long-run Phillips curve and in fact the latest data have been more in line with the long-run, flatter Philips curve.

Figure 5.3: Moving back to the old Phillips curve

Source: LSEG Datastream, Robeco. August 2024.

Central banks' ability to engineer a soft landing in 2025 is important as it would show that at least a battle against inflation has been won, due to luck (in the form of easing supply chains, a lack of wage indexation and productivity gains) and/or skill (in terms of their credibility in anchoring inflation expectations). And yet data-dependent central banks will need to remain vigilant as the war on inflation may not have been won over the medium term. To stick with the landing analogy, over a five-year horizon, the quality of the airstrip (represented by the supply side of the economy and economic structure) may have a bigger impact on what happens than the skills of the pilot (represented by central banks' reaction functions and guidance). The economic structure is the key determinant of the neutral rate of interest, the ultimate beacon that guides central banks' rate decisions.[1]

1. The policy rate at which economic activity is neither inflationary nor deflationary.

In our view, investors and central banks alike are underestimating the post-pandemic level of the neutral rate, both in real and nominal terms. This judgement error will create upward inflation momentum around 2026 and lead to central banks embarking on a second tightening cycle around 2027.

Reasons for a higher neutral rate of interest

A simple rule of thumb suggests that for an economy with a 5% nominal growth rate (the current rate in the US), the nominal neutral rate of interest should be around 4% if we assume interest rates reflect at least an 80% compensation for underlying real growth and inflation risks (as we observe in a steady state). The latest longer-run estimates for the Fed's

policy rate by FOMC members (as represented by the Fed dot plot) show that not even one Fed official currently expects a 4% nominal neutral rate, with the median estimate at 3%.

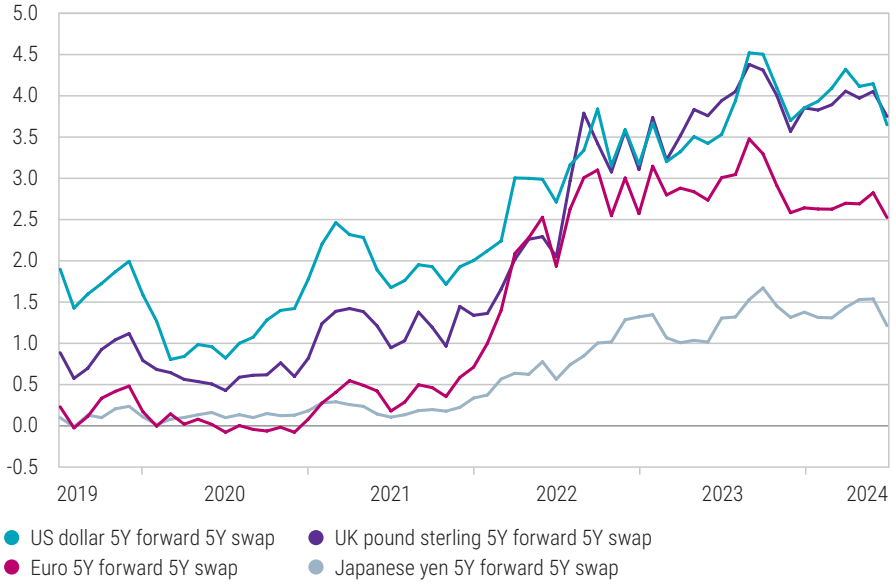
Meanwhile, the real neutral rate estimates provided by Laubach and Williams (John Williams is the president of the New York Fed) seem too low at 1.18% (as at Q1 2024). Applying the rule of thumb described above, the neutral real rate could be 1.70% (80% of the 2.1% annualized US real GDP growth over the past five years), which is 50 bps higher. Looking ahead, the future level of the neutral real rate is experiencing upward pressure. Ferreira and Shousha (2020) uncover three key determinants of the neutral real rate: productivity growth, the working-age share of the population and the net supply of safe assets. They find that a 100 bps increase in productivity growth raises the neutral real rate by 77 bps.

In our base case, we expect a 40 bps per year increase in productivity growth in advanced economies, which would result in the neutral rate rising by 30 bps from current levels. A higher net supply of safe assets, with governments running fiscal deficits at a time when the global savings glut is diminishing, would probably exert further upward pressure on real neutral rates. Ferreira and Shousha find that the global accumulation of international reserves since the 1990s has lowered the net supply of safe assets, reducing the neutral real rate of interest by 50 bps. Higher gross issuance of US Treasuries coinciding with falling demand for US safe-haven assets due to geopolitical fragmentation could have the opposite effect, exerting upward pressure on neutral interest rates.

Considering all these factors together, we expect an average return for US cash of 4% per year over the next five years based on a nominal neutral rate much closer to 4% than the 3% that is currently envisaged by policymakers.[2] Judging by the US dollar five-year forward five-year swap rate (a proxy for the longer-term market-implied neutral rate), which stands at 3.6%, we are much closer to (although still above) the market's view than the Fed's. The 2.5% market-implied neutral rate for the Eurozone seems too low because in our base case we expect 2.3% inflation and 1.7% real GDP growth in the Eurozone, warranting a neutral policy rate of around 3%. We also expect a somewhat higher neutral rate than the market-implied 1.2% in Japan, but we believe the Bank of Japan will err on the side of caution and keep its monetary policy relatively loose, with a policy rate on average below neutral, as deflation will linger long in the memory of the Bank of Japan's policymakers.

2. Over the next five years in the US we expect on average 0.70% labor force growth + 1.75% productivity growth + 2.60% inflation = 5.05% nominal GDP growth. Applying an 80% capture rate results in a nominal neutral US rate of 4.04%.

Figure 5.4: A rising trend in market-implied neutral interest rates



Source: LSEG Datastream, Robeco. August 2024.

Inflation could rise

Inflation expectations have remained well behaved. As of August 2024, US breakeven yield is 2.12%, which is only slightly above the Fed's 2% target. What's more, the correlation between one-year-ahead inflation expectations and three-year-ahead inflation expectations among US consumers has fallen, signaling a declining pass-through of high actual inflation that people experience into the future.

We expect inflation in developed economies to stay in a range close to 2.5%, above-central-bank inflation target rates over the next five years, which will keep central banks on edge.

First, we should not neglect the base rate. Historical data for 23 countries since 1900 shows that the frequency distribution of inflation has a thick right-hand tail (a positive skew), with far more observations above today's 2% target than below it.

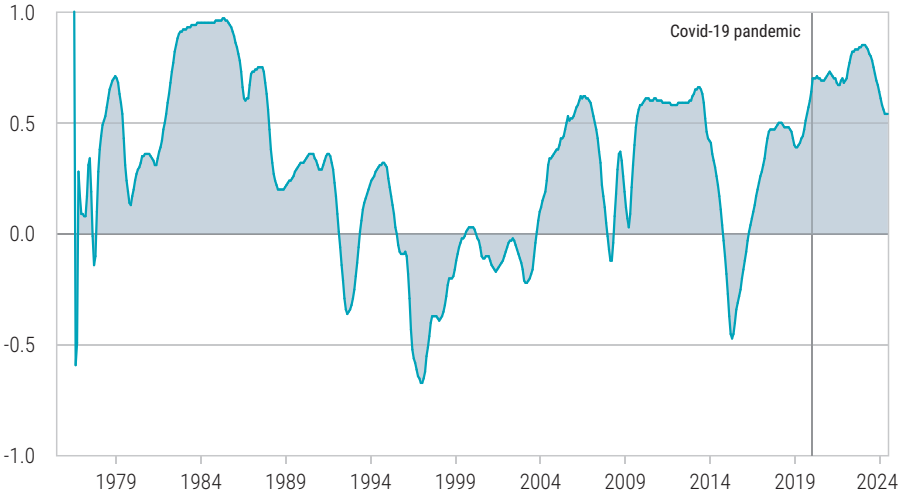
Second, looking at the causes of disinflation since inflation's 2022 peaks, reduced supply chain pressure has been a key contributor. This factor is beyond central banks' control and could quickly reverse in world that is increasingly susceptible to negative supply-side shocks.

Third, we agree with the Bank for International Settlements (2024) that climate change and geopolitical tensions are forces that could structurally alter the dynamics of goods inflation over the longer term. This implies that all else being equal, services inflation has to make a smaller contribution to overall inflation than it did before the pandemic if we are to sustainably return to a 2% inflation target. But the opposite has been the case recently: services inflation has been high and sticky. While increased adoption of AI might be disinflationary for goods inflation, the lower degree of substitution between labor and capital in the services sector will still create net inflationary pressures as long as the productivity effect from AI exceeds the job displacement effect, which forms part of our base case.

Last, while Bernanke and Blanchard (2024) do not see evidence of labor market tightness having caused inflation in recent years in most economies, there could be a significant inflation catch-up in services wages due to populations aging and the reduced free movement of people, both of which will create labor scarcity.

One interesting central bank to highlight in our base case is the Bank of Japan, which in July 2024 raised its policy rate to 0.25%, its highest level since 2008. Japan's real policy rate, however, is still deeply negative at -2.50%, so the Bank of Japan sees scope for further tightening in the coming years. Inflation from higher import prices and wage growth is increasingly being passed on to final consumers in Japan, which makes us believe the country has reached an inflation inflection point. After decades of subdued inflation, it is now likely to remain close to but above 2% through 2026, only to fall back in the second half of our projection period. With Japan's trend growth likely to move close to 1%, we expect Japan's policy rate to average 0.85% over the next five years, reflecting a higher neutral policy rate.

Figure 5.5: Higher pass-through of Japanese import prices to consumers



Source: LSEG Datastream, Robeco. August 2024.

In our bull case, life for central bankers is relatively easy as the Goldilocks scenario persists. After an initial soft landing around 2025, inflation expectations remain well behaved as the risk of a negative supply-side shock fades in a world that reconnects. Another trade war is averted, removing an inflationary impulse present in our base case (even though China manages to escape secular stagnation and starts exporting inflation again). With companies' focus shifting toward optimizing efficiency once again rather than ensuring they are resilient in the face of negative supply shocks, producer prices remain lower than in our base case. A much more pronounced boost to the global economy from productivity growth due to faster adoption of AI results in lower wage pressures than in our base case.

First, this is because productivity gains outpace underlying real wages, keeping unit labor costs in check and preventing a potential wage-price spiral. Second, as in this scenario the displacement effect of adopting AI on labor demand is significant (US unemployment rises by 20 bps per year purely due to technological unemployment), workers react by toning down their wage demands in exchange for job security and rotating toward more labor-intensive services, reducing services inflation. Inflation in developed economies remains close to central bank targets. Real policy rates are high, reflecting a higher neutral real rate of interest than in our base case. Echoing the 1950s, a thriving global economy does not experience a second wave of inflation due to a robust supply side. Therefore, nominal policy rates are somewhat lower than in our base case.

In our bear case, geopolitical problems create more frequent and more serious negative supply shocks. This reinforces fiscal dominance, with the US in particular running persistently high fiscal deficits. A tariff war escalates, driving import prices higher. Central banks are incentivized to keep rates below neutral after a soft patch in 2025 for longer. Therefore, inflation rebounds after 2025, peaking above 4%. A second wave of inflation develops that is much more powerful than the one we consider in our base case. Inflation expectations become unanchored, with the yield curve bear-steepening. In 2027, central bankers try to get inflation under control by hiking rates. A fairly deep recession results in 2028; this is the price to be paid for excessive fiscal stimulus after the pandemic. Given the depth of the recession and as inflation expectations revert back to central bank target levels, policymakers use almost all the monetary ammunition available to them and cut interest rates by around 400 bps, averting a 1930s-style economic depression and, in the words of Lawrence Summers, "the mother of all stagflations".

5.2 Developed government bonds

In theory, long-dated nominal government bonds are considered riskier than cash because of their exposure to real productivity growth risk and inflation risk. Investors experienced how inflation risk can erode the real value of their nominal bonds during the high inflation of 2021-2022. Government bonds can also face mark-to-market losses in periods in which interest rates increase to curb inflation. Investors therefore typically demand a term premium as a reward for holding these long-term assets instead of cash. We expect that over the long run, the premium for holding long-dated government bonds will be 75 bps over cash, slightly below the empirically observed global average of 100 bps since 1900.

However, as we saw in the Valuation chapter, interest rate curves are inverted in the US, the UK and Germany, with long-term bond yields lower than cash yields. This suggests that bond investors in these countries are preparing for central banks to cut interest rates soon. This is not the case in Japan, where the term structure of interest rates still slopes upward, although interest rates overall are at a substantially lower level.

In our base case, we expect bond yields in Germany to steadily increase to slightly above 3% and stay there over the remainder of the next five years, although they may face some downward pressure toward the end of the period. We expect US Treasury yields to initially fall below 4%, but with inflation pressures persisting and the debt-to-GDP ratio increasing, they are likely to hit 5% in the middle of our projection period before falling back to 3% by 2029. We expect a similar picture in the UK, but with yields staying well below 5%. We expect Japanese bond yields to rise to around 2% over the next five years.

The consequence of rising interest rates is that returns for government bond investors in Germany and Japan will be below the central bank policy rate. The realized term premium is expected to be negative for both countries. For the UK, the additional return of investing in bonds relative to cash will be close to zero. The situation for the US is very different. The lower bond yields we expect toward the end of our projection period should lead to positive returns for investors in US Treasuries, and the realized premium for bonds over cash will be exceptionally high at around 2% per year.

We hedge the local-currency return of each developed government bond market into the respective base currencies. The currency hedging cost is the difference in the predicted policy rates as currency hedging is usually achieved by rolling short-term derivative contracts. For example, the 6.00% expected return for US Treasuries becomes a 5.50% return when hedged into euros because of the 50 bps difference in cash interest rates between the US and Germany. When we do the same for other developed bond markets, the asset class provides a 4.00% expected return per year for investors with the euro as their base currency. For US dollar investors, the expected return is 4.50% per year. However, this is substantially below the expected return of US Treasuries, so international diversification comes at a cost for US investors.

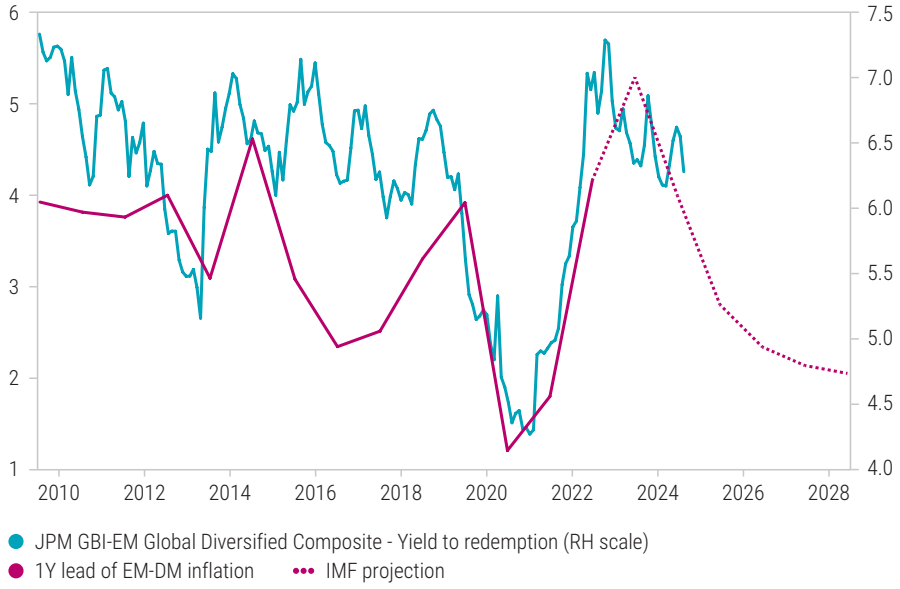
In our bullish scenario, interest rates in most developed markets will be around their long-term equilibrium level of 4% after five years, except for in Japan, where they rise to 2%. This leads to somewhat lower expected returns for government bonds in this scenario.

In the bearish scenario, bond yields rise substantially in the first half of our projection period, reaching 6% in the US and UK and over 4% in Germany. The second half of the period is marked by sharply falling bond yields, such that they end up at around 2% in these three countries. Initial losses are outweighed by larger subsequent gains, leading to expected returns for developed market government bonds of 5.75% per year for a euro investor and 6.00% for a dollar investor.

5.3 Emerging market debt

Local-currency emerging market debt is a heterogenous asset class that sits between investment grade and high yield from a credit rating perspective. Country-specific idiosyncratic risks have historically played a prominent role. Our analysis shows that over the years, the asset class has been increasingly driven by external factors. Our model explaining annual local-currency emerging debt returns by global drivers such as commodity prices and global credit, global high yield and US Treasury returns shows the explained variance has risen over the past five years from 82% to 96% (full sample 2000-2024 R2= 69%). The coefficients with other global fixed income are positive and strongly significant, highlighting the importance of global return drivers in explaining local currency emerging market debt returns. The commodities coefficient is negative, indicating lower commodity prices reduces the inflation premium in nominal yields, resulting in higher returns. Local-currency emerging debt yields are highly correlated with the difference in inflation between emerging markets and developed markets. As the IMF World Economic Outlook expects the inflation gap between emerging and developed economies to fall toward 2029, this suggests local-currency emerging market bond yields could fall below 5% by 2029.

Figure 5.6: IMF's projection of a falling inflation differential between developed and emerging markets suggests local-currency emerging bond yields will fall significantly



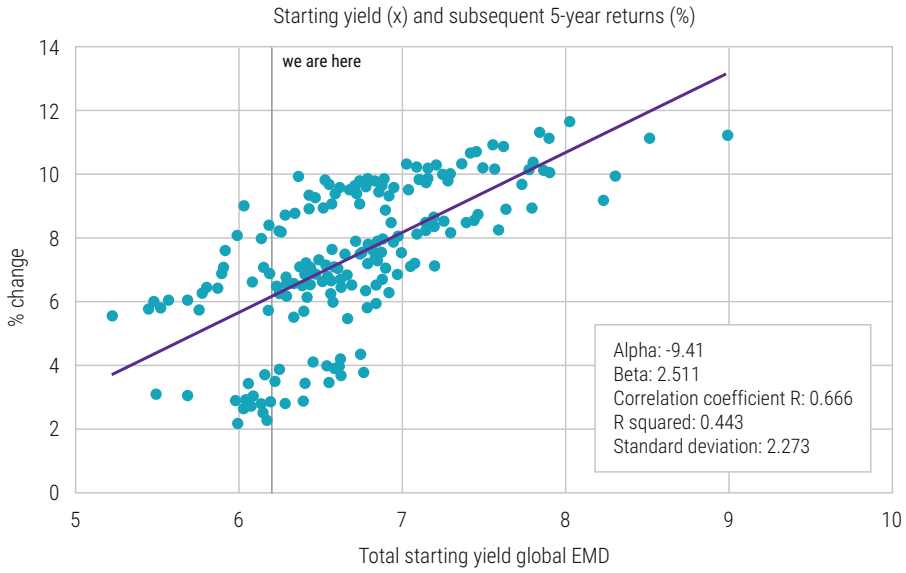
Source: LSEG Datastream, Robeco. August 2024.

Despite a falling inflation differential boding well for yield compression further down the road, we still see expect local-currency emerging market bond yields to be above 5% by the end of 2029 in our base case. This is firstly because we expect US Treasury yields to stay around 4%, and secondly because the physical risk resulting from climate change and the financing needed to mitigate its impact will increase financing costs for emerging market governments toward the end of the decade. Based on our rates models, we expect local-currency emerging debt to provide a return of 6.00% per year over the next five years for a euro investor, which is 25 bps above its steady-state return. This estimate is backed up by the asset class's current yield of 6.2%: starting yields are generally fairly good proxies for subsequent returns in fixed income.

In our bullish case, we expect even more synchronization of emerging market central banks' rate cycles with those of other central banks around the world. As inflation returns to target in many economies, yields will be lower. With the carry component of overall returns somewhat lower than in our base case, we would expect the asset class to return 5.50%.

In our bearish case, a second wave of global inflation results in local-currency emerging bond yields rising, reducing the return the asset class provides. In the second half of the projection period we also expect more notable depreciation of emerging market currencies against developed market currencies (despite valuation metrics like deviation from trend purchasing power parity suggesting they should appreciate modestly, all else being equal). In this scenario we expect the asset class to provide a 3.50% per year return for euro investors.

Figure 5.7: Local-currency emerging market debt's starting yield is a good predictor of its returns over the subsequent five years



Source: LSEG Datastream, Robeco. August 2024. Vertical axis is five-year return in local currency.

5.4 Corporate bonds

Corporate bonds pay investors a premium over government bonds to compensate them for the credit and liquidity risks that investing in the asset class involves. While they are procyclical assets like equities, their upside is capped, whereas equities have in theory unlimited upside potential.

Where are we in the credit cycle? As we discussed in our Valuation chapter, corporate bond issues are expensive based on their below-median credit spreads, especially for high yield. Meanwhile, the USD-denominated market is more expensive than the EUR-denominated market.

Investment grade

We expect investment grade corporate bond spreads to increase in the first half of our projection period to reach almost 2% and 6% for high yield before falling back to below-median levels toward the end of the five years. Default losses will initially increase as we expect a modest default cycle around 2027. After the weakest companies have defaulted, default losses will return to normal (default rate of 0.25% per annum) in the final two years of our horizon.

We expect the return from investing in investment grade corporate bonds denominated in euros to be 150 bps per year higher than the return earned from investing in German government bonds. The additional return for USD-denominated investment grade

corporate bonds is only 50 bps as starting spreads are low and we expect average losses resulting from defaults and downgrades. While the spread of global corporate bonds relative to global government bonds seems wide at 125 bps, this is partly due to the difference in the composition of the two indices. The Japanese government bond market is large, and we expect low returns from this asset class, while there are almost no yen-denominated corporate bonds in the global corporate bond index. This has a negative effect on the expected return of the global government bond market compared with that of the global corporate bond market.

In our bullish scenario, we expect credit spreads to stay as low as they are today, in similar fashion to the buzzing bubble that we discuss in this year's Special Topic section. Default losses are close to the cumulative default rates observed over the past five years. In this scenario we expect a 4.5% return per year for investment grade credit for euro investors. Our bearish scenario sees investment grade suffer higher default losses, but at the same time there is a much larger positive return contribution from duration in the second half of our projection period as central banks start cutting rates. As a result, we expect a 7.25% per year return for investment grade credit for euro investors in this scenario.

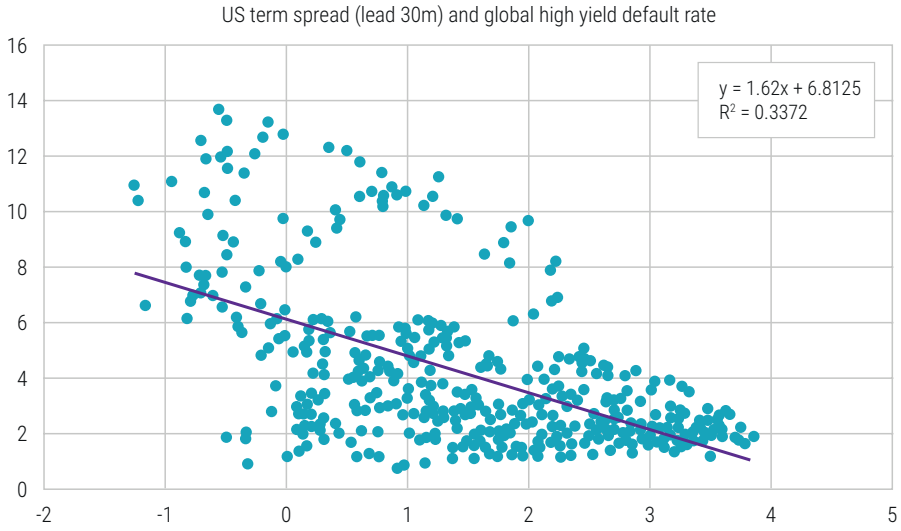
High yield

High yield involves a considerable amount of equity-like risk. Its correlation with equities has averaged around 40% over the past 25 years, with the other 60% of its return variance explained by its bond-like features. High yield is much more susceptible to default risk and more heavily influenced by the earnings cycle than investment grade corporate bonds. We expect earnings growth of around 10% per year in developed markets over the next five years, which will certainly provide a cushion, but it probably will not prevent a worsening in interest coverage for the lower-rated segment within the high yield market. In our view, a post-pandemic era of higher real rates will result in rising defaults as high yield issuers are facing a wall of maturing bonds around 2026-2027 which will need to be refinanced against higher rates.

The era of ultra-low interest rates during the 2009-2019 expansion has kept defaults for speculative grade debt below the average level of 3% observed since 1920. But given the inversion of the yield curve, which has historically been a predictor of defaults in the subsequent 30 months, we believe that defaults could peak around 6% this cycle, probably around the midpoint of our projection period. In anticipation of this wave of defaults we expect spreads to increase to 650 bps around 2026 before falling back afterwards. Spreads tend to compensate buy-and-hold investors for default risk.

Another mitigating factor that could reduce the amount of defaults is that global corporate leverage is still low by historical standards, although it has been rising since central banks started tightening in 2022. High yield spreads have compressed relative to investment grade conditioning for leverage and the phase of the business cycle. The difference in spreads between global high yield and global investment grade is currently tight (243 bps at the time of writing), which suggests a below-steady-state excess return for high yield relative to investment grade of 50 bps. We expect high yield to provide a return of 5.50% per year over the next five years for a euro investor in our base case.

Figure 5.8: Inversion of yield curve predicts a 6% default rate for high yield

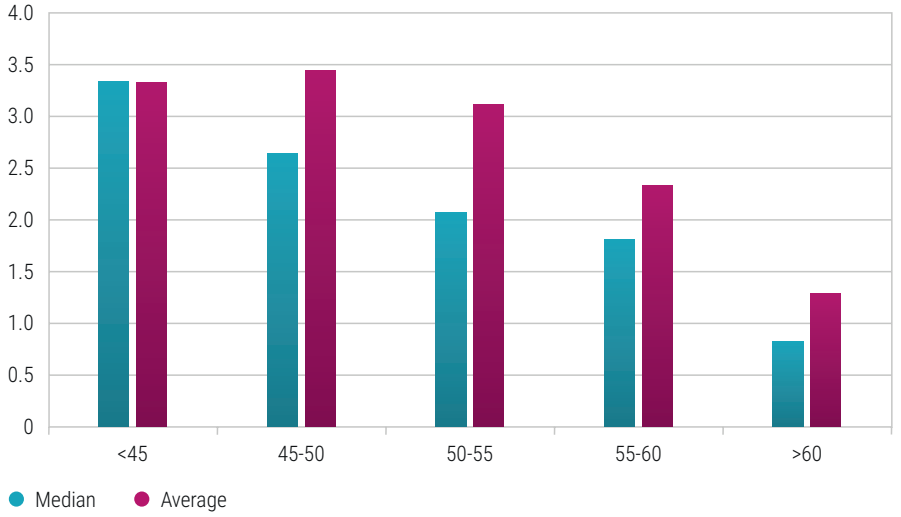


Source: Robeco, Bank of America Merrill Lynch. Default rate (2.5 year forward) on vertical axis. Term spread is 10-year yield minus Fed funds rate. Period 1954-2024.

In our bullish case a wave of defaults is averted thanks to a strong earnings cycle, leverage remaining low and lower interest rates. US real activity grows at on average 3% per year, and the ISM manufacturing leading indicator is in the 55-60 range. Our analysis shows that in such environments in the past, speculative grade default rates have been only 2.3%. In the absence of an impending wave of defaults, global high yield spreads remain in a range close to 420 bps.

In our bear case spreads are on average almost 100 bps higher than in our base case, peaking close to 1,000 bps as the maturity wall hits around 2027. By then, central banks have embarked on a second tightening cycle, forced by the bond vigilantes in the wake of a second round of above-target inflation, creating additional turmoil at what is already a critical juncture. In this case, spreads temporarily do not fully cover for the default losses that US high yield investors incur. In this scenario we expect global high yield to return 3.5% per year for a euro investor, which is 250 bps below its steady-state return. If this scenario pans out, investors would clearly receive higher returns from investing in investment grade than in high yield.

Figure 5.9: High yield default rates during ISM manufacturing regimes



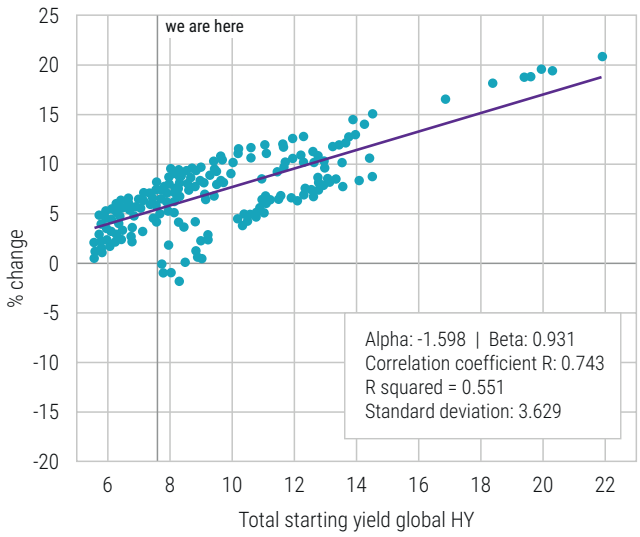
Source: Robeco, Bank of America Merrill Lynch, ISM. Period 1950-2024.

The Commission Parameters (2019) in the Netherlands has mapped credit risk for each rating.[3] They find that the lowest-rated segment of investment grade (BBB) has 80% bond-like exposure and 20% equity-like exposure. They find that high yield bonds only have 60% bond-like exposure and 40% equity-like exposure. As such, another way to calculate expected returns for corporate bonds would be to combine the expected returns of government bonds and equities in the appropriate proportions. This approach results in a 5.25% per year return forecast for global investment grade corporate bonds and 5.75% for global high yield. Our bottom-up created method results in the same expected return for investment grade and a 25 bps lower return for high yield. As a consistency check, our corporate bond estimates are not far off this short-cut, which only uses information about government bonds and equities. A third method, which only considers the starting yields for investment grade and high yield as predictors of subsequent 5Y returns, results in almost the same expected returns as the previous two methods.

3. Commission Parameters (2019). Advice Commission Parameters. Den Haag: Commission Parameters

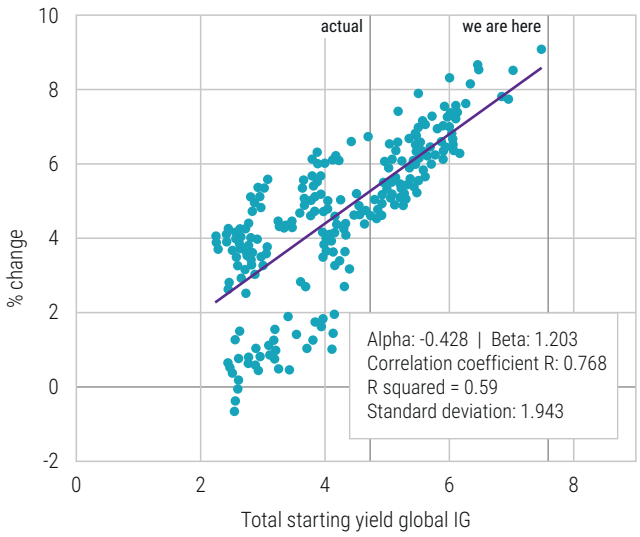
Figure 5.10: Starting yield approach delivers almost identical outcomes to our two other return approaches

Global HY – starting yield (x) and subsequent 5-year returns (%)



Global market implied ERP vs subsequent 5Y annual excess equity returns

Global IG – starting yield (x) and subsequent 5-year returns (%)



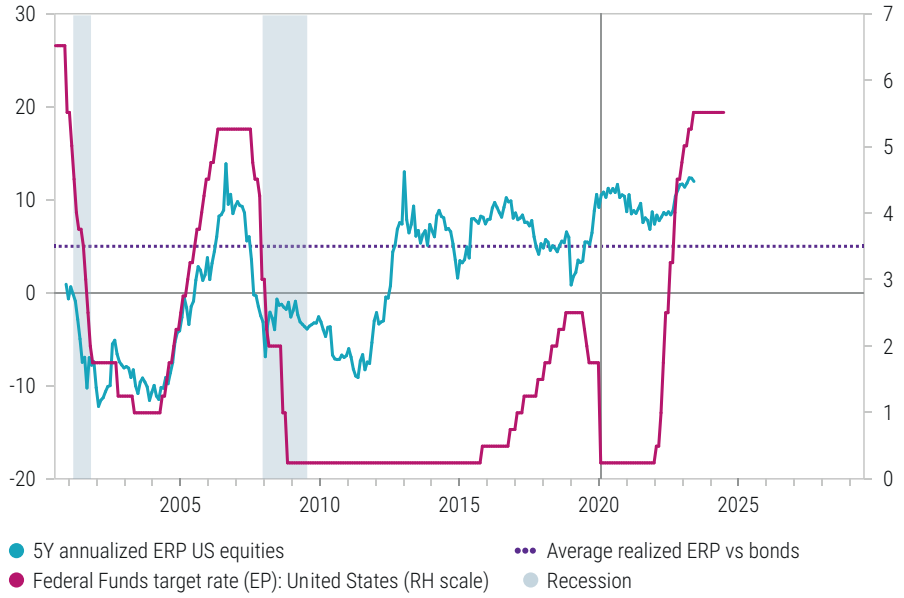
Global market implied ERP vs subsequent 5Y annual excess equity returns

Source: LSEG Datastream, Robeco. August 2024.

5.5 Equities

Last year, the market was anticipating a recession and a rate-cutting cycle, with rising equity multiples generating the bulk of total developed equity market returns. So far, 2024 has seen the contribution of earnings growth next to equity multiple expansion, showing we are in a recovery phase of the global equity market cycle. The nature of the next US central bank rate cutting cycle (whether it is recession-induced or not) will have important ramifications for the initial equity market response and the duration of the recovery phase; the last three rate-cutting cycles initiated by the Fed were all recession-induced and saw the realized five-year annualized US equity risk premium relative to US government bonds drop below its 32-year average (or even become negative). If forthcoming rate cuts prove to be mere adjustments rather than a full-blown attempt to mitigate further economic downside, equity markets may continue to rise relative to sovereign bonds, as they did around the time of the 1995 soft landing. In our base case scenario, we estimate that a US-based investor holding US equities will receive a return 50 bps per year lower than they would from investing in 10-year US Treasuries.

Figure 5.11: The nature of forthcoming cuts matters

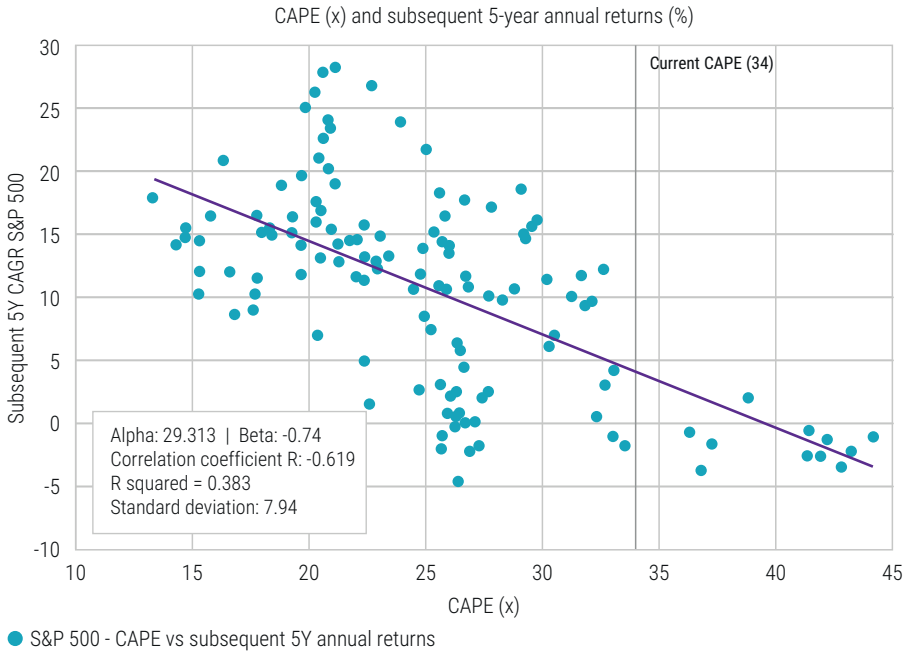


Source: LSEG Datastream, Robeco. August 2024.

A magnificent rally

In recent years the growth of large language models has provided further impetus to US companies' earnings. But these earnings have been concentrated in the so-called Magnificent Seven, leaving the S&P 500 an expensive and highly concentrated index – the Magnificent Seven account for 31.7% of it at the time of writing. The question whether US exceptionalism is set to continue is high on equity investors' list of concerns given stretched valuation levels suggest there could be below-steady-state returns for US equities over the next five years.

Figure 5.12: At a CAPE of 34, subsequent returns over the next five years have historically been below 5% for the S&P 500



Source: LSEG Datastream, Robeco. August 2024.

As we argue elsewhere in this publication,[4] it could very well be that the US equity bubble keeps buzzing for longer even (or rather especially) if we enter an economic soft patch in 2025. A scarcity of growth during a weak period for the economy would mean investors would be willing to pay a high premium for US technology stocks' ability to generate earnings. In addition, a further increase in US equity valuations, with implied US equity risk premiums moving into negative territory, is a possibility as stretched valuations still have to encounter irrational exuberance. So far, investors' exuberance seems to have been rational as the Magnificent Seven have delivered 61% growth in earnings year-on-year, whereas their stock prices are up by 28% year-on-year at the time of writing. The US equity risk premium is low, but not negative. There was irrational exuberance during the heydays of the IT bubble when the 12-month forward market-implied US equity risk premium was negative for almost 2.5 years, showing the market was disregarding cashflow volatility and willing to significantly overpay for future earnings.

4. See the 'Bursting or buzzing bubbles?' special topic in this publication.

Europe on sale

But a persistent scarcity of growth is not our base case beyond 2025. As such, investors should not take US exceptionalism for granted toward 2029 as the global economy proves more robust than consensus expectations. As we explained in the Macro chapter, we expect other developed economies to catch up with the US – especially the UK, Japan and continental Europe. Therefore, growth scarcity is dwindling, improving the prospects for regions outside the US.

Surely there is value to be found in Europe, for instance. The P/E of the S&P 500 is 1.88 times higher than that of its European counterpart (MSCI Europe) – the highest level since 1974. And the MSCI Europe Value index is trading at a 63% discount to the MSCI AC World index – its highest discount in history.

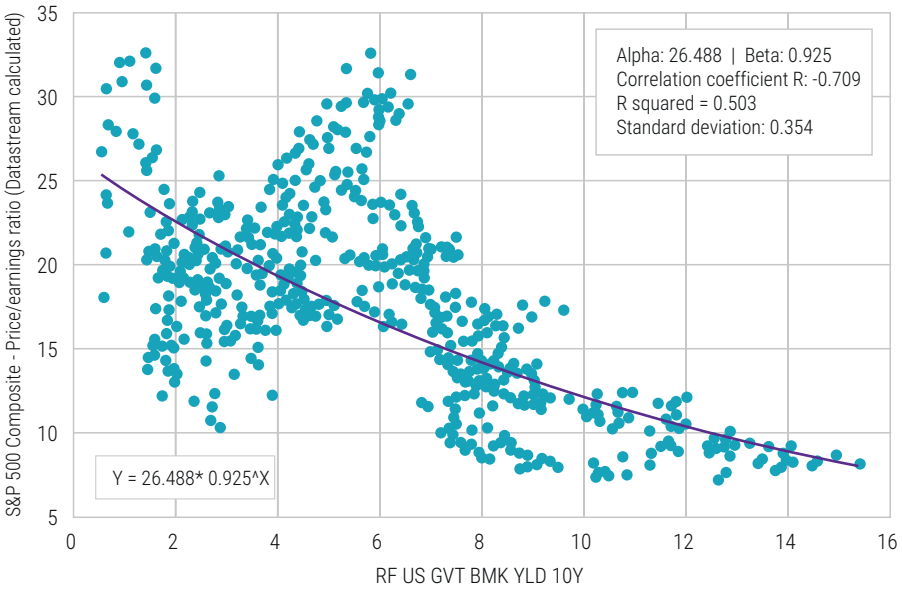
As the appeal of glamourous growth stocks in the US eventually fades, investors may pay more attention to cheap value stocks in Europe. It is always darkest before dawn. Financial markets seem to have given up on Europe and reached the despondency phase of the cycle. They see political turmoil in France and a struggling Germany still feeling the effects of the energy crisis while facing a seemingly secular decline in consumer demand from China and increased competition for its car manufacturers. As Mario Draghi (2024) put it, "radical change is needed" and the market agrees. That said, since 2020, the earnings growth of both the DAX and the MSCI Europe have only underperformed that of the US by a small margin, leaving a cheapening European stock market.

Looking at long-term consensus earnings forecasts, the gap between US and European earnings forecasts is more than 500 bps per year, which is historically high and highlights exuberance about the US. A cyclical rebound as the European consumer gets back on track in the coming years, helped by improving real wage growth differentials relative to the US and the ECB cutting rates before the Fed, could see the tide turn in favor of Europe. Europe seems to have learned some important lessons after its pursuit of excessive austerity and wage moderation in previous decades. In our base case, Europe gets things just right enough to unlock the value in European equities, even in the absence of the large structural reforms the continent needs like increased competitiveness, increased public goods spending and securing supply chains to mitigate its energy dependency. A historical analogy with the current situation would be the aftermath of the bursting of the IT bubble in the early 2000s, when US equities were at peak valuations relative to European equities and European equities outperformed the US by more than 500 bps per year in the following years.

Japanese companies could see improved pricing power as there is increasing passthrough of import prices into consumer prices, boosting their profitability. While a strengthening yen could dampen export revenues and local currency returns, Japanese consumers are increasingly willing to frontload consumption as inflation has returned. A higher interest rate environment bodes well for Japanese financials.

Meanwhile, US nominal yields averaging around 4% will probably exert downward pressure on US multiples in the second half of the 2020s, capping total US equity returns despite solid earnings especially from technology, healthcare and consumer discretionary as these sectors tend to be positively correlated with unexpected inflation. A combination of equity multiples contracting while earnings are solid is consistent with a business cycle in expansion. Given our upgraded expectations for European and Japanese equity returns we have raised our developed market equity return forecast from 5.75% per year last year to 6.50% per year for a euro investor. This represents below-steady-state compensation for taking equity risk relative to holding cash.

Figure 5.13. Nominal yields around 4% coincide with a P/E for the S&P 500 of around 20



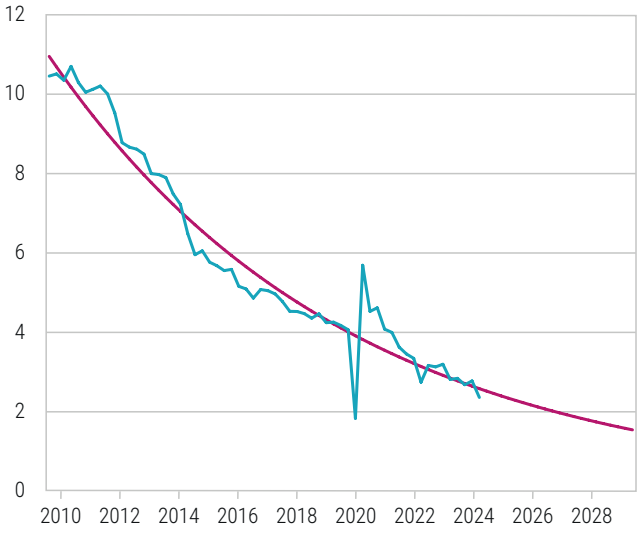
● RF US GVT BMK YLD 10Y vs S&P 500 Composite - Price/earnings ratio (Datastream calculated)

Source: LSEG Datastream, Robeco. August 2024.

China's growth relative to that of the US economy remains key for the performance of emerging market equities. Given the likely further slowdown in GDP catch-up of China versus the US, we do not expect emerging markets' earnings per share to grow at the 21% per year rate that current long-term consensus forecasts suggest. Instead, a further growth slowdown in China would probably result in emerging markets struggling to outpace developed markets' earnings growth. A bottoming out in China's real estate market could turn the tide for China, with a reinvigorated Chinese consumer leading to a sustainable rerating for Chinese equities relative to other emerging market equities. Indian equities, meanwhile, look expensive. We therefore see limited room for multiple expansion for emerging market equities in general, with the potential for outperformance of cheap emerging stock markets that maintain strategic ambiguity in an increasingly multipolar world.

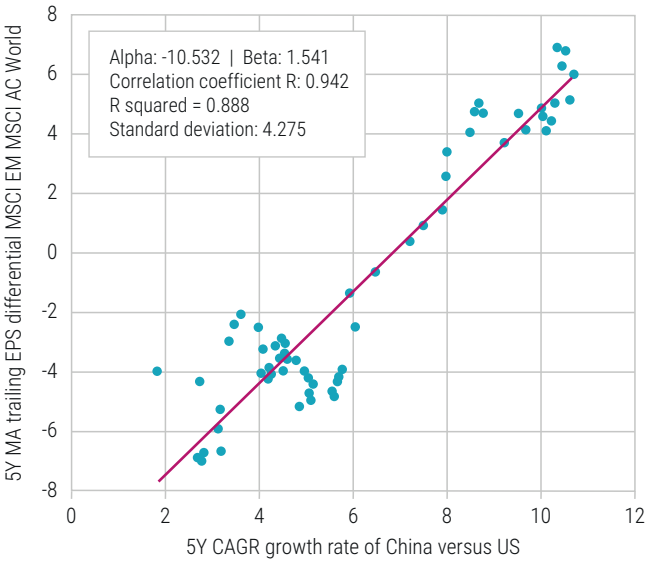
Figure 5.14: Shrinking economic growth outperformance relative to advanced economies reduces the potential for emerging market companies to grow their earnings more quickly than firms from developed markets

With growth catch-up China slowing down...



- 5Y CAGR growth rate of China versus US
- Logarithmic trend line of (5Y growth rate (first - last values) of GDP: China (Mainland)-5Y growth rate (first - last values)

...difficult to see EM EPS structurally outgrow DM EPS



- 5Y CAGR growth rate of China versus US vs. 5Y trailing EPS differential MSCI AC World

Source: LSEG Datastream, Robeco. August 2024.

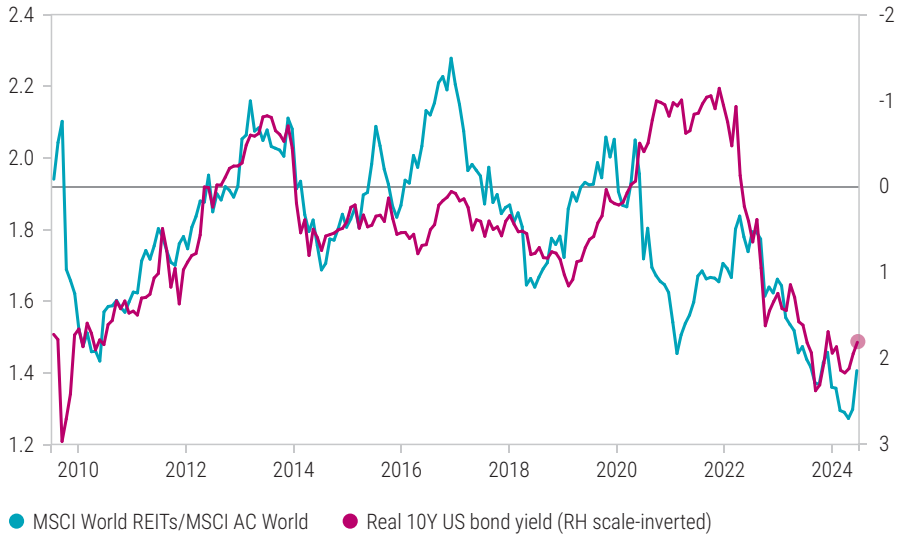
In our bullish case, profit margins and sales growth increase and productivity growth reduces unit labor costs. US equity multiples do not compress as much as in our base case, but pay-out ratios for a given earnings level are lower as increased AI adoption requires a higher degree of corporate capital absorption. We expect a return of 9.75% per year for developed equities for a euro investor in this scenario. While in our base case emerging market equities provide below-steady-state returns, in this scenario emerging equities significantly outperform developed market equities thanks to productivity growth catching up more with that of developed markets, a weaker US dollar and higher external demand for commodities to facilitate the green transition, with the asset class returning 16.75% per year. While outperformance of 700 bps per year may sound unrealistic, emerging equities outperformed developed equities by over 2,000 bps per year over five-year periods during the heydays of globalization.

In our bearish case, global companies increasingly have to prioritize supply chain security above efficiency, denting their profitability. Higher tariffs, especially on imported technology goods, hurt profit margins. Restrained international labor mobility and expensive import substitution keep local labor markets tight, while fading productivity gains from stalled adoption of AI raise unit labor costs. While high nominal growth in a high inflation regime (with US inflation above 3% on average) means nominal equity earnings are still solid initially, a tightening cycle to re-anchor inflation expectations results in a sharp drop in both earnings and multiples. Lower equity multiples are also a reflection of higher geopolitical risk premiums in a world faced with frequent negative supply shocks. In this scenario we expect a return of 4.00% per year for developed equities for a euro investor. Real returns for US equities are -1.50% per year, close to but still above the -2.90% per year that is reported by Guido Baltussen, Laurens Swinkels, Bart van Vliet and Pim van Vliet (2023) during stagflationary episodes since 1875. Emerging market equities return 5% per year.

5.6 Real estate

REITs can be described as bond-like equities. They are often considered an alternative asset class, but in essence they combine characteristics of bonds and equities. As many REITs are levered, they are more interest-rate-sensitive than standard equities. This can clearly be seen in the strong correlation between REITs' return relative to global equities and movements in the real interest rate. The sharp rise in US real yields in recent years has resulted in REITs underperforming equities significantly. In our base case scenario we do not expect 10-year Treasury yields to fall far below 1.5% on average, although 2025 could see a more significant dip below that level. As such, there only seems to be limited scope for REITs to outperform equities. REITs are a heterogenous asset class covering a diverse range of real estate activities. Many, such as office, retail and residential REITs, have not yet recovered from the shock of the pandemic, hinting at a structural break with the pre-Covid market environment. There have been bright spots in storage and industrial REITs, partly because of increasing demand for data centers. Although REITs' defensive characteristics may make them an attractive option around the 2025 economic soft patch that we envisage, it is unlikely that they will outperform global equities over the coming five years. We expect a 5.50% per year return for the asset class in euros.

Figure 5.15: There is a strong negative correlation between real yields and REITs' return relative to global equities



Source: LSEG Datastream, Robeco. August 2024.

In our bullish case, a more connected world with increased labor mobility, areas of the REITs market that have underperformed, such as offices and residential, rebound. Due to increased adoption of AI there is further upside for REITs that specialize in data storage. A much more stable rates trajectory than in our base case (with investment grade spreads remaining well behaved) contributes to improved interest coverage for the asset class. And yet real rates remain high compared with before the pandemic, capping REITs' upside potential relative to equities. In this scenario we expect REITs to rise by 9.00% per year, which is still slightly below the return of developed market equities.

In our bearish case, real yields drop more sharply as a second inflation wave develops. In this environment of stagflation, REITs outperform equities relative to their steady-state return differential of 100 bps. The return differential closes, with REITs rising by 4.00% per year, which is on a par with developed market equities. This is thanks to lower real rates, the defensive characteristics of the asset class and REITs' (albeit limited) inflation hedging capabilities over the long run.

Table 5.2: In times of high inflation, REITs tend to outperform equities

	ISM					
CPI	< 40	40-45	45-50	50-55	55-60	> 60
< 2%	0.07%	-0.76%	-0.09%	-0.68%	-0.12%	-1.95%
2-3%	-	0.22%	-0.95%	-0.16%	-0.22%	0.83%
> 3%	-7.45%	1.81%	-0.28%	0.05%	0.73%	1.78%

Source: LSEG Datastream, Robeco.

5.7 Commodities

In the 2022-2026 edition of this publication, whose theme was the 'Roasting Twenties', we expected increased demand for commodities to facilitate the green transition. Electrification, for example, requires huge amounts of copper and aluminium. To facilitate the renewable energy transition, there will be a lot of smelting of iron ore, copper and alumina over the coming decades. As well as being subject to secular drivers like climate change, commodities also have strong links to the business and inflation cycles. Energy commodities seem to be particularly sensitive to the level of economic activity relative to the potential output of the economy. Our analysis shows that out of the 12 years since 1984 in which advanced economies had positive output gaps (by which we mean actual output was above potential), energy commodities only fell in value in three.

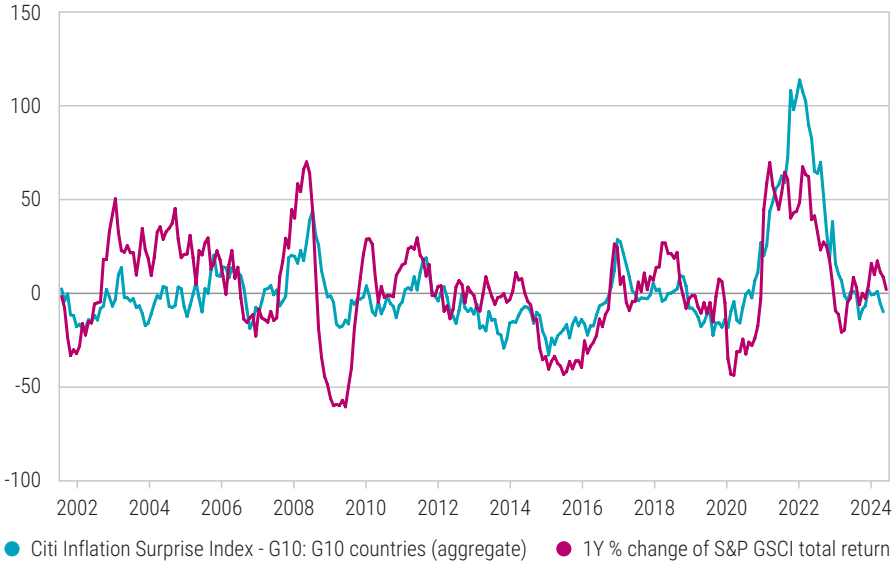
Table 5.3: Relation between output gap advanced economies and energy commodity returns

	Output gap positive	Output gap negative
1984-2024		
GSCI Energy commodity return positive	9	18
GSCI Energy commodity return negative	3	11
Percentage of positive returns	75%	62%

Source: Robeco, IMF, S&P. Period 1984-2024.

As energy commodities account for the largest weight in most commodity indices, it is important to assess the potential degree of economic overheating when forecasting the direction of commodity markets. An economy that is running hot results in higher demand for energy (even accounting for the falling energy intensity of GDP in advanced economies). This may be particularly the case at the dawn of artificial general intelligence. In addition, economies that are heating up also typically experience higher inflation. There is a strong positive correlation between the longer-term inflation expectations embedded in bond prices and the returns of major commodity indices. There is even a strong correlation of commodity returns with unexpected inflation: the correlation of the G10 inflation surprise index with the GSCI Total Return index is 65%. As such, commodities can act as a hedge against inflation. With real GDP growth in developed economies close to trend levels over the next five years in our base case, commodity prices should receive cyclical support as output gaps are likely to be modestly positive. Commodities are one of the few asset classes in which we continue to expect above-steady-state returns, adding to the diversification benefits that they typically provide. We project an expected return of 4.75% per year in our base case, representing a 125 bps premium above cash for a euro investor.

Figure 5.16: Unexpected inflation versus commodity returns



Source: LSEG Datastream, Robeco.

In our bullish case, there will be higher demand for energy as the AI revolution really takes off, requiring many more data centers. There are also greater efforts to implement climate-neutral policies, resulting in increased commodity demand. But in this scenario there is also higher productivity and therefore less economic overheating than in our base case. There are also fewer supply-side disruptions than in the base case. Commodity price action is less volatile as a result. We envisage commodities returning 6.75% per year in euros in this scenario.

In our bear case, ever-more frequent supply-side disruptions incentivize hoarding, resulting in commodity prices rising. Gold benefits as foreign reserve managers increasingly diversify away from the US dollar. In an increasingly fragmented world, commodities supply remains relatively inelastic, even if Europe seeks to open new mines in Scandinavia. The rebalancing between supply and demand is predominantly achieved by demand destruction. While growth is significantly below trend, the commodity intensity of economic growth could rise due to reshoring and a surge in military expenditure. Like in 2020, when the output gap in advanced economies was deeply negative, energy commodities outperform other risky assets. Commodities rise by 8.00% in euros, which represents a positive real return.

5.8 Summary

We provide a full overview of our expectations for the main asset classes in our base case scenario in the introduction to this chapter. In the table below we show these returns alongside our expectations for asset class returns in the other two scenarios, both for euro and US dollar investors.

We can see that in our bullish scenario we expect further high returns for risky asset classes, whereas our bear case scenario forecasts below-steady-state returns for most riskier asset classes, at least for a euro investor. ●

Table 5.4: Five-year return forecast for three macroeconomic scenarios

	Expected Returns 2025-2029 (EUR)				Expected Returns 2025-2029 (USD)		
	Bull	Base	Bear		Bull	Base	Bear
Fixed income							
Domestic cash	3.25%	3.50%	2.25%		3.50%	4.00%	2.50%
Domestic bonds	1.00%	2.25%	4.50%		4.75%	6.00%	7.00%
Developed	3.75%	4.00%	5.75%		4.00%	4.50%	6.00%
Emerging debt	5.75%	6.00%	3.50%		7.75%	7.00%	0.50%
Corporate inv grade	4.50%	5.25%	7.25%		4.75%	5.75%	7.50%
Corporate high yield	6.00%	5.50%	3.50%		6.25%	6.00%	3.75%
Equity							
Developed	9.75%	6.50%	4.00%		11.75%	7.50%	1.00%
Emerging	16.75%	7.25%	5.00%		18.75%	8.25%	2.00%
Real estate	9.00%	5.50%	4.00%		11.00%	6.50%	1.00%
Commodities	6.75%	4.75%	8.00%		8.75%	5.75%	5.00%
CPI							
Inflation	2.00%	2.50%	3.75%		2.00%	2.50%	3.25%

Source: Robeco. September 2024. Returns are geometric and annualized.

EXPECTED RETURNS 2025-2029

6. Historical performance

This is the 14th edition of our five-year Expected Returns report. Several people have asked us how accurate our predictions have been since we started making them back in 2011, so in this chapter we set out our forecasts for the various asset classes and their actual returns for the five-year periods that have been completed since we began. We also plug these figures into a simple mean-variance asset allocation model to determine the extra return that our predictions could have resulted in.

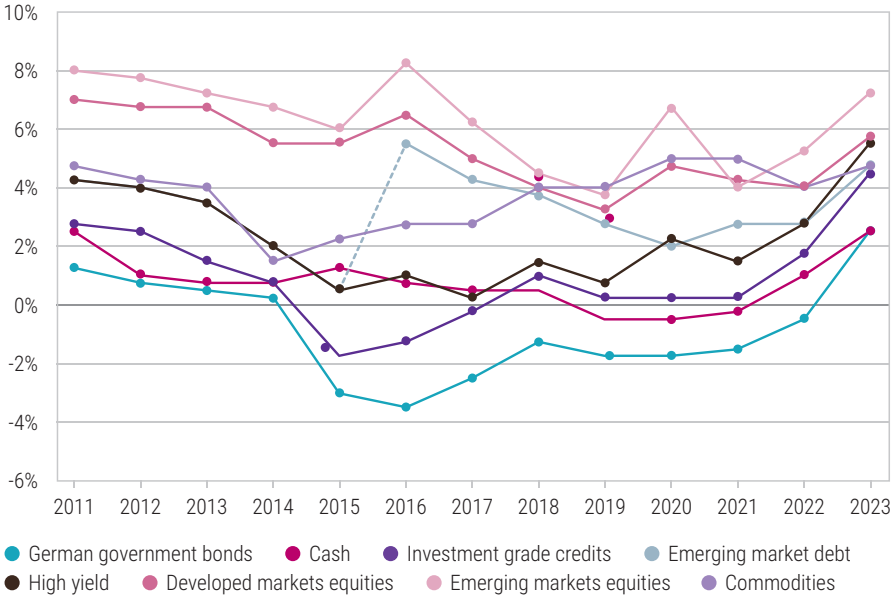
6.1 Predicted versus realized returns

We now have eight overlapping five-year periods for which we have both predicted and actual returns. We show our predicted returns in Figure 6.1, which have always been rounded to the nearest quarter percent.

Note that we stopped predicting the returns of hard-currency emerging debt after the 2016-2020 report, changing to local-currency emerging debt instead. The main reasons were that the local-currency emerging debt market had increased in size, more investors had started allocating to it, and its risk and return drivers were more different from those of the US corporate bond market. We estimated the returns of hard-currency emerging debt to be equal to those of developed market high yield corporate bonds from 2011 to 2015. The market for hard-currency emerging debt seems to be highly correlated with high yield bonds; see Piljak and Swinkels (2017).

Figure 6.1 shows that our five-year expected annualized returns for the various asset classes have varied substantially over time, with those for developed market equities ranging from 3.25% (2020-2024) to 7.00% (2012-2016), and those for government bonds ranging between -3.50% (2017-2021) and 2.50% (2024-2028). We predicted that emerging equities would outperform developed equities in every five-year period except one (2022-2026), but never by more than 2 percentage points per year (2021-2025).
The expected credit risk premiums for both global investment grade and global high yield have been steady, and often above 1.5% and 3.0% per year, respectively.

Figure 6.1: Five-year expected annualized returns for the main asset classes



Source: Robeco. These expected returns are taken from each of our five-year Expected Returns reports, which were published during the last quarter of each calendar year.

Table 6.1: Expected and achieved annualized five-year returns for the main asset classes

	2012-2016		2013-2017		2014-2018		2015-2019		2016-2020		2017-2021		2018-2022		2019-2023	
Asset class	Pred	Real	Pred	Real	Pred	Real	Pred	Real	Pred	Real	Pred	Real	Pred	Real	Pred	Real
High-quality government bonds	1.25	3.30	0.75	2.10	0.50	3.04	0.50	1.64	-3.00	2.18	-3.50	0.84	-2.50	-2.78	-1.25	-2.18
Cash	2.50	0.39	1.00	0.06	0.75	-0.13	0.75	-0.28	1.50	-0.36	0.75	-0.43	0.50	-0.47	0.50	0.16
Investment grade credits	2.75	4.34	2.50	2.95	1.50	2.22	1.50	2.54	-1.75	4.00	-1.25	2.72	-0.25	-1.59	1.00	0.43
Emerging market debt	4.25	4.98	4.00	3.09	3.50	2.93	3.50	3.52	0.50	4.00	5.50	1.86	4.25	0.97	3.75	2.58
High yield	4.25	7.67	4.00	5.35	3.50	2.92	3.50	4.41	0.50	5.48	1.00	3.10	0.25	-1.04	1.50	2.21
Developed markets equities	7.00	15.75	6.75	14.38	6.75	9.15	5.50	11.01	5.50	10.17	6.50	13.91	5.00	9.23	4.00	14.15
Emerging markets equities	8.00	5.95	7.75	6.71	7.25	5.91	6.75	7.61	6.00	10.56	8.25	8.62	6.25	1.33	4.50	4.79
Commodities	4.75	-9.44	4.25	-10.50	4.00	-11.27	1.50	-2.88	2.25	-4.16	2.75	1.26	2.75	9.00	4.00	9.46

Source: Robeco, LSEG Datastream, Barclays, JP Morgan. Annualized geometric returns in euros. Expected returns published during the last quarter of the previous year. Until 2015-2019, emerging debt was hard-currency debt, from 2016-2020 onward it has been local-currency debt.

Table 6.1 shows our predicted returns from Figure 6.1 alongside the actual returns that the various asset classes have achieved over the eight full five-year periods since we began making these forecasts. What are our main takeaways?

It is difficult to try to predict cash returns over a period of five years. In the first report, our predicted return was more than 2 percentage points per year higher than the return cash actually achieved (2.50% versus 0.39%), and the deviations between predicted and actual returns have been greater than 1 percentage point per year several other times. We know that the return on cash is risky over extended holding periods from Campbell and Viceira (2005), and, unfortunately, our findings back this up. Cash is only risk-free for investors with a short investment horizon.

We expected long-term interest rates to increase (and therefore government bond returns to suffer) for several years before they actually did, as we can see with our expected return for German government bonds of -3.00% per year for the 2016-2020 period. However, it turns out that timing the market is just as difficult in fixed income as it is for equities. It was not until 2022 that interest rates finally rose substantially, resulting in our predicted annualized return for German government bonds for 2018-2022 of -2.50% being close to their achieved return of -2.78% per year. Compounding the issue, the following year we stopped predicting that yields would increase sharply, such that our prediction for 2019-2023 was nearly 1 percentage point per year too high.

Commodity returns can be very volatile. They were highly negative – around -10% per year – in the initial five-year periods in which we were making our predictions. Inflation, which tends to be positively related to commodity prices, was substantially below our expectations during these periods. Over the last two full five-year periods, however, commodities performed strongly, with almost double-digit annualized returns. For these periods we increased our predicted return for commodities, but substantially less than we should have.

Equity markets have performed extremely well since 2012, partly due to central banks helping investors in times of crisis in combination with governments across the globe creating large debt-to-GDP ratios. Emerging markets, which are often deemed to involve higher required returns than developed equities, only outperformed developed equities in one of the full five-year periods, and even then only marginally – they rose by 10.56% per

year between 2016-2020, compared with 10.17% per year for developed equities. The stellar performance of the US stock market is the driving factor behind developed equities' consistent outperformance over the period.

Note our prediction of 3.50% per year for emerging market debt for 2015-2019 and its actual return of 3.52%. It doesn't get any better than that!

Even though it is interesting to compare predictions with the actual outcome, the value added by forecasting returns for an investor can best be judged in practical terms, such as the performance of a dynamic asset allocation that is based on the predictions relative to a static benchmark. For this, it is more important to correctly predict the direction and the relative returns of asset classes than their absolute returns.

6.2 Dynamic asset allocation

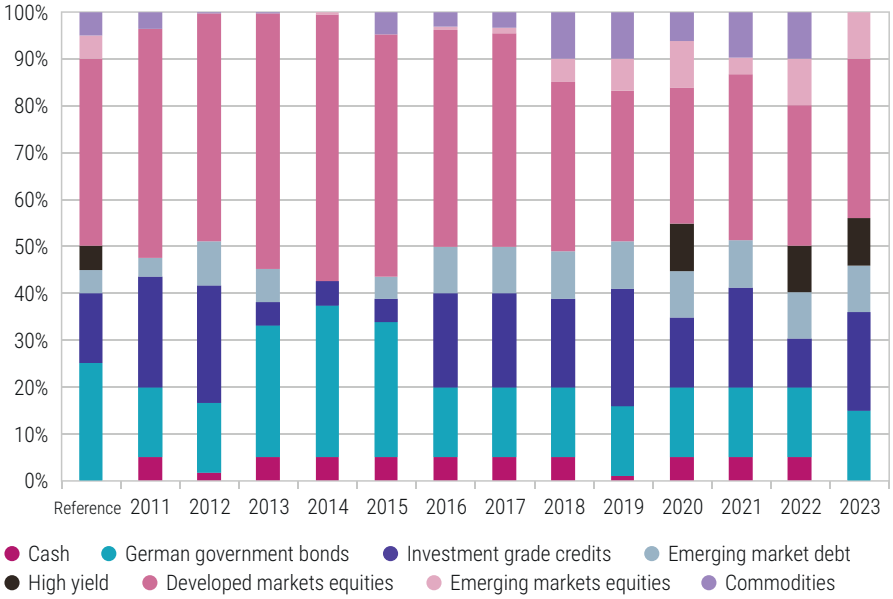
To calculate a dynamic asset allocation based on our five-year expected returns, we need to make several assumptions. We assume a mean-variance investor uses our latest five-year Expected Returns report to inform their expected returns for the main asset classes. However, we do not have many non-overlapping five-year periods available, which makes it difficult to assess their performance over such a long horizon. What's more, many investors re-evaluate their asset allocation every year, updating it with the latest insights. This implicitly shortens the investment horizon to one year. So, for this exercise we use the five-year expected returns over a one-year horizon. At the end of each calendar year, we use monthly returns from the previous 10 years to estimate a covariance matrix that enables us to calculate portfolio volatility. We compare the dynamic asset allocation to a static reference portfolio. The difference in return between the dynamic asset allocation and the reference portfolio is the value added from using our return expectations. The static reference portfolio is derived from average market-capitalization weights for the various asset classes (see Doeswijk, Lam, and Swinkels (2014)). Its composition is shown in the first column, labeled 'Reference', in Figure 6.2.

Our dynamic allocations are constrained such that they do not deviate too much from this reference portfolio. The weight in the portfolio of German government bonds must remain within 15% and 35%. The range for global investment grade credit is 5-25%, and that for global developed markets equities 20-60%. All asset classes with a 5% weight in the reference portfolio have a permissible range of 0-10%. The ex-ante volatility of the dynamic portfolio must be at most equal to that of the reference portfolio, such that any extra return cannot be the result of taking on more ex-ante risk; it must only come from better use of the available risk budget.

The approach above is designed to keep things simple. There are improvements that could be made, but they would come at the expense of additional complication. For example, we could use a more sophisticated risk model than calculating risk based on 10-year historical returns, we could include the insights of Black and Litterman (1992) by shrinking the outcome to the reference portfolio, or we could recognize that correlations tend to increase during crises in our calculation of risk; see Chow et al. (1999) and Campbell, Huisman and Koedijk (2001).

We show the resultant dynamic asset allocations at the end of each year in Figure 6.2. Although the reference portfolio contains no cash, the dynamic portfolio regularly invests up to the maximum of 5% in this asset class to enable it to allocate more to higher-risk assets if we believe they have strong return potential at that time. The dynamic portfolio does not always contain high yield bonds, emerging market equities or commodities, but at other times allocates the maximum of 10% to these asset classes. As such, our predictions result in a truly dynamic allocation.

Figure 6.2: Dynamic asset allocations over time



Source: Robeco. Dynamic asset allocations based on our five-year expected returns for the various asset classes.

6.3 Performance of the dynamic asset allocation

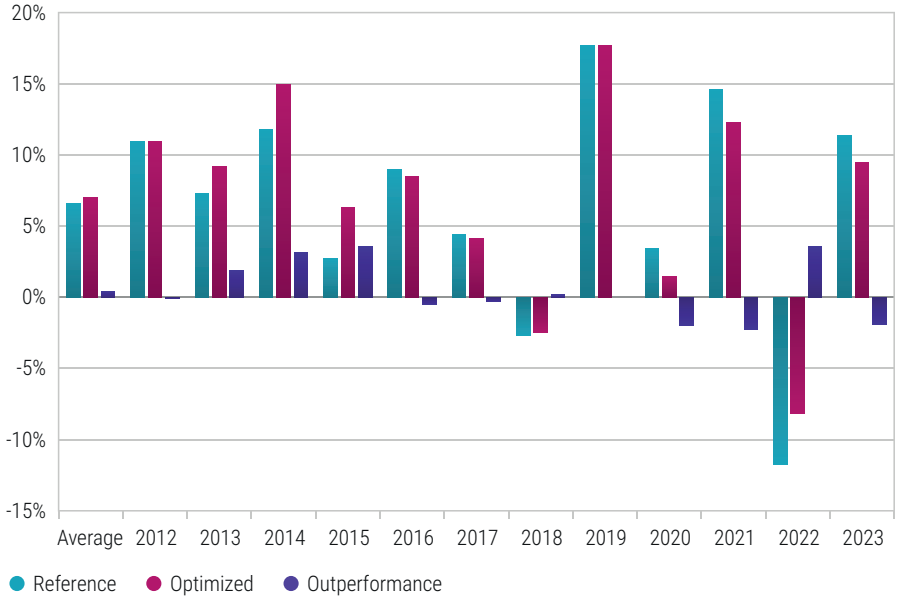
We now turn to the performance of the dynamic allocation relative to the reference portfolio. We evaluate it on a calendar-year basis, which is different from Table 6.1, which compares our five-year predictions with the actual returns over five-year periods. The calendar year returns of this dynamic asset allocation are shown in Figure 6.3.

The dynamic allocation outperforms the reference benchmark in half of the calendar years and underperforms in the other half, but as most outperformances are substantially larger than the underperformances, there is an average outperformance of 46 bps per year. Since the double-counted turnover is about 25% per year, transactions costs would amount to 3 bps per year if we assume trading at the asset class level costs 10 bps. In the two years in which there are negative total returns for the reference portfolio (2018 and 2022), the dynamic portfolio outperforms the reference portfolio. Although this sample size of two is small, it may be indicative that our valuation component signals when investment returns would be low.

By comparing the average five-year expected returns of the dynamic portfolio with that of the reference portfolio, we can obtain an estimate of its expected outperformance. The average expected outperformance over this period is 33 bps per year, for the same ex-ante volatility. Ex-post, the average outperformance is slightly higher at 46 bps per year, and the dynamic asset allocation's ex-post volatility of 7.4% is lower than the 8.1% of the reference portfolio. Given the ex-post tracking error of 2.1%, the dynamic portfolio achieves an information ratio of 0.22.

These results are achieved using simple techniques and assumptions. Introducing more complexity in the process might further increase the return for the amount of risk taken. In practice, we use more sophisticated methods for the multi-asset solutions that we develop for our clients. ●

Figure 6.3: Performance of dynamic asset allocations over time



Source: Robeco, LSEG Datastream, Barclays, JP Morgan. Annual returns in euros for the reference portfolio, the dynamic asset allocation and the difference between the two. Backtested performance. For illustration purposes only. Historical returns are no guarantee for future performance.

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The sale of the Fund qualifies as a private placement pursuant to section 2 of Uruguayan law 18,627. The Fund must not be offered or sold to the public in Uruguay, except under circumstances which do not constitute a public offering or distribution under Uruguayan laws and regulations. The Fund is not and will not be registered with the Financial Services Superintendency of the Central Bank of Uruguay. The Fund corresponds to investment funds that are not investment funds regulated by Uruguayan law 16,774 dated 27 September 1996, as amended.

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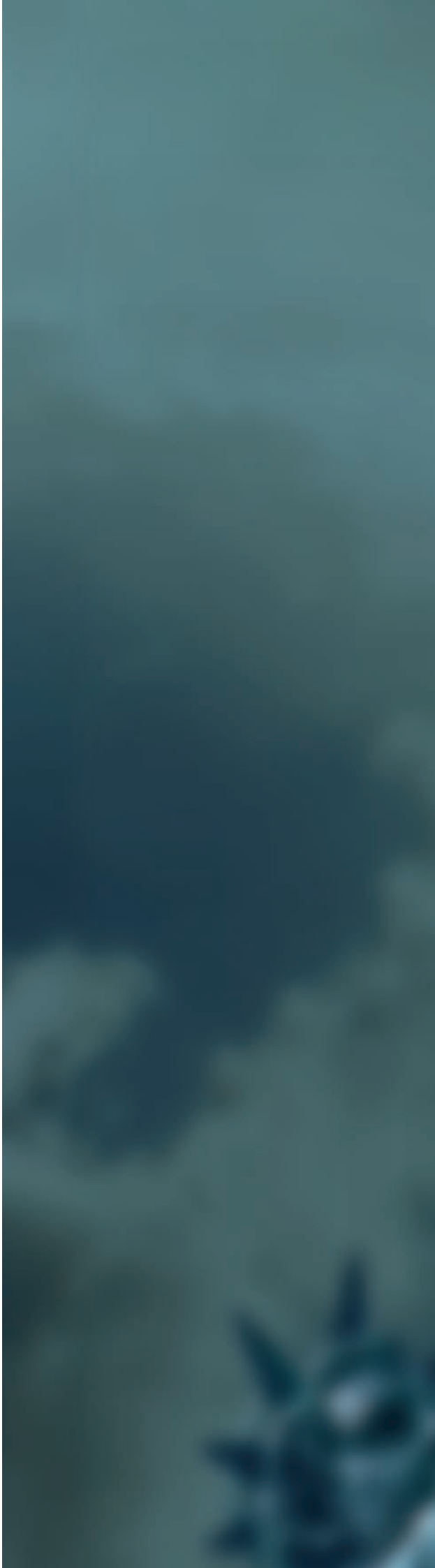
The Investment Engineers



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