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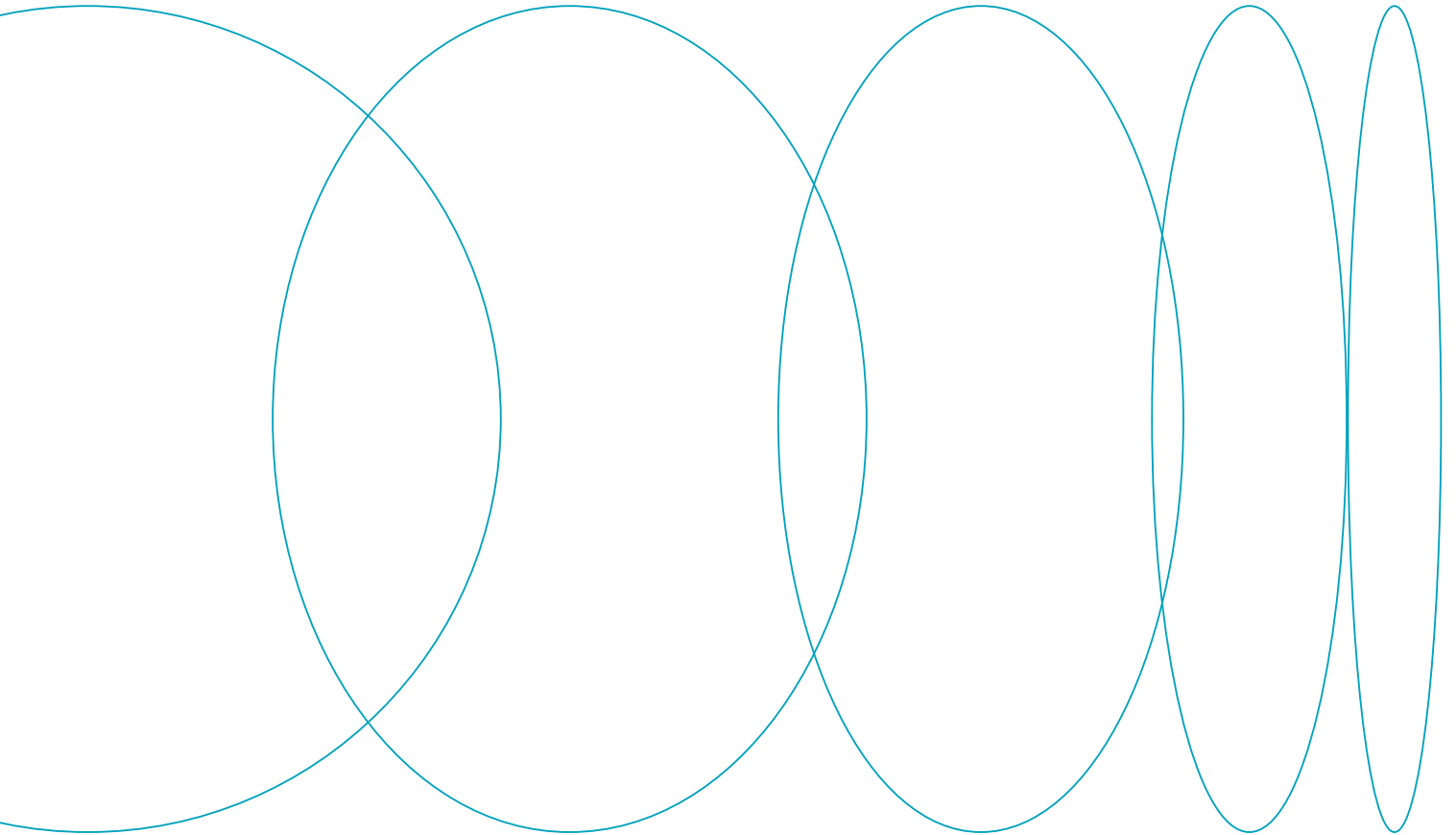
5-YEAR EXPECTED RETURNS

The Great Rewiring

2027
2031

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2027

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September 2026

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Foreword



The title of this year's report, *The Great Rewiring*, reflects our belief that investors are navigating a period of profound adjustment. Shifts in technology, geopolitics, economic policy, and market structure are redefining the investment environment, creating both uncertainty and opportunity. Alongside our capital market assumptions, we explore four structural themes influencing investor outcomes: energy security, private credit, emerging debt and equity markets, and the evolution of 3D investing beyond sustainability.

Until recently, investment professionals would typically navigate reports such as this themselves, connecting assumptions, asset classes, and portfolio implications while exercising a degree of selectivity along the way. Today, many clients complement that process with large language models that help them analyze, interrogate, and interact with investment research. This report was

not written with a single reading path in mind. Some readers will focus on methodology, others on portfolio implications, and increasingly many will engage with the content through digital tools, using them to explore specific questions, compare scenarios, summarize key findings, or even create personalized listening experiences. All of these approaches are valid ways to engage with the material. For those seeking a more concise entry point, we also provide a curated summary, podcast, and additional supporting content on our website. Consider it our contribution to preserving your token budget while minimizing exposure to the occasional AI hallucination.

At the same time, we believe that the value of investment research does not reside solely in forecasts, tables, or charts. Its greatest value often emerges through interpretation. This is particularly true today, when investors face difficult questions about how technological change should be reflected in asset prices. While our base case assumes that advances in areas such as artificial intelligence will accelerate productivity and underpin a broadening earnings delivery, we continue to debate the extent to which current market valuations already discount these potential gains. Vigilance about downside risks is warranted against the backdrop of valuation levels that, for some risky assets, are clearly stretched from a historical perspective. The return on invested capital on AI spend, the true productivity passthrough of AI and the macroeconomic repercussions from procyclical fiscal policy are focal points here.

This is where dialogue with our specialists can add value. They can help translate these findings into your portfolio context, evaluate alternative scenarios, and explore the implications of the themes discussed in this report. In an era where noise is abundant and genuine signals are scarce, the ability to test ideas, challenge conventional thinking, and engage in informed dialogue remains as valuable as ever.

We therefore see this report as more than a set of expected return estimates. It is a structured framework for thinking about long-term investment opportunities, risks, and trade-offs. Whether you read it cover to cover, explore it with the help of AI tools, or use it as the basis for a conversation with our investment professionals, we hope it helps you navigate an increasingly complex investment landscape with greater confidence.

Anton Eser
CIO Robeco

The authors

This document has been compiled by Laurens Swinkels and Peter van der Welle (September 2026). It represents the views of Robeco's Investment Solutions 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 Investment Solutions team, with contributions from colleagues from across the company. The team currently consists of 18 experts, with an average of more than 16 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 range of global assets is managed by the team. Their solutions include multi-asset strategies, tailor-made multi-asset mandates, life-cycle portfolios, and customized liability-driven and buy-and-maintain fixed income strategies.

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 Expected Returns research forms the foundation of our strategic asset allocation framework. Its forward-looking assessments of returns across major asset classes and under different economic scenarios serve as key inputs in the design of the team's multi-asset investment solutions.

EXPECTED RETURNS 2027-2031

1. Introduction

The age of efficiency is gradually giving way to an age of plasticity. Michael Gazzaniga, one of the founding fathers of modern cognitive neuroscience, often referred to the remarkable ability of the brain to reorganize itself in response to disruption. Neural pathways are not fixed. They adapt, reconnect and create new routes when circumstances change – a process known as plasticity. Moreover, his field of study suggests that a highly efficient brain is not necessarily the most adaptable. In economics, too, we are at a juncture where adaptability is starting to outweigh optimization. We call this process The Great Rewiring.

For much of the past three decades, investors operated in a world optimized for efficiency. Globalization expanded supply chains, labor remained abundant and capital flowed freely across borders. Firms organized production according to comparative advantage, while financial markets increasingly rewarded specialization, scale and concentration.

Today, that economic architecture is changing as we move from just-in-time efficiency to just-in-case resilience. Some observers, such as Canadian Prime Minister Mark Carney, even see a “rupture, not a transition” underway as economic interdependence is being weaponized in an era of great-power competition.¹ While we see a more managed multilateral drift, it is undeniable that geopolitical fragmentation brings a higher frequency of negative supply shocks as chokepoints are being leveraged to gain advantage. The Strait of Hormuz closure earlier in 2026 is a case in point. Like a neural network adapting to a changing environment, the global economy is creating new pathways to circumvent these chokepoints. Geopolitical fragmentation, demographic pressures and the surge in artificial intelligence are simultaneously reshaping the way economies allocate capital, organize production and conduct trade.

Last year we argued that the world was entering a *Stale Renaissance*: a period in which extraordinary technological progress coexisted with a drag from elevated economic policy uncertainty and reduced headroom for central banks to ease monetary policy. We remain firmly committed to the Renaissance element of that thesis and to our view of constrained monetary policy, but are inclined to qualify the ‘stale’ element. We have raised nominal GDP growth projections across our scenarios.

What has changed is our understanding of the cyclical implications of the capex underway to facilitate the AI revolution, as well as our assessment of the resilience of the global economy. This resilience has been evident both in the face of what the IEA described as the largest supply disruption in the history of the global oil market and in the aftermath of the earlier tariff shock, which saw US tariffs reach their highest levels since the 1930s.² This resilience stems from the ability to adapt and rewire in spite of emerging chokepoints.

1. Carney, M. (2026), Special Address at the World Economic Forum Annual Meeting, Davos, Switzerland, 20 January 2026.

2. The Middle East and Global Energy Markets – Topics – IEA

The three dimensions of the Great Rewiring

The Great Rewiring occurs along three closely related dimensions.

First, trade is being rewired as firms diversify supply chains and governments increasingly value security alongside efficiency. Importantly, the world is not necessarily deglobalizing; global trade volumes are well above trend. Rather, it is reorganizing, leading to greater dispersion in cross-regional trade volumes. We find that this has ramifications for cross-asset returns.

Second, the role of capital is being rewired as we move toward what is likely to be the highest share of capital formation in global GDP since the 1970s. In our view, we have reached a major inflection point in the shift from a consumption-led economy toward a more investment-led economy. The physical economy is on the rise; the asset-light economic model, reliant on network effects and intangibles, may start to lose ground in the next five years in favor of capital deepening.

Lastly, production itself is being rewired. The next phase of the AI-led productivity renaissance we called for last year will be led by firms that manage to transform and redesign production processes around AI. We find that organizational capital is a key enabler of productivity gains from AI. Our conviction that AI will predominantly augment

labor rather than displace it has grown, assuming AGI does not arrive before 2030. Markets have rewarded the suppliers of AI. The next phase will reward the rewiring.

The rise of the middle power

The winners of the next five years are likely to be economies that maximize adaptability while minimizing the efficiency losses that adaptation requires. We expect to see 'the rise of the middle power' as we find middle powers relatively well equipped to navigate this trade-off: they rank high on our Ricardian efficiency metric while regaining energy security. Our research suggests the world is not reorganizing into neat poles. Geopolitical ambiguity abounds. Many countries do not want to choose sides and are positioning themselves as connector countries between superpowers. As great-power rivalry intensifies, middle powers have increasing incentives to deepen economic ties with one another. When superpowers compete, middle powers compound.

A rejuvenated economic expansion

For asset allocation, this new dynamic matters. Regime transitions tend to broaden opportunities. The post-Covid recovery has increasingly concentrated performance around a small set of growth engines, with the momentum factor taking a clear lead in the equity factor space. The age of plasticity is likely to reward a wider range of return drivers, especially in emerging markets. Rather than asking which single region, sector or factor will dominate, investors may increasingly benefit from building portfolios capable of adapting to a broader internal distribution of outcomes.

Our research suggests that the next five years remain supportive for risk-taking, as we may not be as 'late' in the business cycle as is widely believed if our Great Rewiring thesis is correct. We could see this expansion match the length of the Great Expansion from 2009-2019. Bull markets don't die of old age, and this one, measured from its Covid-induced recession trough, is 'only' six years old, two years below the average bull market duration. More often, bull markets end when too much capital chases too few profitable opportunities.

Value transfer from enablers to adopters

As demand for AI proves highly elastic, we find that looming profit margin compression for hyperscalers need not translate into weaker technology sector earnings. Yet value might increasingly be transferred from AI enablers to successful adopters. We therefore expect that a European investor can still earn an above-steady-state equity risk premium, as this bull market has further to run. Looking across NBER expansion phases since 1879, those characterized by both strong productivity growth and elevated investment intensity generated above-average equity risk premiums compared with low-productivity, low-investment expansions.

After years dominated by multiple expansion, the transition toward a different equity return composition continues in a capital-deepening scenario. The next five years are likely to be characterized by a lower-P/E, higher-EPS world, in which earnings growth accounts for a larger share of total returns.

Our trade rewiring theme points toward a moderation of US exceptionalism and a broadening of opportunities across international equity markets as multilateral drift creates economic value at the regional level. Here, five opportunities are hiding in plain sight: emerging markets, Europe, small caps, value and low-volatility stocks. The objective is not to identify a single winner among this set, but to recognize that these opportunities have low correlations with one another, creating better diversification and adaptability in portfolios when market narratives start to shift.

From a multi-asset perspective, the risk-free rate will likely inch higher in coming years. In our view, a higher level of the neutral rate of interest will emerge against the backdrop of capital deepening and a corporate re-leveraging cycle taking shape. We remain constructive on equities relative to government bonds in our base case. Fixed income once again offers attractive starting yields, but sticky inflation, a structurally higher neutral interest-rate environment and sustained budget deficits suggest that the extraordinary bond tailwinds of the 2010s are unlikely to be repeated. Credit remains supported by resilient interest coverage, but a convergence toward median spread levels is likely as companies refinance at higher rates amid a progressive re-leveraging cycle. Real assets and commodities continue to provide useful diversification in a world where geopolitical and supply-side shocks remain more frequent than during the globalization era. This year, we've raised our expected return for REITs above the steady-state level for the first time since 2014.

Keep minding the tails

The coming five years are unlikely to resemble the previous five. The age of plasticity naturally requires us to remain vigilant about tail risks, both to the upside and the downside of our base case. We still judge risks to our base case to be tilted to the downside. At its most successful, The Great Rewiring becomes a Luminous Renaissance: a world in which capital deepening unlocks a new wave of accelerating productivity and earnings growth while moving inflation back to central bank targets. At its most fragile, it descends into Synaptic Decay: a world in which rupture severs economic connections faster than new ones can be formed, triggering an implosion of the AI capex boom and a US recession, and ultimately creating a stagflationary environment that undermines both sovereign bonds and equities. ●

Table 1.1: Expected returns 2027-2031

	5-year annualized return	
	EUR	USD
Fixed income		
Domestic cash	3.00%	4.25%
Domestic government bonds	3.25%	5.00%
Developed global government bonds (hedged)	4.00%	5.25%
Emerging government debt (local)	5.50%	6.25%
Emerging government debt (hard)	4.00%	5.25%
Global investment grade credits (hedged)	3.75%	5.00%
Global corporate high yield (hedged)	4.25%	5.50%
Equity		
Developed market equities	7.00%	7.75%
Emerging market equities	8.00%	8.75%
Listed real estate	7.00%	7.75%
Commodities	5.00%	5.75%
Consumer prices		
Inflation	2.50%	3.00%

Expected performance is no guarantee of future results. The value of your investments may fluctuate. The scenarios presented are an estimate of future performance based on evidence from the past on how the value of this investment varies, and/or current market conditions and are not an exact indicator. What you will get will vary depending on how the market performs and how long you keep the investment/product. Returns are geometric and annualized. Source: Robeco, September 2026.

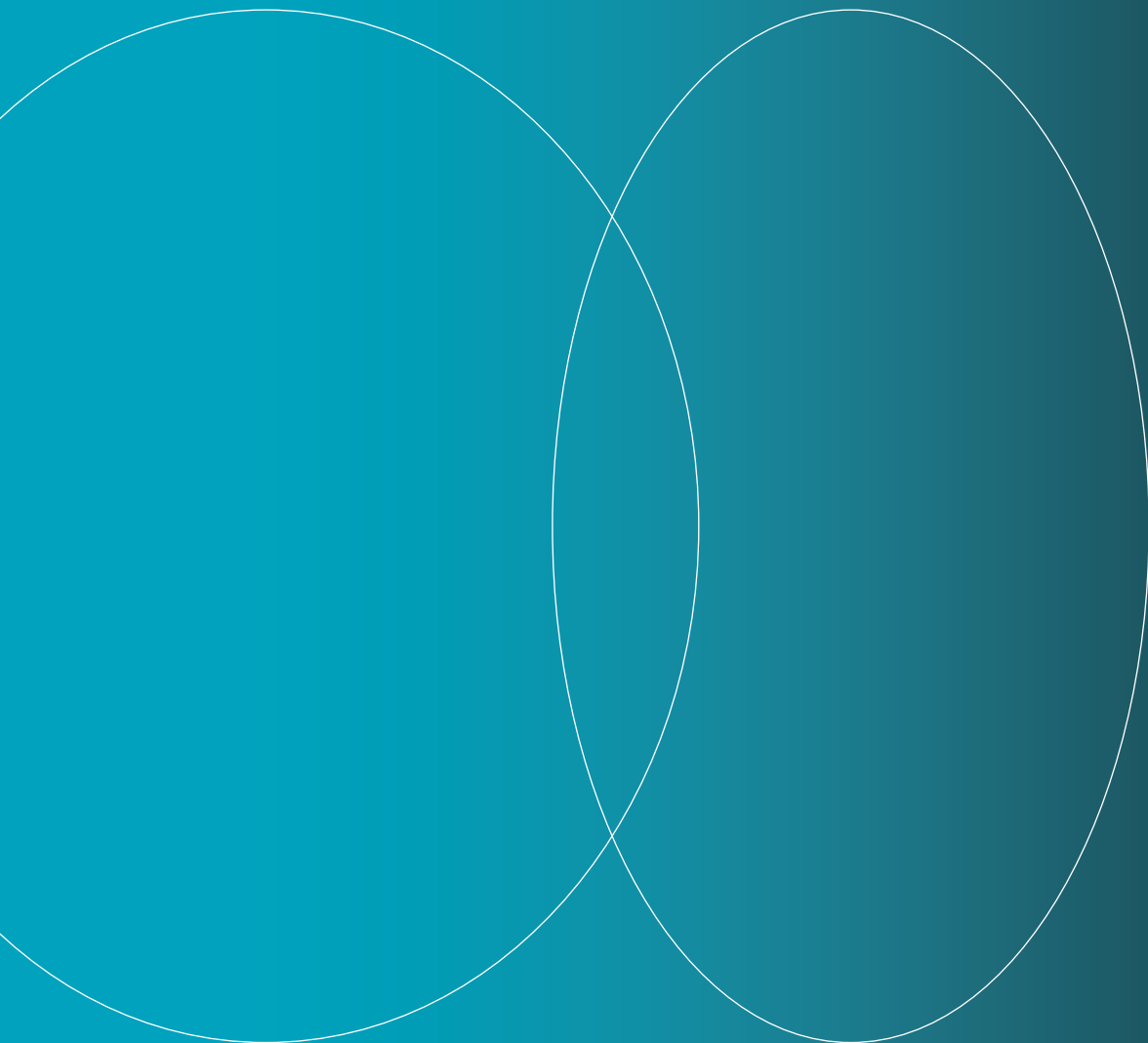
Past performance is no guarantee of future results. The value of your investments may fluctuate.

EXPECTED RETURNS 2027-2031

2. Macro

“Precise adaptation, with each part finely honed to perform a definite function in an optimal way, can only lead to blind alleys, dead ends, and extinction.”

Stephen Jay Gould, *Wonderful Life: The Burgess Shale and the Nature of History* (1989)



Our core view for the next five years is that the global economy is entering The Great Rewiring: a reference to the plasticity of the global economy in an age of rapid change. Like the brain rewires neural networks after disruption, the global economy is creating new pathways after geopolitical, technological and demographic shocks. Last year, we argued that the world was entering a *Stale Renaissance*: a period in which extraordinary technological progress coexisted with a drag from elevated economic policy uncertainty and reduced headroom for central banks to ease monetary policy. We remain firmly committed to the Renaissance and constrained monetary policy part of that thesis but are inclined to qualify the 'stale' element. We have raised nominal GDP growth projections across our scenarios, but retained the negative skew in our scenario probability distribution, assigning a 35% probability to our bear case materializing versus a 15% probability for our bull case.

What has changed is our understanding of the cyclical implications of the capex underway to facilitate the AI revolution as well as the resilience of the global economy. This resilience was evident as the global economy weathered this year what the IEA described as the largest supply disruption in the history of the global oil market, as well as the aftermath of the earlier tariff shock, which saw the highest US tariffs since the 1930s.¹ Given these macroeconomic shocks, the debate is increasingly framed by the IMF's relatively cautious outlook for the global economy, which sees demographics as a structural drag, productivity gains from AI as modest, geopolitical fragmentation as an efficiency loss and higher debt as a constraint on future growth. We agree with the diagnosis, but disagree with the conclusion. In our view, the IMF underestimates the payoff from the Great Rewiring now underway.

1. [The Middle East and Global Energy Markets – Topics - IEA.](#)

Labor scarcity is accelerating automation rather than simply reducing potential growth. Artificial intelligence is likely to prove more transformative than previous digital revolutions because it can partially accelerate its own diffusion through organizational adaptation. Geoeconomic fragmentation is not merely an efficiency loss; it is also triggering a wave of investment in infrastructure, energy systems, manufacturing capacity and regional deepening of trade ties. Finally, in contrast to pre-GFC, higher debt levels are increasingly financing productive assets rather than consumption, supporting capital deepening across large parts of the global economy.

The Great Rewiring marks the transition from the age of efficiency to the age of plasticity. Neuroscience shows that a highly efficient brain isn't necessarily the most adaptable. Three decades of globalization wired the global economy for maximum efficiency. In today's highly uncertain world, adaptability requires some efficiency loss.

Technology, capital and production systems are being reorganized simultaneously. In the chapters that follow, we explore three dimensions of this transformation: the rewiring of trade from efficiency to resilience, the rewiring of capital from asset-light growth to capital deepening, and the rewiring of production from automation toward augmentation. Together, these forces form the foundation of our base case and explain why we remain more constructive on the medium-term growth outlook than the consensus while inflationary pressures linger.

2.1. The rewiring of trade: From efficiency to resilience

The rewiring of trade

What changed?

- Global trade is diverging rather than collapsing.
- Middle powers are becoming more important.
- Security increasingly trumps efficiency.

What matters?

- Fragmentation raises inflation risks.
- Multilateral drift is more likely than clean multipolarity.
- Winners combine security with Ricardian efficiency.

Nobel Prize winner Paul Krugman opened his recent lecture titled 'A New Economic Order: Global Turbulence and Political Autocracy' at Erasmus University with a rhetorical question: "Which order? I don't see order."² Mark Carney's consequential speech at Davos 2026 captured the same intuition in more geopolitical terms: "Great powers have begun using economic integration as weapons, tariffs as leverage, financial infrastructure as coercion, and supply chains as vulnerabilities to be exploited."³

We have entered an era of power play and the weaponization of (physical) chokepoints, a phenomenon which was again on display barely two months after Carney's speech as the Strait of Hormuz closed.⁴ With the old rules-based order fading, maximizing efficiency increasingly seems to come at a cost. If you don't know where you are going, you had better be flexible and willing to pay for optionality. As a result, we are moving from a just-in-time to a just-in-case economy, where resilience trumps efficiency.

Trade flows diverge after decades of convergence

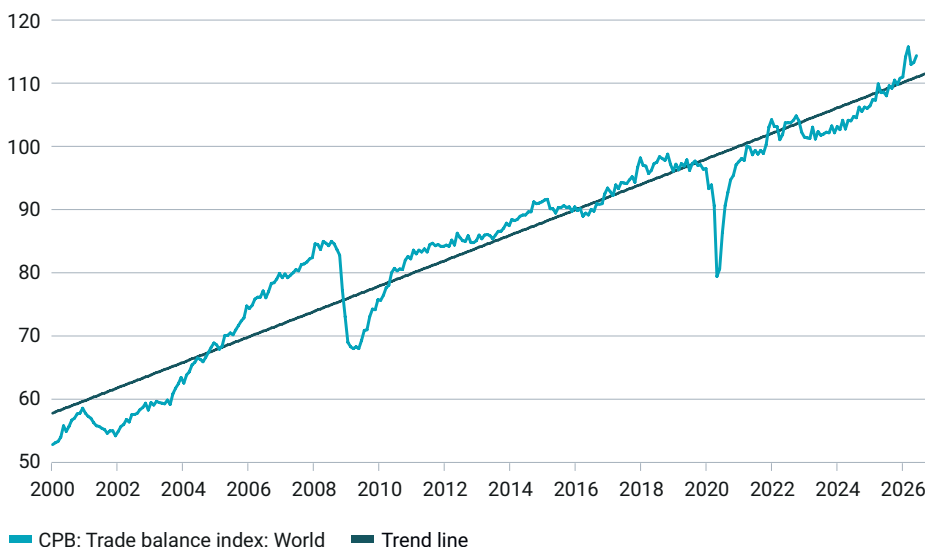
The new order has already been taking shape. We find that, after decades of convergence, regional export volumes have started to strongly diverge since 2021, the year in which global supply chain strains surged. While global trade volumes are still above trend, the global trade cycle is becoming less synchronized.

2. Lecture at Erasmus University, 19 May 2026.

3. Carney, M. (2026), *Special Address at the World Economic Forum Annual Meeting*, Davos, Switzerland, 20 January 2026.

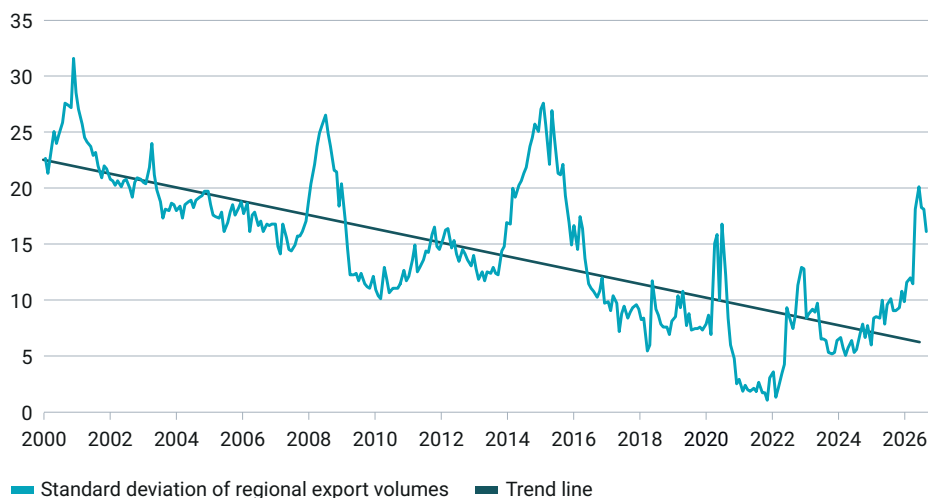
4. See the introduction to our Triple Power Play framework in Expected Returns 2024-2029. For an in-depth overview of how the US conducts financial economic warfare, see Edward Fishman's 2025 book *Chokepoints: American Power in the Age of Economic Warfare*.

Figure 2.1: Trade is not collapsing – global trade volume is accelerating above trend...



Source: LSEG Datastream, Robeco, May 2026.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

Figure 2.2: ...but trade is becoming less synchronized**Divergence after decades of convergence**

Source: LSEG Datastream, Robeco, May 2026.

The increase since 2021 in the cross-regional standard deviation of regional export volumes indicates that a realignment of bilateral trade is underway, which accelerated after the rupture caused by Liberation Day on 2 April 2025, when the highest US tariffs since the chaotic 1930s were announced.

Trade diversion preferred option following shocks

Countries have three options in response to tariffs. First, they may impose retaliatory tariffs (which might backfire). Second, they can promote their own industries with new subsidies or trade barriers (which might, following the Chinese example, create excess capacity and trigger retaliatory measures in response to lower global prices of subsidized goods). Lastly, they can opt to divert trade by increasing trade with other partners, signing new trade agreements (as the EU did by signing the Mercosur agreement in 2026⁵), and entering new markets.

The latter option looks more sustainable and has been the path chosen by many.⁶ Rotunno and Ruta (2025) show that trade diversion is of mutual benefit for two countries that are targeted by tariffs from a large trade partner. Deep integration outweighs retaliation. These academic findings echo Carney's argument that middle powers should respond to great-power rivalry by cooperating more closely with one another.

Rewiring is about geopolitics, not about risk management

How is the realignment of bilateral trade evolving? Our own research finds that not every G20 member has been diversifying and decoupling in recent years. Our measure captures two dimensions of rewiring: whether countries have reduced dependence on their largest import source, and whether they have reduced bilateral trade exposure to China. The striking finding is that these two forms of adjustment do not necessarily move together. Some countries are diversifying their import base without decoupling from China; others are deepening China ties despite concentration risk.

The Global South (Indonesia, India, Brazil) is deepening China trade ties despite concentration risk. This shows that trade rewiring is driven by geopolitics, not portfolio risk management. G20 members where we have seen both decoupling from China and greater diversification include Canada, France and Germany. The latter countries are deepening ties with nearby European partners such as the Netherlands.

5. EU-Mercosur

6. ECB researchers find that after the 2025 tariff escalation, Chinese exports to the US fell sharply while exports to ASEAN, Africa, Latin America and Europe increased strongly. They characterize this as evidence of trade diversion and trade redirection rather than a collapse of trade itself. Global trade redirection: tracking the role of trade diversion from US tariffs in Chinese export developments.

Friendshoring is real, and it is visible not only in trade flows but also in capital flows. Grover & Vézina (World Bank, 2025) show that geopolitical alignment is becoming increasingly important in investment allocation decisions, especially among advanced economies. For sovereign wealth funds, a study finds that non-market factors carry greater weight than at any point since the end of the Cold War.⁷

7. Geopolitical shifts drive sovereign funds towards national priorities, study finds | Reuters.

Table 2.1: Shifts in top importer concentration and China trade

Country	Top partner 2025	Partner changed	Russia in top 3?	2021 Concentration (share of top importer in top 3)	2025 Concentration (share of top importer in top 3)	Concentration change	China trade volume 5Y change Δ	Relationship
Argentina	China	Yes	No	53%	54%	1%	-5%	More concentrated, less China
Australia	China	No	No	71%	73%	2%	60%	More concentrated, more China
Brazil	China	No	Yes	74%	75%	1%	12%	More concentrated, more China
Canada	China	No	No	64%	51%	-13%	-6%	Both diversifying and decoupling
China	Taiwan	No	No	39%	38%	-1%	-	-
France	Netherlands	Yes	No	40%	37%	-3%	-10%	Both diversifying and decoupling
Germany	Netherlands	No	No	50%	49%	-1%	-15%	Both diversifying and decoupling
India	China	No	Yes	50%	54%	4%	36%	More concentrated, more China
Indonesia	China	No	No	68%	73%	5%	27%	More concentrated, more China
Italy	China	No	Yes	42%	42%	0%	7%	More concentrated, more China
Norway	China	Yes	No	49%	52%	3%	-6%	More concentrated, less China
South Africa	China	No	No	72%	76%	4%	13%	More concentrated, more China
South Korea	China	No	No	61%	64%	3%	0%	More concentrated, stable China
Switzerland	UAE	Yes	No	60%	36%	-24%	21%	Less concentrated, more China
UK	China	No	No	42%	45%	3%	-14%	More concentrated, less China
US	Mexico	Yes	No	41%	47%	6%	-57%	More concentrated, less China

Source: LSEG Datastream, Robeco, April 2026.

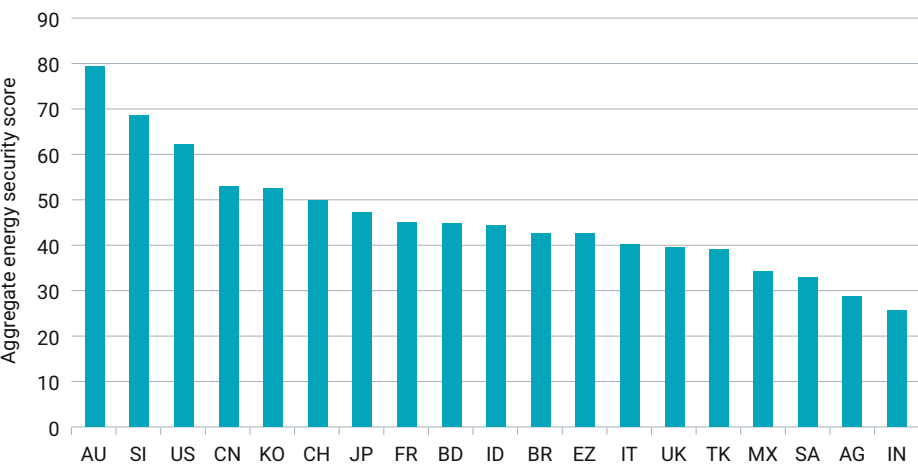
Optimizing security and efficiency

Who benefits from this transformation in the global economy? As Louis-Vincent Gave often argues, “economic activity is energy transformed”. In the quest for resilience and strategic relevance, energy security is the Mount Everest of the current economic landscape. Overcoming challenges related to energy supplies is vital to stay competitive in an era in which energy demand continues to rise despite a steady improvement in energy used per unit of GDP. In our research we therefore concentrated on five elements of energy security; grid quality (measured as electric power transmission & distribution losses as % of output), electricity production (using a Herfindahl index, where 1= fully diversified), net energy imports as % of energy use, renewable energy share as % of total energy production and electricity per capita. We ranked G19 countries based on these criteria, with the top three positions occupied by Australia, Saudi Arabia and the US. At the bottom of the ranking we find India, Argentina and South Africa.

Though energy security is key to remaining competitive, it is not the whole story. We believe that the winners of tomorrow will be those that are able to maximize security while at the same time minimizing the efficiency loss that accompanies this process. The country that reorganizes capital, technology and production most efficiently could outgun even the most energy-secure.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

Figure 2.3: Ranking of G19 energy security



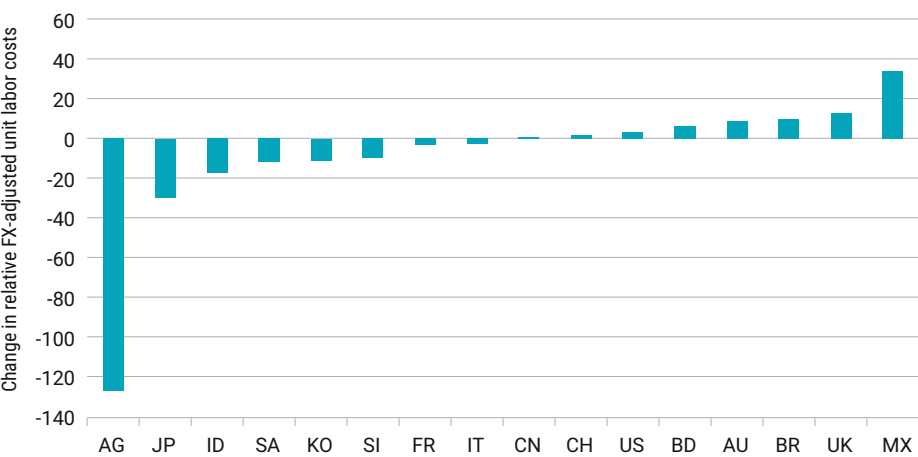
The aggregate energy security score is calculated as the equal-weighted score of grid quality (measured as electric power transmission & distribution losses as % of output), electricity production (using a Herfindahl index with 1= fully diversified), net energy imports as % of energy use, renewable energy share as % of total energy production and electricity per capita. Source: LSEG, Robeco, December 2025.

Therefore, in addition to a security ranking, we revisit the theme of Ricardian efficiency.⁸ David Ricardo famously postulated that trade can raise welfare even when one country is absolutely better at producing everything, because what matters for specialization is relative rather than absolute efficiency.

8. See our earlier work on this in Expected Returns 2023-2027.

This insight has underpinned the age of globalization and global sourcing based on relative labor costs. This time, we proxy Ricardian efficiency by ranking countries by the OECD's relative unit labor costs (FX-adjusted), which capture unit labor costs relative to trading partners in a common currency, and assessing whether relative unit labor costs at the country level have improved or deteriorated over the past five years. This proxy captures the interaction between labor cost growth, productivity and currency movements, making it useful as a partial measure of cost competitiveness.

Figure 2.4: Ranking of G19 relative competitiveness



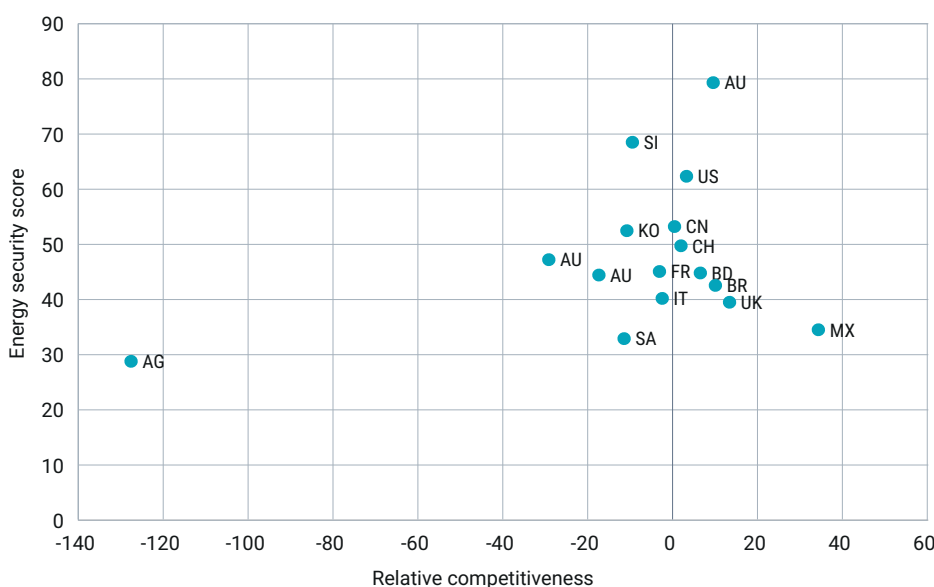
Source: LSEG Datastream, OECD, Robeco, December 2025. Competitiveness is calculated based on the five-year change in OECD relative FX-adjusted unit labor costs.

This shows that Argentina has become notably more cost competitive, whereas Mexico, at the other end of the spectrum, has become much less cost competitive as the peso has appreciated against the currencies of its trading partners in recent years. The Anglo-Saxon countries – US, the UK and Australia – also lost cost competitiveness, as did Germany.

The rise of the middle powers

Which countries rank highest on the axes of energy security and Ricardian efficiency and enjoy a superior trade-off between security and efficiency? Saudi Arabia, Korea, Japan and France look to be the real middle powers here. In an era where chokepoints are weaponized, they will likely have a seat at the table rather than being on the menu. In contrast, Mexico, our favored nearshoring candidate a couple of years ago, has lost ground as its currency has appreciated significantly and now has one of the most overvalued currencies on a relative PPP basis.

Figure 2.5: Ricardian efficiency versus energy security



Source: LSEG Datastream, Robeco, December 2025.

A patchy rewiring in a world of multilateral drift

Our research suggests the world is not reorganizing into neat poles. Geopolitical ambiguity abounds. Many countries do not want to choose sides and are positioning themselves as connector countries between superpowers. As great-power rivalry intensifies, middle powers have increasing incentives to deepen economic ties with one another. This is what Baldwin (2025) calls “multilateral drift”. We continue to see multilateral drift as the most likely trade scenario over the next decade. This scenario likely delivers a patchy rewiring characterized by partial fragmentation and selective integration rather than a clean multipolar equilibrium.

The inflationary cost of security

Patchy rewiring may be less disruptive than open rupture, but the move to ‘just in case’ involves an efficiency loss that also coincides with higher inflation. Ambrosino et al. (2024) find that the inflationary impact of fragmenting trade depends on whether fragmentation occurs gradually, with a disinflationary impact, or more suddenly, with a

strong inflationary impact, and the degree to which consumers are willing to absorb higher import prices. In a gradual rewiring scenario, consumers anticipate the erosion of their real incomes from more expensive imports and subsequently reduce aggregate demand. However, as we showed last year, the US demand for foreign goods has become less elastic in the last couple of years, which suggests a higher willingness to absorb higher prices, raising the prospect of inflation resulting from fragmentation.⁹ In addition, the pursuit of resilience in the age of AI for most countries will concentrate on importing state-of-the-art technology goods, including semi-conductors, for which demand is highly inelastic, as already shown by Ghodsi et al. (2016).

9. See Figure 4.9 on page 91 of Expected Returns 2026-2030.

Mark Carney's Davos phrasing, "we are in a rupture, not transition," is perhaps too strong and we might instead see gradual fragmentation alongside deeper integration elsewhere. But even gradualism may still not neutralize the inflationary impulse as countries prioritize security above efficiency. This feature keeps an inflationary bias in our base case, especially against the backdrop of surging prices upstream in the AI value chain.

The new global order might feature the absence of order itself. The closure of the Strait of Hormuz in 2026 is yet another reminder that new chokepoints will emerge as the global economy rewires. Its winners will likely be the ones that manage to maximize adaptability while minimizing efficiency loss.

2.2. The rewiring of capital: From asset-light to capital deepening

The rewiring of capital

What changed?

- The era of capitalism without capital is ending.
- AI, electrification, defense and manufacturing all require physical investment.

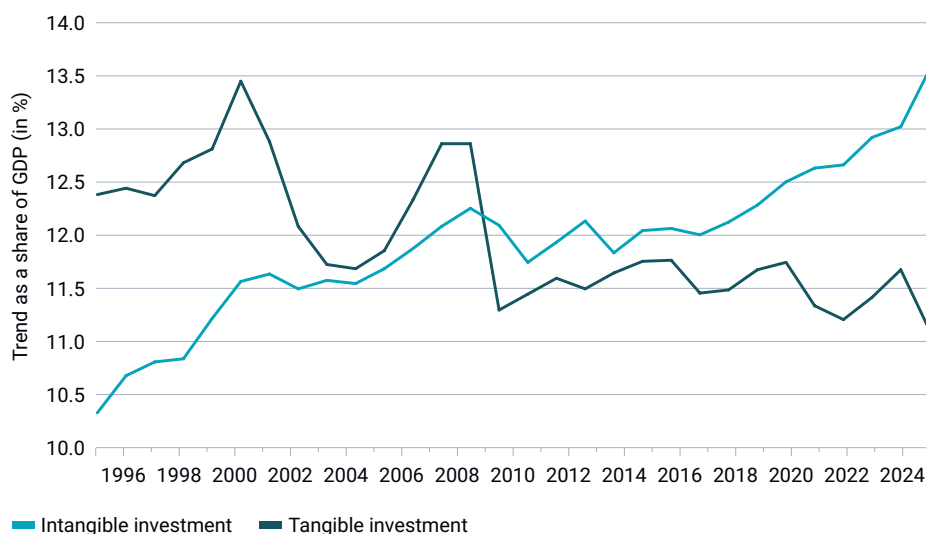
What matters?

- Global capex may reach record levels.
- Neutral rates face upward pressure.
- Corporate releveraging is underway.

For much of the past three decades, the global economy was characterized by an asset-light growth model.¹⁰ Globalization allowed firms to optimize supply chains, outsource production, minimize inventories and reduce capital intensity. Software increasingly overriding hardware. The dominant business models of the 2010s revolved around platforms, networks and intellectual property rather than factories, power grids or industrial infrastructure. Intangible investment's share of GDP rose from 10% in 1995 to 14%, overtaking physical investment's share for the first time in 2009.¹¹

10. See Haskel, J. & Westlake, S. (2017), *Capitalism without Capital: The Rise of the Intangible Economy*. Princeton University Press.

11. World Intangible Investment Highlights 2025.

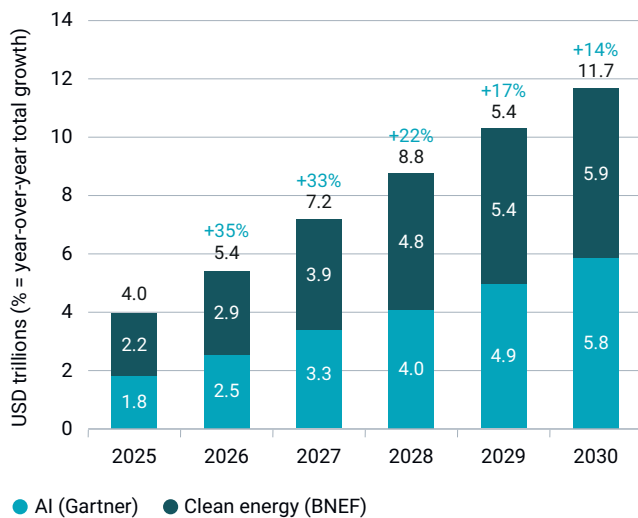
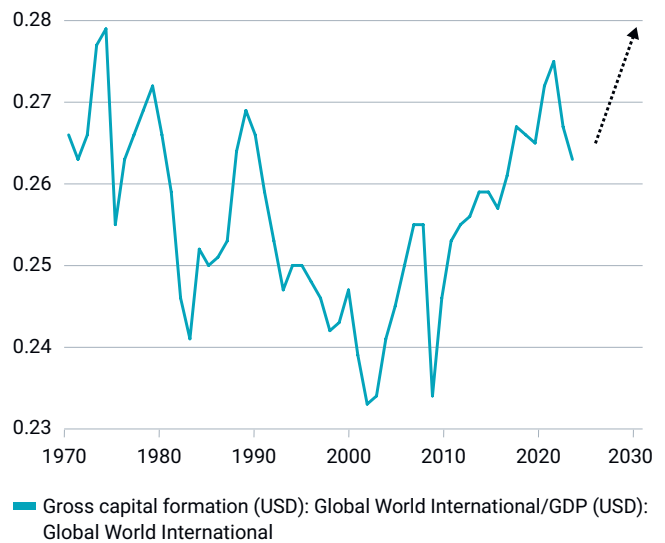
Figure 2.6: Tangible investments have lagged intangibles

Notes: Investment figures are aggregated across the following economies: Brazil, EU-22, India, Japan, the UK and the US. Data coverage varies by country: Brazil (2010-2021), India (2011-2022) and Japan (2013-2023). Source: WIPO-LBS Global INTAN-Invest Database, July 2025.

Yet, the era of capitalism without capital is coming to an end.

The physical economy is on the rise again. Across almost every major sector of the global economy, investment priorities are shifting from efficiency toward resilience, capacity and strategic autonomy. The world is entering a period of capital deepening. Global capital formation as a share of GDP already stands near its highest level in decades, supported by a combination of geopolitical fragmentation, energy security concerns, reindustrialization, the green transition and the rise of artificial intelligence. Yet, capital intensity is likely to rise. The defining feature of this cycle is that several capital-intensive investment waves are occurring simultaneously. Artificial intelligence is triggering one of the largest technology infrastructure booms in modern history. Electrification requires enormous investment in power generation, transmission networks and storage. Defense spending is rising to levels not seen since the Cold War. Finally, manufacturing capacity is expanding as governments and firms seek to reduce strategic dependencies and increase resilience.

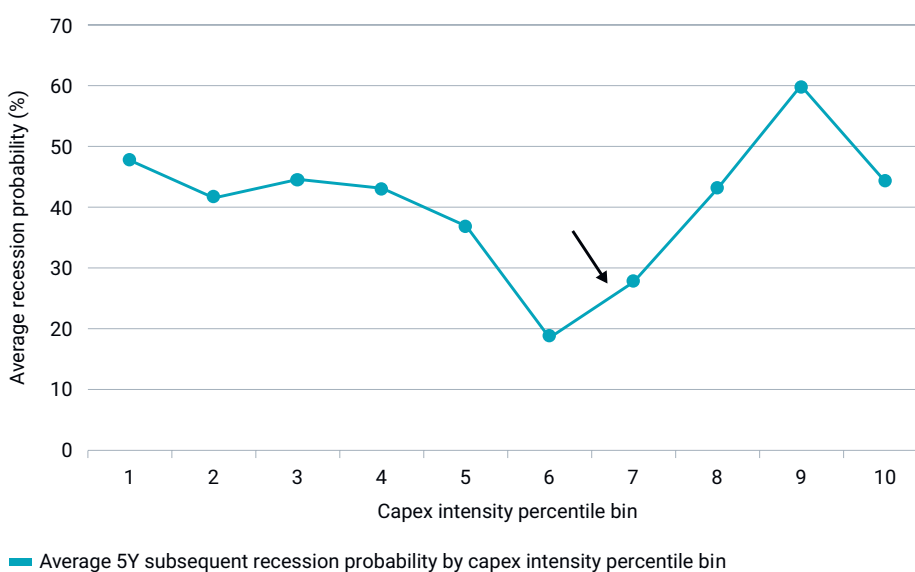
Viewed together, these forces point toward a sustained increase in global fixed capital formation as a percentage of GDP. According to estimates by Gartner and BNEF, AI and green investments alone would amount to a USD 12 trillion build-out toward 2030. We hold that, as global capex grows at a CAGR of almost 10% over the next five years, global gross capital formation could approach 30% of GDP by 2031, exceeding the previous early-1970s peak.

Figure 2.7: The rise in capital intensity**A 12 tln build-out, 10% of current global GDP...****...would imply record-high capex to GDP by 2031**

Source: BNEF, Gartner, LSEG, Robeco, December 2024.

An inflection point in the global economy

Looking at very long time series going back to the late 19th century, the US is currently in the 60th-70th percentile for capex intensity relative to its 10Y trend. What does this imply for where we are in the business cycle? Some observers are worried that we are in a very late stage of expansion with capex already excessive at the macro level. We disagree for two reasons. First, the average probability of a US recession over the subsequent five years is still a moderate 25-30% when conditioned on the current level of capex intensity (capex relative to GDP).

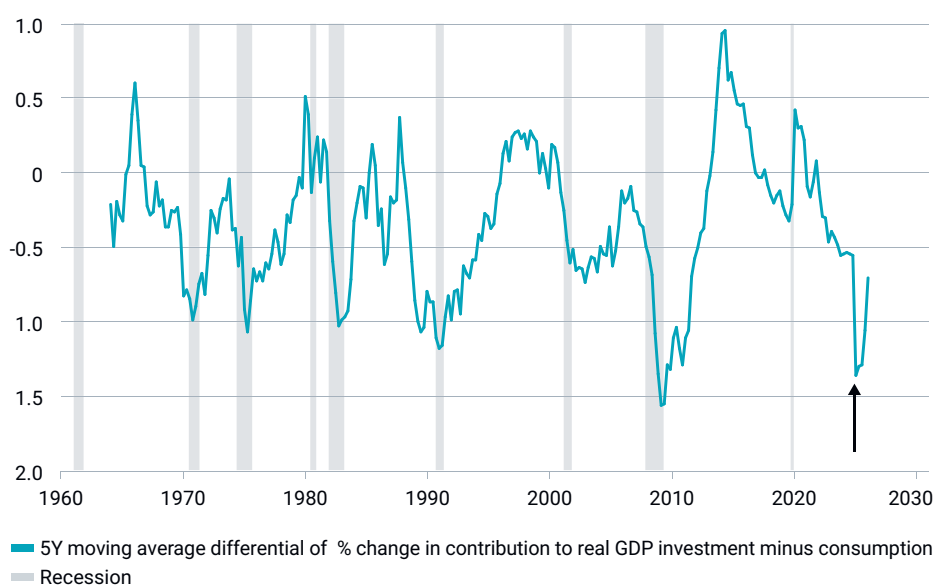
Figure 2.8: Capex intensity and subsequent medium-term recession risk

Capex intensity at time t, grouped into percentile bins, plotted against the subsequent average five-year NBER recession risk. Source: Jordà-Schularick-Taylor Macrohistory Database, Robeco, December 2025.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

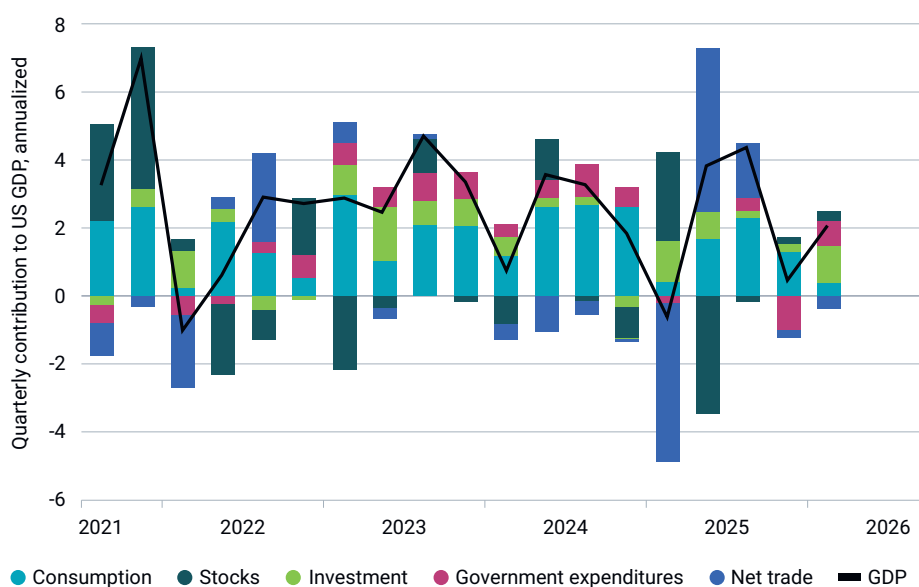
Second, Q2 2025 has seen a major inflection point in the composition of real activity growth, tilting away from consumption-led growth toward investment-led growth in developed economies, notably the US. These turning points in the 5Y moving average of the investment-minus-consumption contribution to GDP usually occur very early in the recovery phase of business cycles as the average distance to recession following a cyclical trough is 51 months. This time around the inflection only happened while the post-Covid expansion had already been underway for five years, which suggests there is more room for the expansion to run.

Figure 2.9: A major inflection point between investment and consumption



Source: LSEG Datastream, Robeco, June 2026.

Figure 2.10: Consumption has done the heavy lifting post-Covid



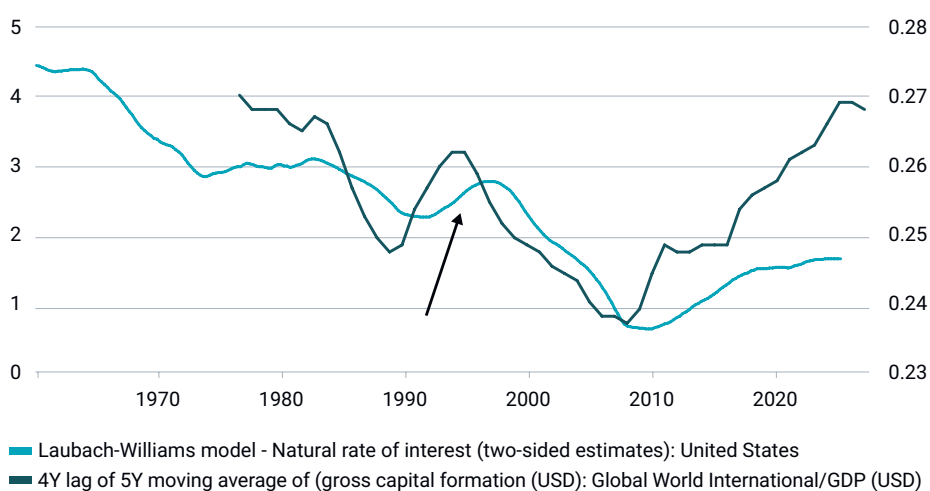
Source: LSEG Datastream, Robeco, June 2026.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

Capex intensity raises neutral rates

In previous editions of our Expected Returns, we already hinted at the transition from a savings glut to a bond glut resulting from financing these investments. This could have major implications for the level of the global neutral rate of interest. We find that global capex intensity leads the Laubach-Williams (LW) estimates of the neutral rate of interest by several years. A sizeable gap has already opened up between the level of the LW estimate of neutral rates and the level of capex intensity. Szoke et al. (2024) observed that this gap could be largely explained by the convenience yield – the yield that investors are willing to forego for holding safe and liquid assets. The most recent literature has increasingly moved closer to the notion that the neutral rate is not merely a savings-investment balance variable but a function of safe asset demand and supply.

Figure 2.11: High capex intensity followed by higher neutral rate

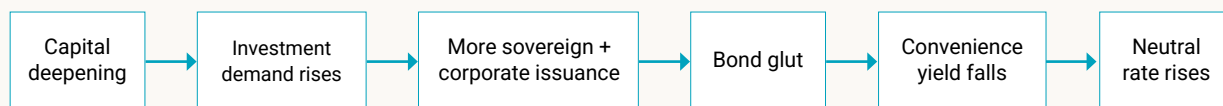


Source: LSEG Datastream, Robeco, March 2026.

A bond glut could exhaust investors' willingness to pay a convenience premium for sovereign bonds as scarcity fades. For instance, Straub (2025) estimates that every 10% higher debt-to-GDP ratio raises the neutral rate by 12-22 bps, which is corroborated by the findings of Bhatt et al. (2026) and Plante et al. (2025). Sticky fiscal deficits, rising sovereign bond free float and quantitative tightening are likely to push both neutral policy rates and term premiums higher. This fiscal trajectory is increasingly unusual by historical standards given the absence of recession. A continued procyclical fiscal expansion risks crowding out private investment, raising the real cost of capital and increasing the sensitivity of financial markets to changes in foreign demand for US government debt. In addition, as the neutral rate is also a function of productivity, an AI-related productivity acceleration could also impact the level of the neutral rate of interest. Rachel (2026) finds that a 1% boost to productivity growth could see neutral rates 100 bps higher, an estimate close to but above an earlier study by Ferreira and Shousha (2020).

Why the neutral rate sees upward pressure

Source: Robeco



A corporate re-leveraging cycle is underway

The next five years may see a simultaneous increase in both sovereign and corporate bond supply. Electrification, defense spending and AI infrastructure may already have triggered a corporate re-leveraging cycle. The AI-related capex cycle is increasingly outgrowing the internal funding model of the hyperscalers. Hyperscaler capex begins to exceed operating cash flow, and the marginal dollar of AI-related capex therefore becomes more sensitive to funding costs and market access in the medium term.

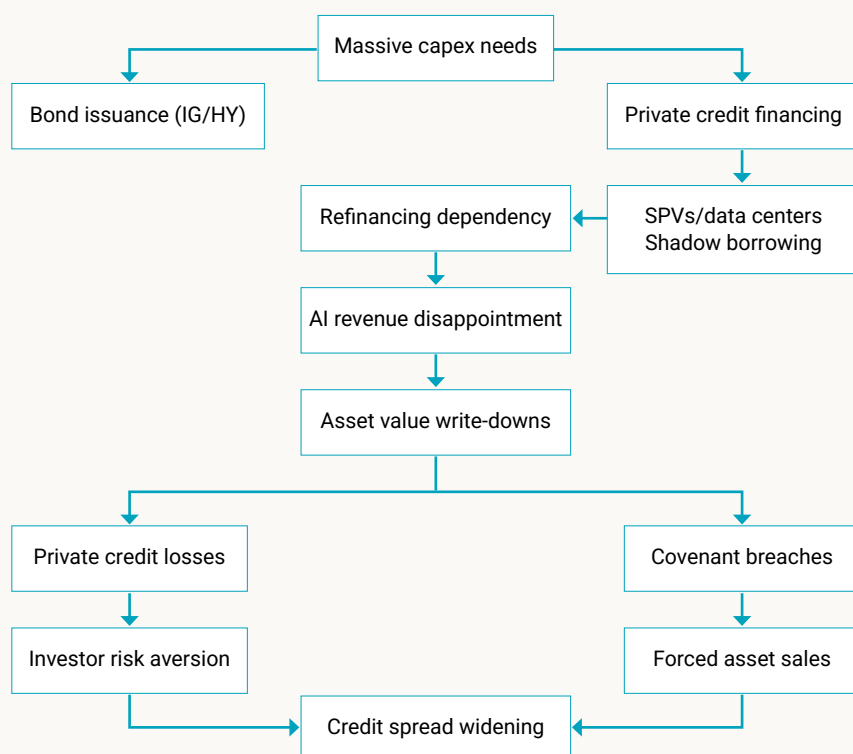
Whereas previous capex cycles were mainly financed by banks, this cycle sees a notable shift from internally funded investment toward corporate bonds, leasing arrangements, loans and private credit. The Great Rewiring is therefore not only a technological transformation. It is also a rewiring of capital itself. A corporate re-leveraging cycle is underway.

We find that overall global corporate net debt/EBITDA is still at a relatively early stage, as it remains well below its long-run trend and has scope to rise further.

Yet, this re-leveraging cycle is not without risks if earnings disappoint while refinancing risk is set to increase, given our view of higher neutral rates in the coming years. The BIS (Bulletin 120, 2026) notes that private-credit-funded infrastructure vehicles are often connected to banks through funding facilities and to institutional investors through direct lending exposures. A deterioration in AI project economics could therefore become systemic and propagate through multiple channels rather than remain isolated within the private-credit universe.

How the capex wave could build systemic risk

Source: Robeco



AI infrastructure: building the factories of cognition

The AI investment boom has already become economically significant. Capital expenditure by the largest hyperscalers now approaches 2% of US GDP, levels historically associated with major infrastructure booms like the railroad build-out in the late 19th century. Unlike previous digital revolutions, generative AI requires immense amounts of physical capital. Data centers, networking equipment, semiconductors, cooling systems and power infrastructure form the backbone of the new cognitive economy.

Recent Gartner forecasts illustrate the scale of the build-out. Global AI spending is projected to reach USD 2.6 trillion in 2026, with infrastructure accounting for more than 45% of total expenditure.¹² McKinsey estimates global spending on data centers could reach USD 7 tln by 2030, explicitly framing this as one of the largest infrastructure buildouts in modern history.¹³

12. Gartner (2026). Global AI spending forecast.

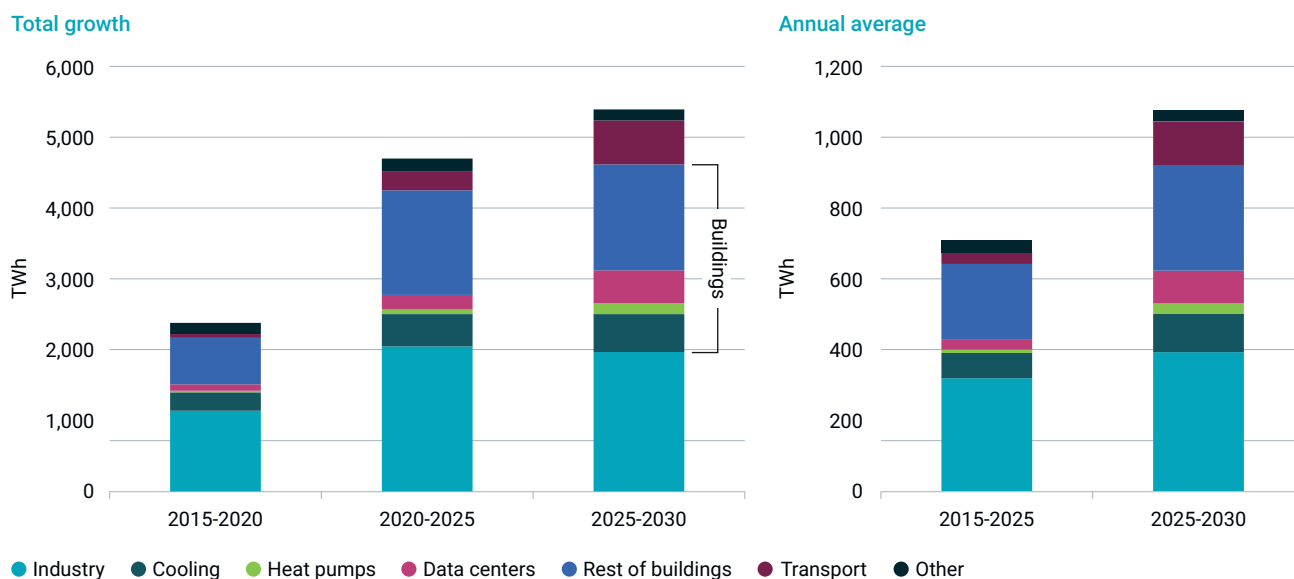
13. McKinsey & Company (2026). Data-centre investment estimate.

There is an additional twist. AI is unique among general-purpose technologies in that it can potentially improve its own implementation. By assisting with coding, workflow design, process optimization and knowledge management, AI can accelerate the organizational rewiring required to realize productivity gains. Earlier general-purpose technologies depended entirely on human effort to redesign workflows around them. AI may partially participate in its own diffusion process.

The broader investment thesis ultimately rests on an important assumption: the cost of useful cognition must continue to fall. Historically, waves of infrastructure investment have often resulted in excess capacity, increased competition and lower unit costs. Railways, telecom networks and cloud computing all followed this pattern. If the current AI capex cycle eventually suppresses inference costs, value is gradually transferred from AI enablers to AI adopters. This process would spur a genuine episode of cross-sectoral capital deepening.

Electrification: from energy security to power security

The second pillar of capital deepening is electrification. Historically, energy security was primarily about securing access to hydrocarbons. Toward 2031, it will increasingly be about securing access to electricity. As transport, industrial processes, heating systems and digital infrastructure electrify, power availability becomes a strategic economic input rather than a utility concern.

Figure 2.12: Electricity demand growth 2015-2030

Artificial intelligence is acting as a powerful accelerator of this trend. According to the International Energy Agency (IEA), global electricity demand from data centers is projected to increase from approximately 415 TWh in 2024 to around 945 TWh by 2030, exceeding the current annual electricity consumption of Japan.¹⁴ Electricity demand from AI-optimized data centers is expected to increase more than fourfold over the same period. In advanced economies, data centers are projected to account for more than 20% of total electricity-demand growth through 2030. In the United States, the impact is even more striking: data centers are on course to account for almost half of all electricity-demand growth between now and 2030.¹⁵ Bain estimates that by 2030 AI compute requirements could reach 200 GW globally (1 GW is roughly the capacity of one nuclear power plant), with the US accounting for half.¹⁶

14. International Energy Agency (2026). Data-centre and electricity-demand projections.

15. S&P Global (2026). Data-centre electricity demand/US electricity-growth reference.

16. Bain & Company (2025), *Global Technology Report* (6th annual edition): "\$2 trillion in new revenue needed to fund AI's scaling trend".

The investment implications are substantial. More data centers require more electricity. More renewable generation requires more grid investment. Greater electrification requires additional storage capacity and transmission networks. Investment in one component creates demand for investment in another. The result is a multi-year capital formation cycle that extends far beyond the technology sector. Just as oil was the strategic resource of the twentieth century, reliable electricity may become the strategic resource of the twenty-first. The AI revolution is therefore not only a computing story but increasingly an energy story.

Defense investment: the return of the security premium

Perhaps nowhere is the shift from an asset-light world to one of capital deepening more visible than in defense. For three decades Europe enjoyed a peace dividend, allowing governments to allocate resources away from military investment and toward other priorities. Yet, the peace dividend is now morphing into a security premium.

Germany has become the clearest illustration of this regime shift. According to recent budget plans, military expenditure is set to increase from EUR 51 billion in 2022 to approximately EUR 180 billion by 2030, more than tripling within less than a decade. Defense spending would rise from 1.2% of GDP in 2022 to around 3.5% of GDP by 2030.

Following Germany's reform of the constitutional debt brake, defense expenditure above 1% of GDP is largely exempt from traditional fiscal constraints, substantially lowering the barriers that historically limited military investment.

Germany is not acting in isolation. Across Europe, policymakers increasingly view military capability, supply-chain resilience and technological sovereignty as strategic necessities rather than discretionary expenditures. The broader European rearmament cycle is therefore gathering momentum, reinforced by NATO's longer-term ambition to move toward substantially higher defense commitments.

Procurement cycles remain lengthy, production bottlenecks persist and delivery schedules often stretch across multiple years. However, the policy architecture is beginning to change. Recent European defense initiatives increasingly seek to localize procurement and strengthen the domestic defense-industrial base. Eligibility criteria attached to several programs are designed to ensure that the overwhelming majority of funded projects accrue to European suppliers, while non-European content is generally restricted to a minority share of final contracts. The objective is clear: transform defense budgets into industrial capacity rather than import demand.

This distinction matters. In the short term, procurement delays, labor shortages and production bottlenecks imply that the economic impact of rearmament is likely to be smaller than headline spending announcements suggest. In the medium term, however, the effort to expand manufacturing capacity, localize supply chains and rebuild Europe's defense-industrial base has the potential to transform defense spending into a genuine capital deepening cycle.

Manufacturing capacity: rebuilding productive resilience

The final pillar of capital deepening is manufacturing. For decades, firms optimized for efficiency by concentrating production where costs were lowest. The result was a highly efficient, yet increasingly fragile production system. The pandemic, geopolitical tensions, semiconductor shortages and trade fragmentation exposed the vulnerabilities of that model.

The response has been a gradual shift toward resilience. Nearshoring, friendshoring, dual sourcing and strategic redundancy are becoming increasingly common features of corporate investment strategies. Governments are actively subsidizing domestic manufacturing capacity in sectors ranging from semiconductors and batteries to critical minerals and industrial equipment. The objective is no longer simply to minimize costs but to maximize resilience.

Critically, resilience requires capital. Duplicate supply chains, domestic production facilities, strategic inventories and localized manufacturing ecosystems all require substantial investment. The result is a reversal of several decades of declining capital intensity.

Technology boom: disinflation ahead?

The common denominator across AI infrastructure, electrification, defense and manufacturing resilience is that they all require physical investment. For three decades, firms optimized around software, intellectual property and global supply chains. The next decade may require data centers, grids, factories and strategic inventories. The Great Rewiring is therefore not simply a technology story. It is the return of capital itself.

In the end, rebuilding capacity could bring much-needed relief for high-pressure economies like the US or the UK and ultimately bring inflation back toward target. Our research finds that some technology booms have seen a U-shaped inflation pattern, with CPI remaining below 2%. This might reinforce Fed Chair Kevin Warsh's view that this AI boom is disinflationary.¹⁷

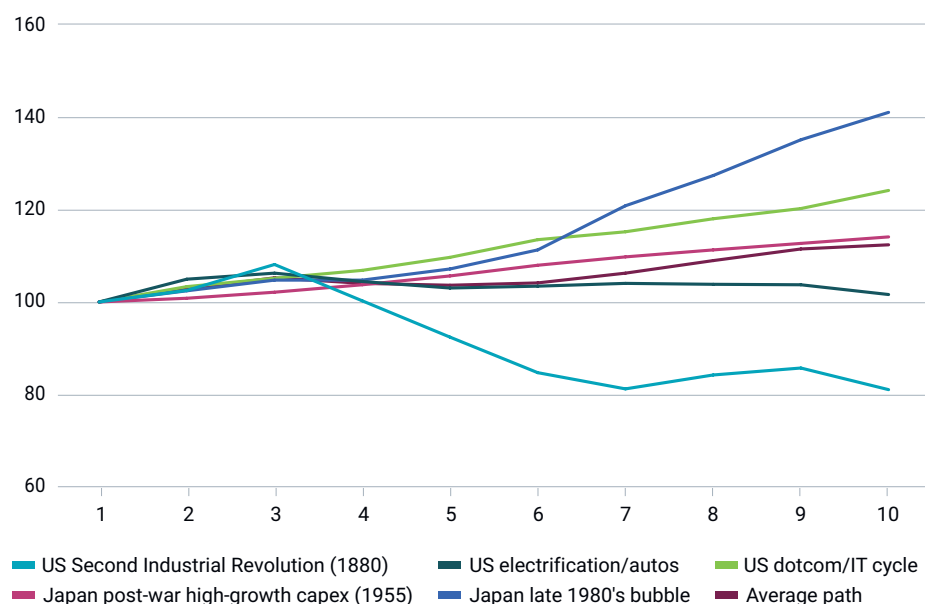
17. See Warsh, K. (2025), *The Federal Reserve's Broken Leadership*, Wall Street Journal, November 2025, arguing that "AI will be a significant disinflationary force, increasing productivity and bolstering American competitiveness."

Table 2.2: Inflation during historical capex booms

US Second Industrial Revolution (1880)	US electrification/autos (1921)	Japan post-war high-growth capex (1955)	Japan late 1980's bubble	US dotcom/ICT cycle	Average CPI path	Average CPI (%) T-T+10
100.0	100.0	100.0	100.0	100.0	100.0	
102.5	104.9	100.8	102.4	103.3	102.8	1.4%
108.0	106.2	102.1	104.7	105.1	105.2	1.7%
100.2	104.4	103.7	104.7	106.8	104.0	1.0%
92.4	103.0	105.6	107.1	109.6	103.6	0.7%
84.8	103.4	107.9	111.2	113.4	104.1	0.7%
81.3	104.0	109.7	120.7	115.1	106.2	0.9%
84.3	103.8	111.2	127.2	117.9	108.9	1.1%
85.8	103.7	112.6	134.9	120.1	111.4	1.2%
81.1	101.6	114.0	140.8	124.0	112.3	1.2%

Source: Jordà-Schularick-Taylor Macrohistory Database, Robeco, July 2026.

Figure 2.13: Higher inflation only 5-10 years after start capex boom



Source: Jordà-Schularick-Taylor Macrohistory Database, Robeco, July 2026.

2.3. The rewiring of production: Man versus machine

The rewiring of production

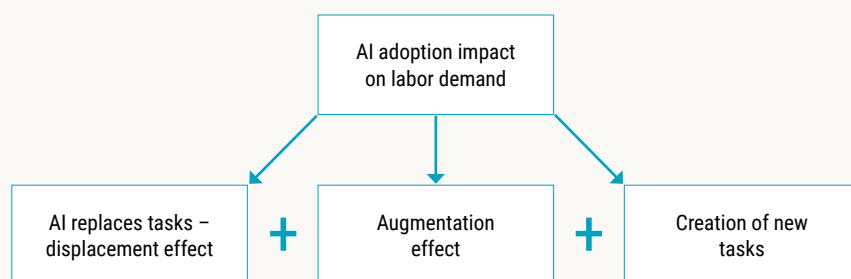
What changed?

- AI affects growth through automation, augmentation and new task creation.

What matters?

- Augmentation likely dominates automation.
- Diffusion matters more than frontier capability.
- Falling cognition costs could trigger a productivity renaissance.

Channels of AI-induced labor demand



Displacement of labor

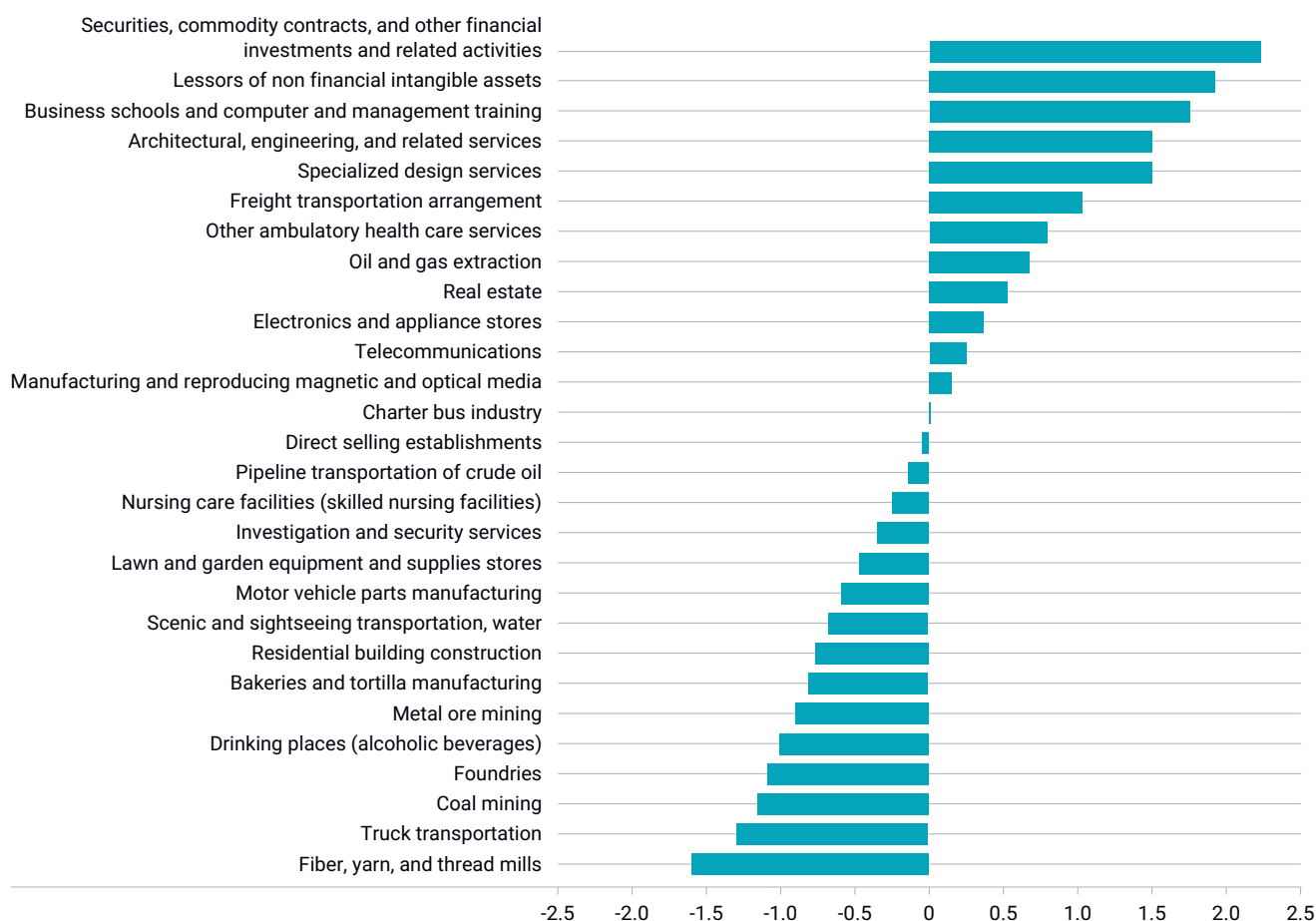
As we posited in recent years, the closer we move toward artificial general intelligence (AGI), the higher the elasticity of substitution between labor and capital could become, increasing the risk of technological unemployment. At the same time, we believed that the elasticity of substitution was lower than commonly assumed, underpinning our base case view that the augmentation would trump the displacement effect.¹⁸ Reviewing the latest literature and conducting our own research, our conviction about this thesis has only strengthened.

18. See, for instance, page 88 of [Expected Returns 2025-2029](#).

Over the next five years, AI is more likely to replace tasks than workers. Jobs are a bundle of tasks. Estimates of the number of tasks exposed to AI differ substantially, ranging from around 20% to 60% depending on the methodology used. The ILO estimates that 3.3% of global employment is concentrated in occupations with the highest exposure to generative AI, where technical substitution is greatest. Exposure alone, however, is insufficient to drive task displacement. Tasks must also be economically attractive to automate.

Whether a task can be profitably automated depends on the balance between labor-cost savings and the cost of deploying AI, including verification, compute and token costs. Consequently, not every task that is technically feasible to automate will be economically viable.

Figure 2.14: Industry-level AI exposure



Source: Felten, Raj and Seamans (2021), Robeco, August 2026. The X-axis shows the average AIIE score.

The academic literature differs markedly on the size of this profitable automation bucket. Acemoglu (2024) assumes that only around 23% of AI-exposed tasks become economically attractive to automate and estimates average task-level cost savings of roughly 27%. By contrast, Aghion and Bunel (2024) assume that approximately half of exposed tasks eventually become profitable to automate, with labor-cost savings approaching 40%. These differing assumptions result in a tenfold difference in estimated productivity gains over the coming decade.

Importantly, the key disagreement is not whether AI works but whether automation remains profitable at scale. The growth of the profitable automation bucket depends critically on verification, inference, compute and token costs continuing to decline. If these costs remain elevated, many technically feasible use cases may never become economically attractive.

Recent evidence suggests that this risk should not be dismissed. Nvidia's¹⁹ Bryan Catanzaro recently noted that, for his team, "the cost of compute is far beyond the cost of the employees."²⁰ At the same time, several companies have reported rapidly exhausting AI budgets as token consumption increased. As shareholder scrutiny of AI-related spending intensifies, firms may become increasingly selective about which tasks are delegated to algorithms and which remain in human hands. In such an environment, realized outcomes may gravitate closer to Acemoglu's more cautious view than to the more optimistic assumptions embedded in Aghion and Bunel's framework.

19. The company mentioned on this page is for illustrative purposes only. No inference can be made on the future development of the company. This is not a buy, sell, or hold recommendation.

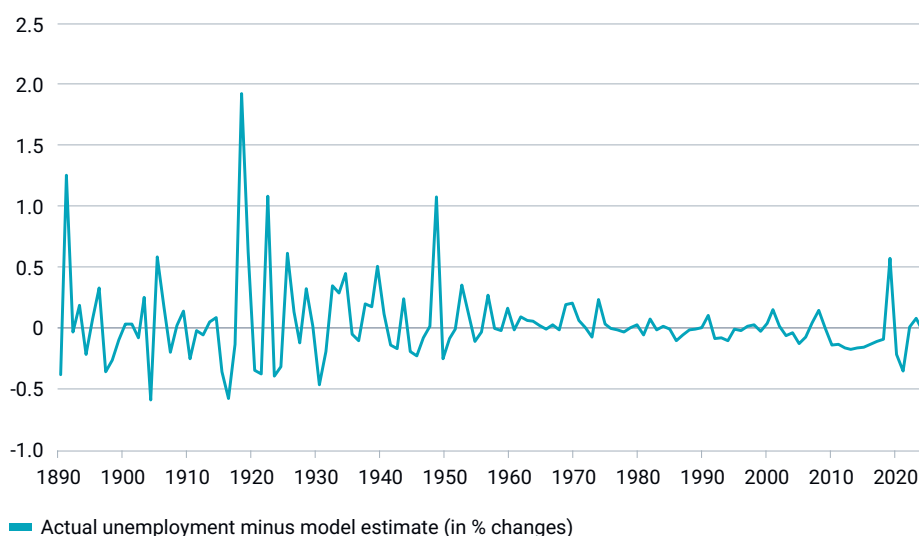
20. AI can cost more than human workers now.

Table 2.3: Impact of automation

Variable	Acemoglu	Aghion-Bunel
Tasks exposed to AI	~20%	~60%
Profitably automatable	~23%	~50%
Labor-cost savings	~27%	~40%
Annual TFP uplift	~0.07pp	~0.68pp
EPS impact	Modest margin enhancement	Potential earnings supercycle

Source: Robeco, August 2026.

Our own research finds that historical innovation waves rarely generated unemployment more than a few percentage points above levels explained by normal business-cycle dynamics. For the US, the railroad build-out in the late 19th century, the electrification wave in the early 1920s and the rapid improvements in industrial innovation in the 1950s led to a temporary spike in US unemployment which could not be explained by normal business-cycle dynamics and therefore likely reflected the emerging technology boom. As such, we hold that US unemployment might increase by around 1% due to job displacement toward 2031 (next to a 1% ‘conventional’ increase due to late-cycle dynamics).

Figure 2.15: Technological unemployment

Source: Jordà-Schularick-Taylor Macroeconomy Database, Robeco, December 2025.

Augmentation of labor

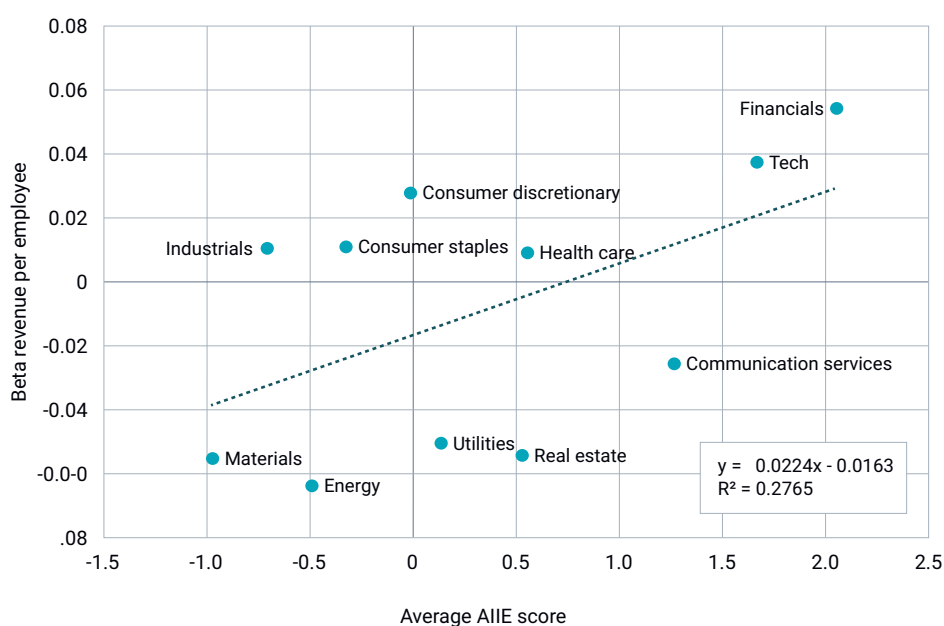
Although much of the focus in financial media is on job displacement, the automation impact of the AI boom is only one leg of the tripartite impact on labor demand. Economic history shows that the largest benefits from general-purpose technologies occur not when tasks are automated but when firms redesign work around the new technology. Thus, the more interesting and important channel, and one of this year's main macro subthemes, is the ability of AI to augment labor. In this situation, humans remain in the loop and improve their productivity because AI acts as a complement to labor. What if a lawyer, engineer or analyst can become 15-30% more productive by better workflows, enhanced knowledge diffusion and learning effects? The current literature broadly points in this direction. Brynjolfsson, Li & Raymond (2023, 2025) find an augmentation

gain of +30-35% for low skill/novice workers in customer support. Noy and Zhang (2023) find a 40% faster task completion and an 18% increase in quality among professional writers. Software developers enjoy a +26% increase in completed tasks using AI according to Cui, Demirel et al. (2025). This early empirical evidence suggests that AI augmentation increases worker productivity by accelerating learning, diffusion of expertise and improved decision quality. AI might prove to be transformative for new tasks within existing occupations, especially if they have a high ex ante AI exposure. For instance, whereas financial analysts previously collected data, built charts and ran models, increasingly they will manage machine cognition; supervising AI agents, designing multi-agent workflows and synthesizing AI-generated investment views.

Following the empirical work of Loaiza and Rigobon (2025) the enduring comparative advantage of humans lies in EPOCH capabilities: empathy, presence, opinion, creativity and hope. The paper argues that tasks relying on these capabilities are difficult to automate but are often highly augmentable by AI. They see higher hiring rates for EPOCH intensive occupations. Likewise, there is already tentative evidence that labor demand in high-AI-intensity industries has been rising. Kharazian et al. (2026) find that firms that make the largest AI investment subsequently grow employment, while low-intensity adopters show little statistically significant employment effect. This could hint at a K-shaped dynamic where winners leap ahead and laggards in AI adoption start to lag further behind.

These literature findings echo our own work on the relationship between AI exposure and productivity. Using AI exposure data from Felten, Raj and Seamans (2021) at industry NAICS level, we mapped these at sectoral level. Subsequently, we regressed this on the estimated beta of revenue per employee at the sector level (which in turn is the beta from a post-ChatGPT dummy regression on revenue per employee at the sectoral level). The findings are quite striking; there is a statistically meaningful relationship between AI exposure and observed revenue per employee growth after the introduction of LLMs. Each one-point increase in AI sector exposure is associated with roughly 2.3 percentage points higher post-ChatGPT revenue per employee growth.

Figure 2.16: Exposure to AI and post-ChatGPT revenue per employee



Source: Felten, Raj, Seamans (2021), LSEG Worldscope, Robeco, July 2026.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

Productivity is about much more than buying an LLM

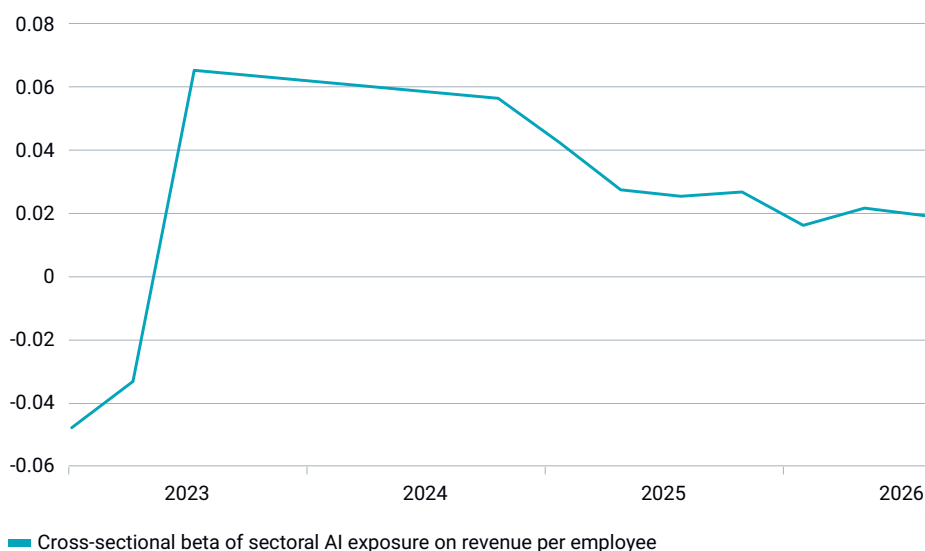
Brynjolfsson, a notable AI optimist, emphasizes that productivity gains from digital technologies depend on complementary organizational innovation rather than the technology alone. Buying a Copilot license is easy but transforming business processes around AI to reap the productivity benefits is much harder and takes time. While 98% of businesses use AI in the workplace, only 39% of firms have actually successfully integrated AI in their workflow.²¹ This transformation process creates the typical J-curve effect observed during previous general-purpose technological revolutions as documented by David (1990). When electrical motors appeared in the late 19th century, factories initially kept the existing layouts and simply replaced steam engines with electric motors. Only after complementary innovations like assembly lines, decentralized machine placement and new workflow designs did productivity surge. This lagged impact has led to the famous Solow paradox as Solow remarked in 1987 that he could see computers everywhere except in the productivity statistics. Also in this case, productivity as a result of computerization took off years later as IT skills of the global workforce started to improve. For economists and investors alike, getting a grasp of the speed of AI diffusion is pivotal. The academic literature is still sparse on this subject.

21. Google Cloud Infrastructure report (2025).

Diffusion is already underway

We find that at the sectoral level, diffusion is already underway. Estimating the cross-sectional beta of sectoral AI exposure on revenue per employee, we find a hump-shaped curve since the introduction of ChatGPT. This shows that while AI exposure became a powerful differentiator after the GenAI shock, initial AI exposure subsequently became a less powerful differentiator for revenues per employee as the benefits spread beyond the most AI-exposed sectors.

Figure 2.17: AI exposure leaders initially escaped the pack – today much less so



Source: Felten, Raj, Seamans (2021), LSEG Worldscope, Robeco, July 2026.

This is exactly what we would expect from a general-purpose technology. First, an early winner-takes-most phase. Second, the diffusion phase and lastly productivity gains spreading beyond creators to adopters. This latter effect will shape market dynamics in the coming years as investors will award successful adopters, not simply companies that own AI. The next stage of AI diffusion may be shaped less by absolute model capability than by the falling cost of useful cognition.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

This dynamic also carries echoes of Baumol's disease. Historically, many service sectors such as professional services, administration, education and parts of healthcare experienced limited productivity growth because they relied heavily on human information processing while at the same time having to incur higher wage costs to prevent workers moving to the high productivity sectors. By lowering the cost of information processing, AI has the potential to raise productivity in these traditionally low-productivity sectors, allowing gains to diffuse from innovators to adopters and reducing the relative advantage of early AI leaders. In addition, AI as a general-purpose technology is truly unique. Electricity could not redesign factories, nor could the internet rewrite a company's workflows. Yet AI can continuously improve its own implementation in workflows and thus help speed up its own diffusion. In this sense, AI may partially reverse Baumol's cost disease, as productivity improvements spread beyond a narrow group of technology creators into the broader service economy.

Mind the gap between adoption and transformation

Given the importance of organizational innovation in transforming business processes, we looked at the amount of organizational capital at the sectoral level as defined in the EU-KLEMS database. Sectors with high AI exposure, which at the same time enjoy a high organizational capital per employee, are likely to see the highest J-curve impact in the coming years. We find that healthcare and real estate are sectors with a high level of organizational capital while also having a moderately high AI exposure. In contrast, the consumer staples sector sees a low AI exposure and also a low organizational capital per employee, making this sector less susceptible to a steep pickup in productivity in the coming years.

As awareness of organizational innovation as a key enabler increases in the medium term, a cross-sectoral wave of complementary investments (for instance, in information processing equipment) will continue. To tap into the gains from AI adoption, firms need to optimize their data infrastructure. While energy security is often seen as the big constraint for AI adoption at the macro level, the bigger hurdle at the firm level is access to high-quality contextual business data for AI tooling. Around 70% of organizations struggle with data governance and integrating data into AI models.²² In the AI era, proprietary data may become what the assembly line was to electrification: the complementary asset that determines whether a general-purpose technology translates into productivity gains.

22. Google State of AI Infrastructure 2025 Research Report page 3

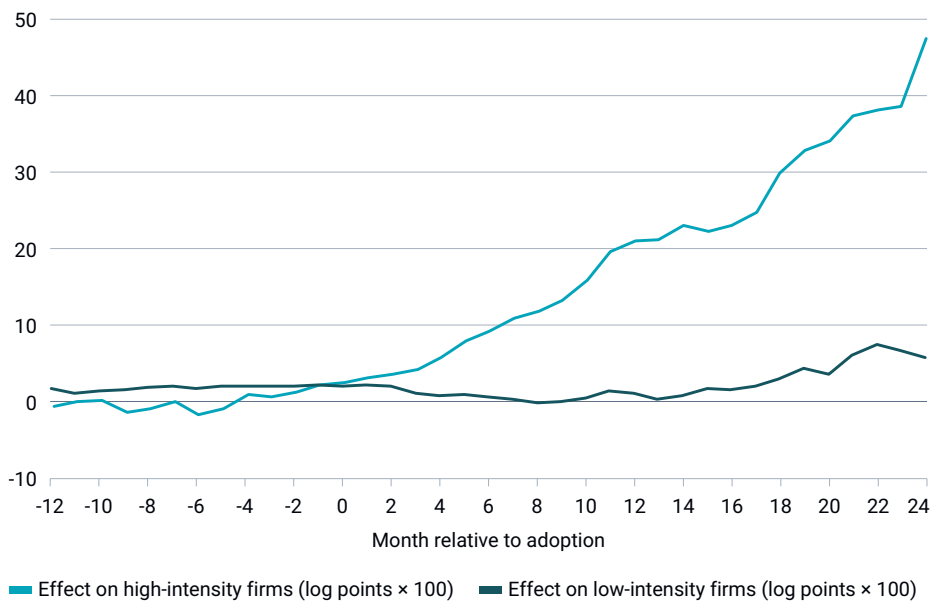
McKinsey (2025) describes this next phase of adoption as organizational rewiring: workflow redesign, governance and employee retraining. With the number of jobs with some level of AI exposure vastly outnumbering those at risk of becoming outright displaced, the augmentation effect will likely become the dominant driver of AI-driven productivity relative to the automation effect.

The emergence of new jobs

Lastly, the third channel by which AI can influence labor demand is the creation of new tasks. Technology not only displaces labor but also creates new demand for it. Acemoglu and Restrepo (2019) state that new task-creating technologies increase labor demand in which labor has a comparative advantage over capital. Technology changes occupations not by simply eliminating tasks but by altering which expertise is valuable. Recent work by Acemoglu, Autor and Johnson (2026) highlights 'new task-creating technologies' as the most unambiguously pro-worker form of innovation because they generate demand for novel human expertise and increase both the quantity and variety of work performed by people. This type of change has been a constant throughout economic history; roughly 60% of today's workers are employed in occupations that scarcely existed in 1940 (see Autor et al. 2022).

Figure 2.18: High AI-intensity firms increased hiring

Change in headcount since AI adoption (high AI-intensity versus low AI-intensity job)



Source: Kharazian, A., Simon, L., & Stevens, R. (2026). *A New Look at AI's Impact on Jobs: Firm-Level AI Spending and Workforce Adjustment*. Ramp Economics Lab. <https://ramp.com/data/ai-jobs-impact>.

Evidence of new task creation is already emerging. Loaiza and Rigobon (2025) find that newly emerging tasks exhibit higher levels of uniquely human capabilities, while firms adopting AI most aggressively continue to expand hiring rather than contract it (a finding consistent with Kharazian et al. (2026)). At the occupational level, entirely new AI-related roles such as AI engineers, prompt engineers and AI governance specialists have appeared, but the more important transformation is occurring within existing occupations as workers increasingly supervise AI systems, design workflows and validate machine-generated outputs.

From automation to augmentation

We are entering an age where the economic cost of cognition (being the sum of inference, verification, integration and governance) is quite likely to decline. At least, periods of infrastructure overinvestment associated with general-purpose technologies have often been followed by intense competition, excess capacity and falling unit costs.

Historical experience further suggests that when the cost of a productive input falls sufficiently, demand for that input often expands rather than contracts. This is what Jevons observed in his 1865 book about coal demand rising despite steam engines becoming more efficient (now known as the Jevons paradox). Similarly, if demand for cognition is highly elastic, lower AI costs can spur capital deepening, increase productivity and wage growth, and facilitate the emergence of new jobs. It is too early to tell whether a) the cost of AI adoption is actually going to decline and b) whether the elasticity of demand for cognition is truly elastic and well above 1.

Yet, as long as humans compete and keep pushing the frontier, there is a strong reason to believe that demand for cognition remains highly elastic. The early evidence is encouraging. Firms adopting AI most aggressively continue to expand hiring rather than retrench, new tasks appear increasingly centered around uniquely human capabilities, and productivity gains are beginning to diffuse beyond AI creators toward a broader set of adopters. If this pattern persists, the dominant economic effect of AI over the coming

decade may not be labor substitution but labor augmentation. In that world, falling AI costs would not merely replace human effort; they would amplify it, allowing workers to specialize in higher-value activities and enabling the creation of entirely new forms of economic output, as occurred during past general-purpose technology booms. The ultimate prize of the AI era may therefore be less about automating existing work and more about expanding the frontier of what humans are able to accomplish.

Table 2.4: AI exposure and preparedness by region and sector

Country groups	Abbreviation	Sector	AI exposure	AI preparedness
China	CHN	Tradable Non-tradable AI-intensive	0.30 0.43 0.58	0.64
Emerging market economies Asia, Central Asia, Russia, etc.	EMA	Tradable Non-tradable AI-intensive	0.18 0.41 0.72	0.50
Emerging market economies Latin America, Middle East, Africa, etc.	EML	Tradable Non-tradable AI-intensive	0.24 0.46 0.72	0.50
EU and Switzerland	EUS	Tradable Non-tradable AI-intensive	0.40 0.60 0.82	0.68
Low-income countries	LIC	Tradable Non-tradable AI-intensive	0.17 0.47 0.72	0.35
Other advanced economies	OAD	Tradable Non-tradable AI-intensive	0.36 0.56 0.77	0.73
United States	USA	Tradable Non-tradable AI-intensive	0.43 0.67 0.85	0.77

Source: Cazzaniga et al. (2024), and IMF staff calculations. Note: The levels of AI preparedness are the same across the sectors within a country. EMA = Emerging market economies Asia, Central Asia, Russia, etc. EML = Emerging market economies Latin America, Middle East, Africa, etc. EUS = EU and Switzerland, LIC = Low-income countries, and OAD = Other advanced economies. The detailed composition of the countries in each group is presented in Annex II. For ROW, the values of LIC are used.

A four-channel view of AI-driven growth

Economists traditionally describe production using the standard Cobb-Douglas production function:

$$Y = AK^\alpha L^{1-\alpha}$$

where: Y = output A = total factor productivity (TFP) K = capital L = labor

Growth accounting then decomposes economic growth into contributions from productivity, capital accumulation and labor:

$$\Delta Y = \Delta A + \alpha \Delta K + (1-\alpha) \Delta L$$

This can be further decomposed into: **A four-channel view of AI-driven growth**

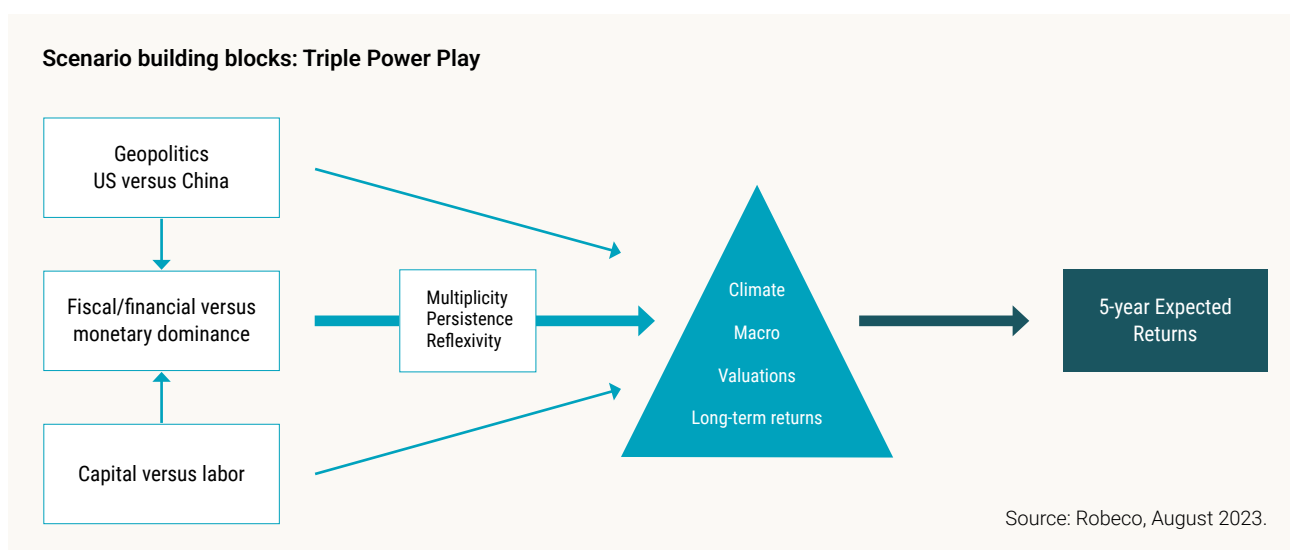
We decompose the contribution of AI into four distinct channels:

$$\Delta Y = \underbrace{\Delta(K/L)}_{\text{Capital deepening}} + \underbrace{\Delta A_{\text{automation}}}_{\text{Automation}} + \underbrace{\Delta A_{\text{augmentation}}}_{\text{Augmentation}} + \underbrace{\Delta A_{\text{new tasks}}}_{\text{New task creation}}$$

Past performance is no guarantee of future results. The value of your investments may fluctuate.

2.4. Scenarios

Viewed through the lens of our Triple Power Play framework, the rewiring of trade, capital and production can be understood as the economy's adaptive response to the growing influence of fiscal dominance, strategic competition between the United States and China, and the shifting balance of power between labor and capital. The secular forces described in Expected Returns 2026-2030 remain largely intact and continue to shape our long-term outlook. Demographic aging, technological progress, elevated debt levels and geopolitical competition remain central features of the investment landscape. We will now discuss our scenarios, which differ primarily in the degree to which adaptation to these forces succeeds.



Base case: The Great Rewiring (50% probability)

"Wind extinguishes a candle and energizes fire."

Nassim Taleb

The base case is ultimately a story of successful adaptation, but at a cost of somewhat higher inflation and marginal creative destruction in the Schumpeterian sense.²³ The rewiring of trade encourages resilience rather than efficiency, the rewiring of capital raises investment intensity, and the rewiring of production lifts productivity through automation, new task creation, but especially augmentation of labor. Together these forces allow the global economy to absorb demographic headwinds, fragmentation and higher debt burdens more effectively than many consensus forecasts assume.

The US economy remains in expansion over the next five years, becoming one of the longest NBER expansions in history by 2031. We now expect a 2.5% real GDP growth rate (CAGR) with inflation increasing further to 2.9%. Given the higher neutral policy rate, we raised the average Fed policy rate by 30 bps to 4.25%. So far this expansion, the consumer has done the heavy lifting, but we increasingly see investment playing a larger role in GDP growth, growing at close to 10% (CAGR). While the cost of inferencing might drop in the coming years, we think the era of steady technology goods disinflation is coming to an end. At the moment, the US consumer enjoys a positive wealth effect, which is currently five times as important for US consumption growth relative to its

23. See Joseph Schumpeter (1942), *Capitalism, Socialism and Democracy*, Chapter VII, "The Process of Creative Destruction".

income contribution. We expect this share to decline even as we do expect US unemployment to increase by 2% over the next five years. US unemployment will increase by 1% for cyclical reasons while the remaining 1% is caused by automation. Real income growth, while currently lagging output per hour worked, will pick up as productivity growth rises to 2.5%, a pick-up by 1% of the pre-Gen AI trend.

Unlike many existing estimates, this uplift does not solely reflect automation. It also incorporates capital deepening, labor augmentation, organizational innovation and new task creation. This productivity boost also prevents the US from a major overheating episode even as pressure builds in 2027/28. We believe Europe will see a higher investment contribution to real activity as well but in contrast to the US, excess savings also create a tailwind for European consumption. We expect to see the rise of the middle powers, with countries like Canada, Australia, Japan and core Europe seeing a stronger catch-up versus the US. A higher multiplier from procyclical fiscal expansion will also contribute. For China, we have raised our average inflation forecast by 20 bps compared to last year on an improved consumption growth outlook but still see average inflation not exceed 2% as industrial excess capacity lingers, the property sector recovery remains incomplete and policy stimulus remains piecemeal. Selective rewiring of global value chains could eat into China's export growth, alongside a strengthening of the Chinese yuan.

Bull case: The Luminous Renaissance (15% probability)

"The most incredible thing about miracles is that they happen."

G.K. Chesterton

In 2024, the OECD asked whether AI will prove a "miracle or myth" for productivity growth.²⁴ The bull case represents a world in which the Great Rewiring proves substantially more successful than anticipated. While the IMF continues to view demographics as a drag, fragmentation as an efficiency loss and AI as a source of only modest productivity gains, this scenario sees the global economy experience a genuine productivity renaissance reminiscent of the late 1990s. The key difference is that AI proves more transformative than previous digital revolutions because it accelerates not only automation but also its own diffusion.

24. Filippucci, F., Gal, P., and Schief, M. (2024). *Miracle or Myth? Assessing the macroeconomic productivity gains from Artificial Intelligence*. OECD Artificial Intelligence Papers, No. 29. OECD Publishing, Paris.

Even as frontier capabilities expand more rapidly in this scenario, the largest gains do not accrue to the creators of AI but to the adopters as the marginal cost of AI adoption drops. Firms successfully redesign workflows, integrate proprietary data and deploy AI agents across business processes. While labor augmentation is higher, labor displacement is also higher as we inch closer to artificial general intelligence by 2030. Technological unemployment is therefore more pronounced than in our base case. This keeps wage demands in check, lowering unit labor costs, extending the profit cycle. New task creation emerges faster than expected and organizational capital becomes a major source of competitive advantage. Productivity growth accelerates sharply across the service economy, validating the view that AI is a general-purpose technology on par with electrification and the internet.

At the same time, the trade-off between resilience and efficiency eases. Geopolitical tensions stabilize, allowing trade diversion and deeper integration among middle powers to proceed more gradually, lowering inflationary pressures. Capital deepening continues through AI infrastructure, electrification, manufacturing investment and defense spending, but rising productivity prevents overheating. The cost of useful cognition falls rapidly while energy constraints prove less binding than feared as energy efficiency gains largely keep pace with rising overall energy demand.

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The result is a Goldilocks expansion in which, not unlike previous technology booms, the positive supply shock delivers benign disinflation. As such, real GDP growth in developed economies rises materially above trend while inflation gradually converges toward central-bank targets. Equity markets increasingly reward successful AI adopters rather than AI enablers. What initially appeared to be an ordinary technology cycle evolves into a broader economic renaissance in which the gains from adaptation far exceed the costs of fragmentation. As inflation averages around target, neutral rates are slightly below our base case projections for developed market policy rates.

Bear case: The Synaptic Decay (35% probability)

“Collapse occurs when societies reach diminishing returns from complexity.”

Joseph Tainter

Synaptic Decay

The bear case represents a world in which the Great Rewiring stalls before its benefits can be realized. The economy continues to incur the costs of adaptation while failing to capture the expected gains from productivity, capital deepening and organizational transformation. What initially appears to be a powerful investment boom gradually reveals itself as a period of overinvestment, policy fragmentation and institutional decay. The central failure occurs in the transition from AI products to solutions. Firms enthusiastically purchase AI tools but struggle to redesign workflows around them. Organizational bottlenecks prove more persistent than expected, proprietary data remain fragmented and the hoped-for productivity gains fail to materialize. AI adoption becomes widespread, but transformation remains shallow. As a result, automation displaces tasks faster than augmentation creates value. Employment growth weakens, real income growth disappoints and business confidence deteriorates.

At the same time, capital rewiring turns increasingly problematic. The AI infrastructure boom creates pockets of excess capacity similar to earlier technology manias. Investors begin questioning the returns on AI-related investment and funding conditions tighten. A mild recession emerges around 2028, resembling the aftermath of the technology bubble rather than a systemic financial crisis. Yet the economic damage extends beyond the cyclical downturn.

Trade fragmentation intensifies while geopolitical tensions remain elevated. Governments respond to the economic downturn with more interventionism, industrial policy and protectionism. Plagued by frequent negative supply shocks and the weaponization of chokepoints, the global economy increasingly tilts from efficiency toward building resilience, but without generating sufficient productivity gains to offset the associated costs. Supply chains become less efficient, investment becomes more politicized and capital allocation deteriorates.

In this environment, fiscal sustainability increasingly becomes a market concern. The unwillingness of Congress to address years of persistent deficits, together with rising debt servicing costs and a decline in foreign demand for Treasuries, forces the US government to issue debt into a less accommodating market. Higher term premiums push long-term yields materially above policy rates, tightening financial conditions even as growth deteriorates.

What begins as a deflationary overcapacity story gradually morphs into a more troubling stagflationary environment. Inflation remains structurally elevated because security continues to trump efficiency, while growth disappoints because the promised gains from AI fail to arrive. In this scenario, the Great Rewiring becomes an era of institutional erosion in which the global economy loses connectivity faster than it gains adaptability. Sticky US inflation, driven by fiscal dominance and increasingly politicized investment, sees the bond vigilantes pushing US 10Y yields toward 6%. ●

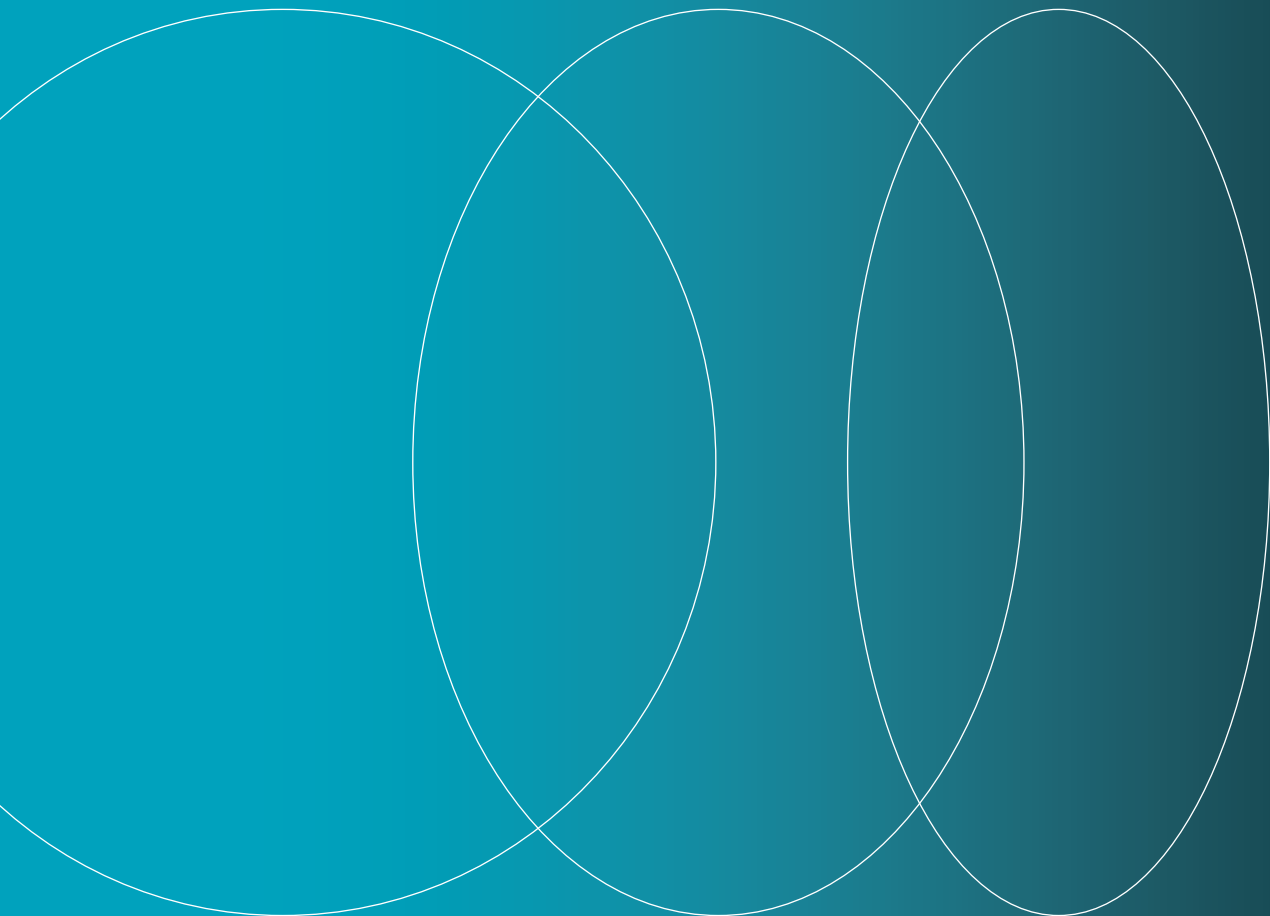
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EXPECTED RETURNS 2027-2031

3. Climate

The global climate continues to warm, while the political atmosphere for curbing carbon emissions appears to be cooling, at least in certain parts of the world. The policies or expectations of future climate policies may impact the value of companies today.

We analyze the extent to which physical climate risks are expected to affect asset classes, and whether transition risks are priced across asset classes. These analyses depend on high-quality data on direct and indirect carbon emissions, as well as a critical assessment of the credibility of companies' stated transition pathways.



3.1 Developments in transition risk

3.1.1 The US keeps backtracking

The Sabin Center for Climate Change Law of Columbia University closely monitors the backtracking of US climate policies under the Trump administration with a detailed online database.¹ Even though some of these policies could be seen as merely symbolic, others materially reduce the price of emissions, or reduce the financial support to encourage development of sustainable energy sources. For example, on 12 February 2026 the Environmental Protection Agency repealed federal greenhouse gas standards for vehicles, while on 12 May 2025 it revoked the Waste Emissions Charge for excess methane emissions in the oil and gas sector.

Beginning in 2026, the Trump administration entered into agreements under which certain developers of offshore wind projects, such as TotalEnergies², received reimbursement of lease investments or fees in exchange for terminating offshore wind leases and redirecting investment toward other energy projects, including fossil-fuel infrastructure. During Trump's second term, the backtracking policies are much more aggressive and impactful than during his first term.

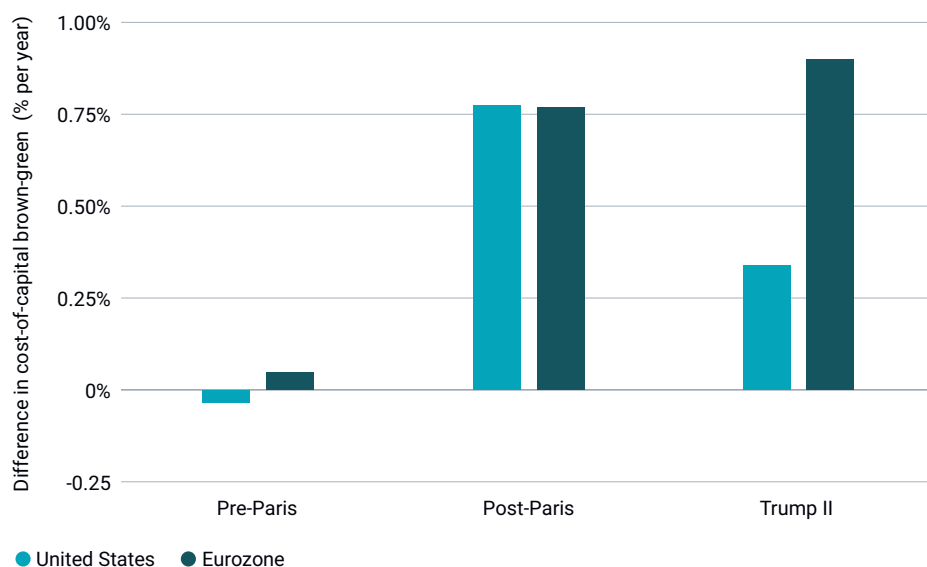
Do these climate backtracking policies affect financial markets? In order to examine this, we calculated the cost of equity for all investable firms listed in the US and the eurozone.³ A higher cost of equity capital is disadvantageous for companies, as it becomes more expensive to finance their business. We divide the companies in each sector into three groups of high ('brown'), medium, and low ('green') carbon emissions. Figure 3.1 contains the average cost-of-equity difference for brown and green companies over three periods: pre-Paris Agreement (January 2010 to December 2015), post-Paris Agreement (January 2016 to October 2024), and after the election that led to Trump's second term ('Trump II') (November 2024 to March 2026).

During the first period, the difference is close to zero, indicating that it does not matter whether a company emits very little or a lot of carbon for its cost of equity. After the Paris Agreement, when climate policies were introduced in both the US and the eurozone, the cost of equity for brown companies increased relative to green companies by about 0.75%, again both in the US and eurozone alike. However, since Trump was elected for the second time, and his climate policy backtracking intensified, the difference in cost of equity for US companies has more than halved. The EU has not weakened its climate ambitions during this period, and the cost of equity of brown companies remains elevated around 0.75%. These results indicate that climate policies impact the pricing of financial assets immediately.

1. <https://climate.law.columbia.edu/content/climate-backtracker>

2. The company shown here is for illustrative purposes only. No inference can be made on the future development of the company. This is not a buy, sell, or hold recommendation.

3. Balvers, Du and Zhao (2016) create a temperature shock factor, and since companies with higher climate change risk exposure load more on this factor, this increases their total cost of capital. We calculate the cost-of-equity capital directly, without explicitly modeling a temperature shock factor.

Figure 3.1: The difference in cost of equity for brown and green companies

Source: Pietersma, et al. (2026), Robeco. Sector-neutral tertile portfolio sorted by Scope 1 and 2 carbon intensities for companies in the US and eurozone. The stock universe is the MSCI World Investable Market Index. The cost-of-equity estimates are an average of several academically established methodologies. Pre-Paris refers to the period January 2010 to December 2015, Post-Paris January 2016 to October 2024, and Trump II November 2024 to March 2026.

Notably, stock returns depend on changes in the cost of equity and (the expectations of) corporate earnings growth. Markwat, Hanauer, and Swinkels (2026) suggest that green stocks have had unexpectedly high earnings growth, which has meant that they have kept outperforming brown stocks despite a lower cost of equity.

3.1.2 The European Carbon Border Adjustment Mechanism

By introducing relatively ambitious carbon pricing within the EU, critics have feared that carbon-intensive production has moved outside the EU and later imported by the EU. The climate effect does not depend on where the emissions occur. So, if carbon pricing in one area merely relocates production rather than reducing emissions, this is clearly not a real-world improvement. Most theoretical economic models lead to substantial carbon leakage following the introduction of carbon pricing, but the empirical evidence on this happening is much weaker. Overviews of carbon leakage from different emissions trading schemes by Cameron and Baudry (2023) and Chen, Di Gregorio, and Paavola (2026) show that some carbon leakage exists, but that the magnitude depends on the local situation and the mitigation measures (such as the free allocation of emission certificates) taken within each system.

The idea behind the European Carbon Border Adjustment Mechanism (CBAM) is to create a level playing field by adjusting for the lack of carbon pricing in countries that export into the EU by charging an import tax equivalent to the EU carbon price. As of January 2026, importers must buy carbon pricing certificates for embedded unpriced emissions. The carbon price that importers must pay depends on the auction prices of the EU Emissions Trading System (ETS). For the first and second quarters in 2026 the prices are EUR 75.36 and EUR 75.28 per certificate, respectively. There are early signs that CBAM is already affecting the trade of steel between the EU and India.⁴

4. See Vrız, Cojoianu, Fischer, and Taschini (2026).

This development has led several other countries, for example Australia, Canada, China, and Türkiye, to accelerate their local carbon pricing policies, which some see as the

most important real-world effect of the CBAM.⁵ Several developing countries have protested against the introduction of CBAM at the World Trade Organization, as they see it as a form of protectionism. But there have also been protests from within the EU, as the administrative burden can be costly, limiting trade, and therefore increasing consumer prices beyond the carbon pricing itself. At this moment, it seems more likely that the CBAM will be enhanced to reduce the administrative burden than that it will be revoked.

5. See Mehling, Dolphin, and Ritz (2025).

For expected returns, the key question is not whether carbon prices and the CBAM exist, but whether future policy tightening or loosening will move realized carbon costs differently from what current valuations already imply for affected sectors.

3.2 The price of carbon emissions across the world

Several regions have introduced prices for carbon emissions over the past years. According to the carbon pricing dashboard of the World Bank,⁶ in the spring of 2026, ETS cover about 25% of global emissions, and carbon taxes another 4%, which is another way of saying more than 70% of global carbon emissions do not carry a price at all. Research warns that the global price of all carbon emissions needs to increase to USD 100 for externalities to be priced in 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.

6. <https://carbonpricingdashboard.worldbank.org/>

There have been some noteworthy developments in this regard in the past year. First, the price of the EU ETS, which is the largest scheme worldwide, has remained high despite substantial political pressure in the aftermath of the US attacks on Iran, which sent energy prices spiking due to supply chain disruptions. While 10 EU governments called for a thorough review of the EU ETS, in February Italy went a step further and called for the suspension of ETS altogether until the review was concluded. However, another group of countries strongly opposed such suspension to keep the EU energy transition going instead of reversing it. During the discussion, the price of the EU ETS went down to EUR 70 in February, but went up again to EUR 80 in May.

Second, the plans to merge the UK ETS with the EU ETS led to a convergence in price toward the end of 2025 with only 10% difference, but negotiations did not go smoothly in early 2026. The price of the UK ETS dropped substantially compared to its EU counterpart, trading 35% lower. Since then, the difference has reduced to less than 20%. The UK carbon price is lower due to the relatively fast decarbonization that reduced the demand for carbon allowances.

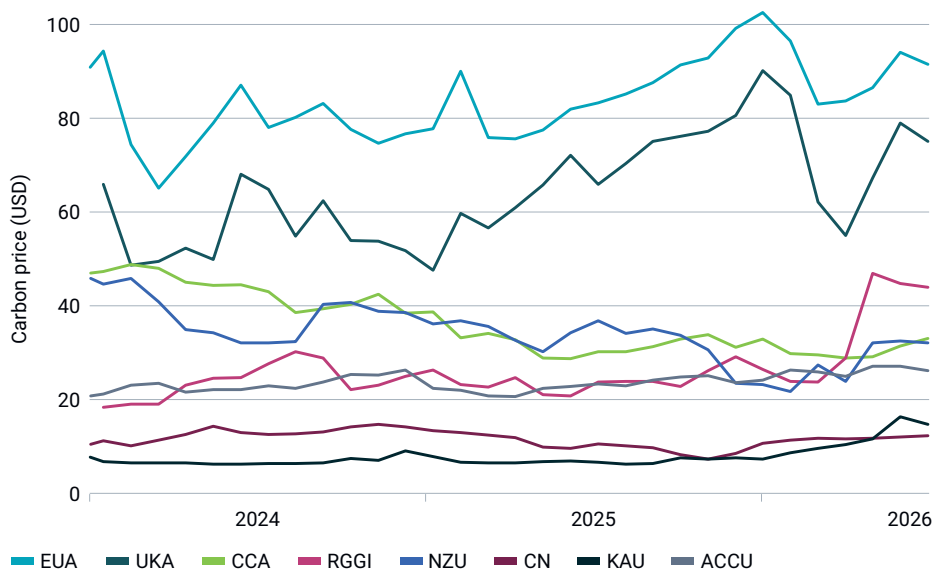
Third, the two main ETS in the US show very different price directions. The Californian Carbon Allowance (CCA) prices have hovered around USD 30 over the past year, down from USD 48 at the start of 2024. The Regional Greenhouse Gas Initiative (RGGI) that covers the US Northeast has seen a sharp increase in carbon price, from USD 25 last year to over USD 45 in the spring of 2026. The difference between the two systems is that there seems to be an oversupply of allowances in CCA, while there is a supply shortage for RGGI, which was feared to increase further with Virginia rejoining the system.

Finally, carbon prices in New Zealand (NZU) and Australia (ACCU) have been relatively stable around USD 25-30 over the past year. Chinese carbon allowance prices crept up from USD 10 to USD 12, while there was a substantial increase from a low level in Korean carbon allowances, from USD 6 a year ago to USD 14 at the end of June 2026.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

In summary, even though the necessity of carbon pricing keeps being challenged in political arenas in times of higher energy prices, the observed market prices show that participants believe that ETS are here to stay. Additionally, geopolitical risks have forced countries to focus on energy security (see also our Special Topic on Energy Security on page 54). While for some countries this may mean continuing to use dirty energy, for other countries this is a catalyst to expand sustainable energy capacity.

Figure 3.2: Carbon allowance price developments across regions



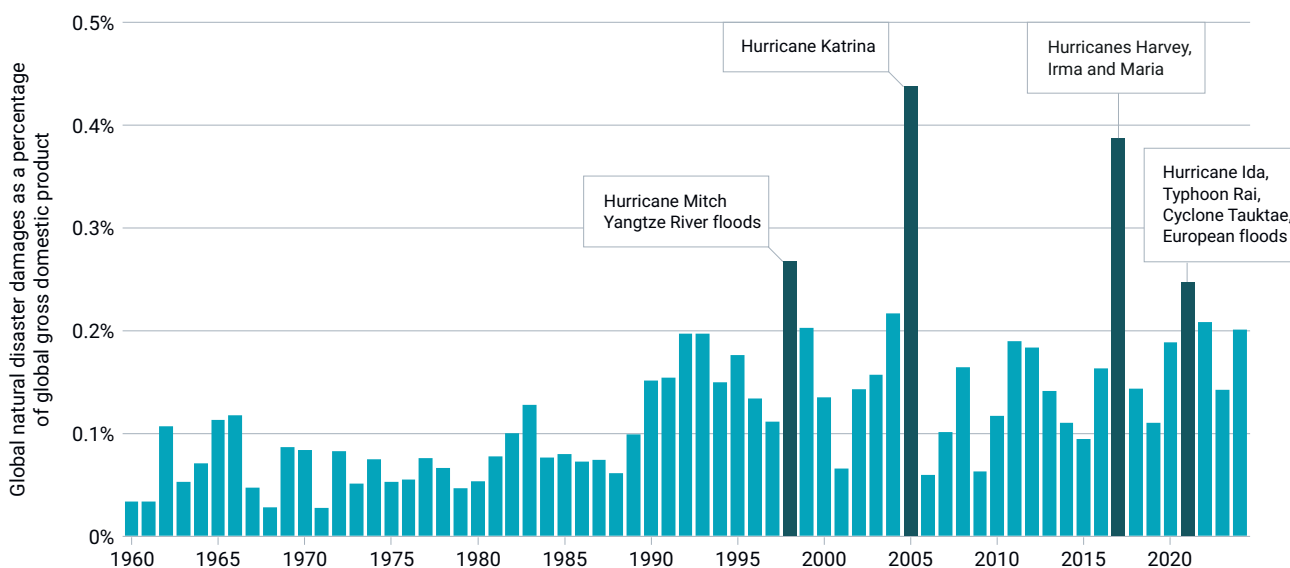
Source: Bloomberg, Robeco, July 2026. Futures prices for European (EUA), United Kingdom (UKA), California (CCA), Northeast US (RGGI), New Zealand (NZU), China (CN), Korea (KAU), and Australia (ACCU). For comparability across regions, the prices are converted to USD, meaning some prices can be more volatile because of exchange rate movements during the sample period. For asset pricing, the relevant variable is not only the carbon price level itself, but expected changes in carbon-price paths relative to what is already embedded in valuations. For a deeper analysis on the liquidity of carbon derivatives markets, see Swinkels and Yang (2023).

3.3 Physical climate risk

3.3.1 Near-term physical climate risk

Climate transition risk deals with the preparedness of issuers to deal with the introduction or repeal of climate change policies such as carbon taxes. Physical climate risk arises directly from damages that climate hazards cause to society, and policy choices affect its severity only over very long horizons. Figure 3.3 shows the total global economic damages from natural disasters, expressed as a percentage of global GDP, that could be related to climate change over the period 1960-2025.⁷ Although there is a noticeable increase in weather-related economic damages from roughly 0.1% of GDP during 1960-1990 to around 0.2% during 1990-2025, there is no clear upward trend within the post-1990 period itself. This lack of a persistent trend makes it difficult to reliably extrapolate physical climate-related damages far into the future. Importantly, these figures capture only the direct economic losses associated with extreme weather events and natural disasters.

7. These statistics include hurricanes and tornados that also existed before human-induced climate change, so attributing all these damages to climate change is an overestimation. However, there is evidence that climate change may increase the frequency and severity of hurricanes and tornados (see, e.g., Forbis et al., 2024).

Figure 3.3: Damages from weather-related natural disasters

Source: Neal and Swinkels (2026), Robeco, Our World in Data. Retrieved June 2026.

These damages from natural disasters do not account for broader impacts on economic growth arising from climate-induced reductions in productivity, which could be orders of magnitude larger than the direct physical damages themselves, but are also much more difficult to estimate.

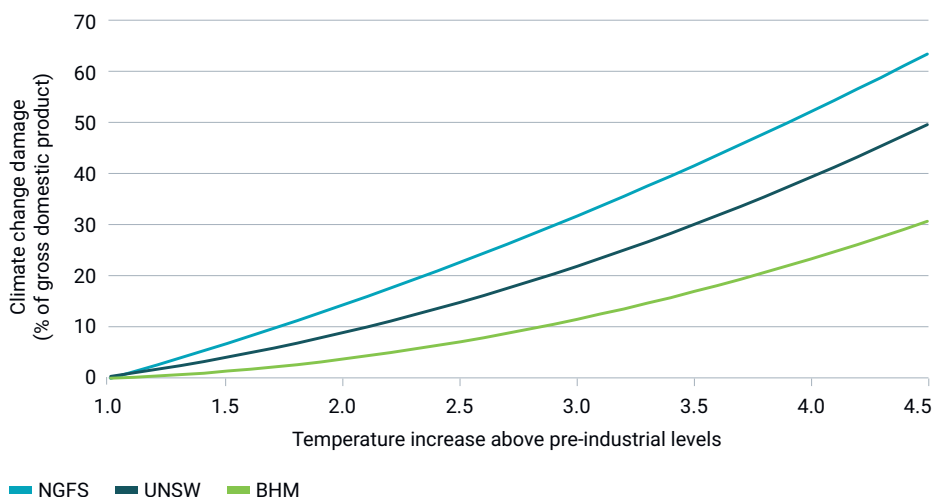
3.3.2 Long-term physical climate risk

Near-term climate policies should prevent large economic losses in the distant future. This is important, because the higher the expected cost of future physical climate risk, the more beneficial it is to curb carbon emissions with stringent carbon policies today. Assessments that assume lower physical damages imply a weaker near-term economic case for stringent mitigation policies. Investing in climate adaptation becomes a necessity when temperatures keep increasing as a result of weak transition policies.

Penn (2025) examines a range of climate damage functions and demonstrates that extrapolating over long horizons can yield vastly different estimates of economic losses, even when they are calibrated using the same historical data. Keen (2021) and Keen and Hanley (2023) argue that mainstream economic assessments substantially underestimate the damages associated with climate change because they rely on empirically weak relationships derived from temperature differences across countries and fail to account adequately for the possibility of global tipping points. By contrast, Bilal and Känzig (2026) combine across-country and time-series variations in climate data and conclude that global warming may have much larger economic consequences than previously estimated. Their results suggest that global GDP per capita would be more than 20% higher today had temperatures not increased between 1960 and 2019. The magnitude of these estimated effects remains controversial.

The most prominent models to estimate climate damages are those used by the Network for Greening the Financial System (NGFS) based on research by Kotz, Levermann, and Wenz (2025),⁸ or the empirical model by Burke, Hsiang, and Miguel (2015), and the cascade model by Neal, Newell, and Pitman (2025), which zooms in on expected climate damages of global temperature rises as high as 4 °C. We translate these three models into temperature-to-GDP-loss outcomes. These functions should be interpreted for illustrative purposes only, and not as reproductions of the original models.

8. Kotz, Levermann, and Wenz (2025) is a revised (working paper) version of a retracted paper that they published in Nature in 2024. While the median damages are hardly affected in the revised version, the confidence bounds are substantially wider. This reduces the probability that taking climate action now is cheaper than not acting on climate change from 99% to 90%, still well above 50%.

Figure 3.4: Estimates of physical climate risk damages in 2100

Source: Neal and Swinkels (2026), Robeco. Chart created in July 2026.

Direct damages displayed in Figure 3.3 are about 0.25% of GDP, which we take as a baseline for the 1 °C temperature increase above pre-industrial levels that we see today. Figure 3.4 shows that the estimated damages from physical risk, including sustained lower productivity, can reach 60% of GDP in the NGFS model, 50% in the UNSW model, and 30% in the BHM model in 2100. Evaluating the economic benefits of preventing physical climate damages over the coming five years does not lead to substantial differences between green and brown scenarios. These differences become material only in scenarios extending beyond 2050, when temperatures have increased further.

This horizon effect is important to keep in mind for our five-year outlook. The risk to asset prices from carbon transition risk is likely much larger than that of physical climate damages on such a horizon.

3.4 The impact of climate change on asset classes

3.4.1 Government bonds

We expect that economic growth will be 25 bps per year lower than it would have been without climate change. This is slightly below the NGFS Phase V estimates for global growth in a baseline scenario with current policies, which is about a 50 bps per year difference, but close to their estimate for the net-zero scenario. This estimate is still uncertain and varies considerably across regions.

In the long run, government bond yields tend to be lower when economic growth is lower, so this lower growth argument has a negative effect. However, nominal bond yields tend to be higher when inflation risk is higher, as nominal bondholders want to be compensated for the risk they take. Volatile energy prices in combination with high indebtedness make inflation management by central banks more difficult in the coming years and could lead to higher inflation risk premiums, which would have a positive effect on government bond yields and may counteract the negative effect from lower real economic growth.

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 (weakly)

positive relationship between climate change risk and government bond yields and credit ratings; see Beirne, Renzhi and Volz (2021), Boehm (2022), and Cappiello et al. (2026).

Over the next five years, we expect that physical climate risks will be at least as high as the 0.25% of GDP that has been realized over the past decade, but of course it is difficult to predict the timing or location of the next devastating global natural disaster. As we are primarily interested in comparing our base currencies, and the developed and emerging government bond asset classes, we can calculate the ex-ante vulnerability and readiness of governments to deal with climate change. Below in Table 3.1, we take data from the Notre Dame Global Adaptation Initiative (ND-GAIN) and compare it with the Robeco Climate & Energy sub-scores from the Robeco Country ESG Framework.

Table 3.1: Climate vulnerability and government readiness

	ND-GAIN		Robeco	
	Vulnerability	Readiness	Score	Climate and energy
Germany	0.301	0.682	69.01	6.93
US	0.312	0.647	66.76	4.18
Japan	0.369	0.685	65.81	5.77
UK	0.288	0.681	69.66	6.98
Developed	0.321	0.651	66.53	5.16
Emerging LC	0.389	0.446	52.87	5.20
Emerging HC	0.404	0.416	50.62	5.12

Source: Robeco, Barclays, Bloomberg, JP Morgan, Notre Dame Global Adaptation Initiative. The ND-GAIN Score weights Readiness positively, and Vulnerability negatively. The ND-GAIN Score ranges from 0-100, where a higher score means less climate change risk. Robeco Climate and Energy is a sub-score of the Robeco Country ESG Framework (as of April 2026). Scores ranging from 0-10, where a higher score is better. Developed is Bloomberg G7 Treasury index. Emerging Local Currency is the JP Morgan Global Bond Index Emerging Markets Diversified. Emerging Hard Currency is the JP Morgan Emerging Markets Bond Index Global Diversified. Index weights from 30 June 2026.

For the four largest markets, and consequently the developed government bond market, the climate vulnerability is low (0.321), while the readiness is high (0.651), leading to a good overall score of 66.53. The Robeco Climate & Energy score is relatively low for developed markets (5.16), mainly because of the low score of the US (4.18). This in turn is largely due to the continued reliance of the US on fossil fuels and its high carbon emissions.

For emerging markets debt, both local- and hard-currency, vulnerability is substantially higher than for developed markets (0.389 and 0.404, respectively), while readiness is lower (0.446 and 0.416, respectively), leading to scores around 50. The similarity of these scores is to some extent unexpected, as the local- and hard-currency government debt markets' issuer composition is very different.⁹ The differences between the Robeco Climate & Energy scores for emerging markets compared to developed markets are tiny.

9. See Giesta and Swinkels (2025)

Overall, these indicators suggest that from a climate risk perspective, emerging markets are more exposed and less prepared than developed markets, which leads to a negative adjustment in expected returns for emerging market debt.

3.4.2 Corporate credits

We collect several climate change risk measures, and a biodiversity footprint measure, for investment grade and high yield bonds. Markwat and Swinkels (2024) contains an overview of the carbon data quality for corporate bond and equity markets.

Table 3.2: Climate change risk metrics for corporate bonds

Sector	Index weights (%)		Carbon footprint		Climate Value at Risk		Climate Traffic Light		Biodiversity Traffic Light	
	IG	HY	IG	HY	IG	HY	IG	HY	IG	HY
Banking	25.4	2.2	2	4	-2.6	-5.4	1.84	1.46	1.90	1.58
Basic industry	2.6	7.5	493	665	-52.7	-62.1	1.42	0.82	0.74	0.54
Brokerage etc.	1.5	1.1	5	17	-1.6	-18.1	0.94	0.63	1.43	1.08
Capital goods	4.8	9.0	157	214	-10.6	-17.1	1.56	0.85	1.17	0.99
Communications	6.8	15.7	22	30	-11.3	-14.2	2.18	1.26	1.80	1.24
Consumer cyclical	8.1	17.9	112	152	-18.0	-35.2	1.65	0.98	1.09	1.13
Consumer non-cyclical	13.3	11.6	123	201	-16.8	-24.8	2.10	1.23	1.03	0.72
Electric	7.8	3.8	327	409	-12.8	-5.9	1.38	1.33	0.76	0.89
Energy	5.9	9.5	318	293	-67.1	-64.1	0.79	0.41	0.55	0.43
Finance companies	1.2	3.1	9	10	-6.8	-2.7	1.04	0.88	1.00	1.03
Financial other	1.4	3.2	16	32	-6.7	-5.9	0.58	0.96	0.46	0.65
Industrial other	0.7	1.4	98	125	-19.3	-1.2	1.12	0.84	1.22	0.87
Insurance	6.2	3.0	20	28	-8.9	-49.7	1.65	1.01	1.38	1.01
Natural gas	1.3	0.1	194	200	-2.8	-22.6	1.54	1.61	0.86	0.70
REITs	2.6	1.6	7	18	-8.3	-16.2	1.27	0.62	0.57	0.47
Technology	7.2	7.4	23	32	-2.9	-5.9	2.56	1.14	1.77	0.92
Transportation	2.7	3.2	183	633	-32.7	-64.5	1.14	0.83	0.39	0.44
Utility other	0.6	0.7	107	149	-9.0	-6.0	1.95	1.24	1.81	1.03
Total	100.0	100.0	104	192	-14.1	-26.9	1.72	0.99	1.30	0.91

Source: Robeco, LSEG Datastream, MSCI, Trucost, MSCI ESG Research. The data was obtained in July 2026. Certain information ©2026 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. The scores for the Robeco Climate Traffic Light and the Robeco Biodiversity Traffic Light are market-weighted averages of scores 0 (misaligned), 1 (partially aligning), 2 (aligning) and 3 (aligned).

Table 3.2 shows the various risk measures at the market index level and for each sector.¹⁰ The two corporate bond asset classes that we distinguish in this report are the investment grade and high yield market in the top row. It is instructive to see how the sectors within these two asset classes differ in terms of climate risk, as well as weight in the index. 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. The investment grade universe has a substantially lower carbon footprint (104 tons of CO2e per USD million invested) than the high yield index (192). However, this measure is purely backward-looking. The climate value at risk measure provides a forward-looking, company value-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 climate value at risk of -14.1% for investment grade compared with -26.9% for high yield.

We also include the Robeco Climate Traffic Light in this overview. Robeco's Climate Traffic Light is a forward-looking assessment of a company's alignment with the goals of the Paris Agreement, taking into consideration the "common but differentiated responsibilities" of different nations. It categorizes companies into four categories: aligned, aligning, partially aligning and misaligned. The assessment is based on a company's emission reduction targets and the credibility of those targets, compared to what is needed by that company to achieve global warming of well below 2 °C by 2100.

10. 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 (2026).

Table 3.2 shows that the investment grade market has a considerably higher score (1.72) than the high yield market (0.99). At the sector level, there are differences between climate risk measures. For example, the investment grade basic industry has a high current carbon footprint (493) and a high climate value at risk (-52.7), but its traffic light looks relatively good (1.42). Overall, the traffic light confirms what we saw for the carbon footprint and climate value at risk: high yield bonds have greater exposure to climate risk than investment grade corporate bonds.

We also include the Robeco Biodiversity Traffic Light in Table 3.2. This traffic light is a practical, forward-looking metric for companies based on their current nature performance and their future plans. This helps investors identify companies that are leading the transition to a more nature-positive economy and those that need to improve their practices. Table 3.2 shows that there is some overlap with the climate traffic light, as companies in the energy sector score poorly on both, whereas companies in the communications sector score well on both. However, the correlation is far from perfect, as is evidenced by the consumer non-cyclical sector, which scores relatively well on the Climate Traffic Light, but not on the Biodiversity Traffic Light.

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. In conclusion, investment grade corporate bonds have little exposure to climate transition risk, while high yield corporate bonds are substantially exposed to transition risks.

3.4.3 Equities

Equity investors also need to consider how climate change will affect companies' cash flows and capital costs in their net present value assessment.

Table 3.3: Climate change risk metrics for equities

	Index weights (%)		Carbon footprint		Climate Value at Risk		Climate Traffic Light		Biodiversity Traffic Light	
Sector	DM	EM	DM	EM	DM	EM	DM	EM	DM	EM
Communication services	8.1	6.0	11	28	-4.4	-9.3	2.61	1.70	2.03	2.41
Consumer discretionary	9.0	7.3	51	131	-7.1	-19.9	1.33	1.86	1.33	0.89
Consumer staples	5.1	2.7	130	221	-23.3	-36.0	1.45	1.95	1.14	0.65
Energy	3.6	3.1	407	669	-71.0	-88.3	0.48	0.71	0.45	0.37
Financials	16.0	18.7	9	8	-3.5	-7.8	1.74	1.21	1.68	1.38
Health care	9.2	2.4	27	32	-7.8	-8.9	2.78	1.02	1.38	0.67
Industrials	11.5	6.8	90	172	-3.9	-15.7	1.49	1.36	1.03	0.99
Information technology	29.8	44.6	20	99	-1.1	-3.7	2.40	1.69	1.62	1.88
Materials	3.3	5.5	351	1001	-35.9	-48.8	1.84	1.17	1.02	0.72
Real estate	1.7	1.0	11	43	-7.1	-19.2	1.57	0.54	0.78	0.49
Utilities	2.6	1.9	336	1203	-13.7	-62.2	1.95	1.36	1.29	0.79
Total	100.0	100.0	68	174	-8.5	-14.2	1.98	1.50	1.44	1.48

Source: Robeco, LSEG Datastream, MSCI, Trucost, MSCI ESG Research, Clarity AI. DM refers to developed markets and EM to emerging markets. The data was obtained in June 2026. Certain information ©2026 MSCI ESG Research LLC. Reproduced with permission. See Table 3.2 for more information on the climate change risk measures.

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 68, compared to 104 for investment grade corporate bonds. The climate value at risk is -8.5%, also lower than that of investment grade corporate bonds (-14.1%). The three equity sectors with the worst footprints and highest climate value at risk in developed markets are utilities, energy, and materials.

Table 3.3 shows that climate risk metrics are generally worse for emerging markets than for developed markets. The carbon footprint of emerging markets equities is 174, about 2.6 times higher than the 68 for developed markets. Emerging equities' climate value at risk (-14.2%) is higher than that for developed markets (-8.5%). This is not only due to differences in the sector composition of developed and emerging markets, as also within most sectors emerging markets show higher climate change risk. For example, the carbon footprint of utilities in developed markets is 336, while this is 1,203 for emerging markets.

Even though the Robeco Climate Traffic Light recognizes that emerging markets have more time to decarbonize their economies than developed markets in the Paris Agreement, the average score is lower for emerging markets (1.50 versus 1.98). The Robeco Biodiversity Traffic Light indicates that these risks are about the same for developed and emerging markets (1.44 and 1.48).

Despite the fact that the carbon footprint for developed markets equities is lower than that of investment grade credits, we expect the impact of climate transition risks to be higher for equity markets. Equities are the first assets to suffer when (climate) risks materialize and therefore are more negatively exposed to transition risk. Since most metrics suggest that emerging markets equities are more vulnerable to climate change risk than developed markets, we deem the climate change risk for emerging equity markets higher relative to developed equity markets. In turn, climate risk exposure of developed market equities is higher than that of investment grade corporate bonds.

3.4.4 Real estate

The carbon footprint of real estate is relatively low, as we can see in Table 3.3.¹¹ However, the exact location of real estate properties may be a better measure to evaluate the climate change risk exposure than carbon footprints, despite limited research on the impact of climate change on real estate. 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.¹²

Overall, physical climate risks can be high for real estate due to extreme weather events,¹³ as many valuable properties are located in areas threatened by climate change.¹⁴ Moreover, Zhu and Fuerst (2026) find that climate risk is priced for the listed real estate companies in the US. Thompson et al. (2026) find that in England, prices of flood-affected houses are lower and these properties are less frequently sold.

Although carbon emissions are markedly lower for real estate, the adaptation and insurance costs for specific locations closer to future physical climate risks suggest to us that climate change risks are similar to developed equity markets.

11. Note that this only includes Scope 1, 2, and 3 upstream emissions, and Scope 3 downstream emissions are not included as they are notoriously difficult to measure.

12. See Clayton et al., (2021).

13. See Robinson and Zheng (2026).

14. For an example of flood risk estimation for different areas within Shanghai, see Tu et al. (2023).

3.4.5 Commodities

The climate change risk for commodities depends on the type of commodities that we consider. Agricultural commodities are likely to suffer directly from physical climate risks such as floods and droughts, which we think will rise in the future. On top of that, there may be biodiversity risks in the agricultural sector that may also affect agricultural prices.

For precious metals, direct physical and transition climate risks are likely low, as their value depends mainly on financial system crisis and currency debasement risks. Both risks may increase under extreme climate scenarios, but this would be an indirect effect. There could also be some transition risk from the mining sector as an additional indirect negative effect.

For energy commodities, climate change seems to be a double-edged sword. On the one hand, demand for commodities is likely to decrease as long-run global economic activity slows by 25 bps per year. On the other hand, the supply of certain energy commodities may be lower due to corporate decarbonization policies with fewer investments in fossil fuel extraction by conventional energy companies. Equinor (2026) estimates that global carbon emissions will go down by 2050 to between 15 and 30 gigatons per year for their four future scenarios, down from 35 gigatons today, but far away from a zero-carbon future. The way in which these carbon emissions reductions take place, in combination with energy security and geopolitical risks, will determine whether climate risk will increase or decrease energy commodity prices.

If progress is made toward the Paris Agreement and the green energy transition, the short-run commodity intensity – especially industrial metals – of economic activity could increase. This is because the transition increases demand for the industrial and rare-earth metals used in wind turbines, solar panels and batteries.¹⁵ This rise implies that a greener economy could, at least in the medium term, be beneficial to industrial metal prices. We realize that short-run demand and supply shocks may create excessive volatility in these transition commodities.

15. For a review article on innovation and commodity inputs in batteries, see Hasan et al. (2025).

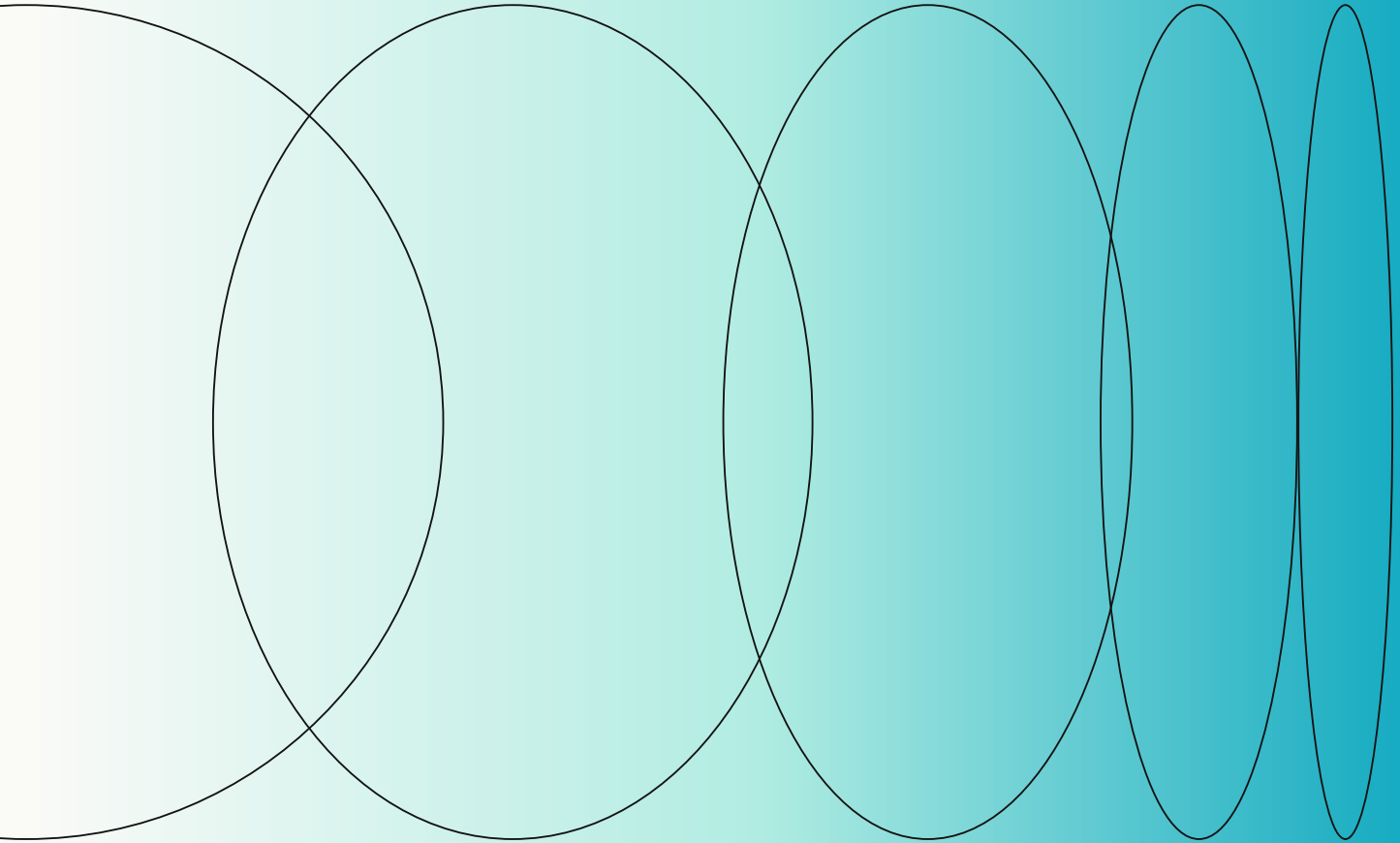
3.5 Summary

In conclusion, the US keeps on backtracking on its policies supporting the energy transition. While this mood does not yet seem to spill over to Europe or emerging markets, there is a considerable risk that it will delay the introduction of new ambitious climate change policies there as well. Even the successful European ETS and recently introduced CBAM have become a topic of discussion in European trade politics. If the richest and most carbon-intensive economy is not taking up its leadership role when it comes to combating climate change, others may also prioritize short-term economic or political gains over long-term partial global coordination.

Given the US backtracking and consequential political uncertainty on global climate policies, we conjecture that current valuations already reflect expected policies, while policy uncertainty prevents a directional adjustment for expected returns at the broad asset-class level for the coming five years. Since we expect physical climate risks to be at least as high as they have been in the recent past, and financial markets do not fully incorporate this, we expect emerging markets debt expected returns to be negatively affected by 25 bps over the coming five years. ●

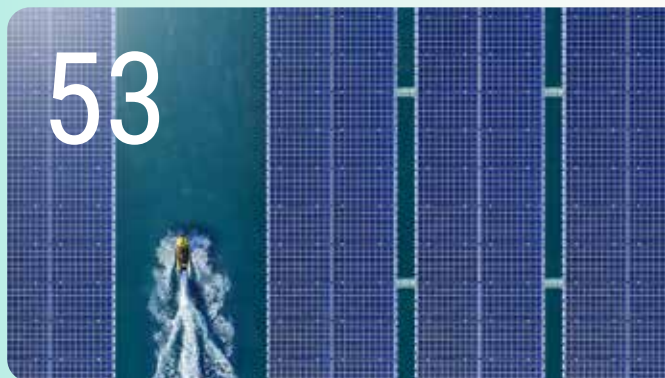
Special topics

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



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Chokepoints and energy security 2.0



Energy security has returned to the center of the macroeconomic and investment debate, but its meaning has evolved significantly. Historically, the concept focused primarily on securing sufficient oil and gas supply at affordable prices. Today, modern economies depend not only on fuels, but also on resilient electricity systems, transmission networks, semiconductors, storage infrastructure, critical minerals and reliable global trade routes. In an increasingly fragmented geopolitical environment, energy security is therefore no longer simply about access to energy; it increasingly concerns the ability of economies to function during periods of disruption.

This evolution reflects what we describe as Energy Security 2.0: the transition from a just-in-time globalized system toward a more resilient just-in-case model. Governments and corporations are increasingly prioritizing strategic reserves, backup capacity, diversification and strategic autonomy over pure efficiency optimization. For investors, this shift matters because resilience is becoming an increasingly important driver of capital expenditure, earnings visibility and long-term returns.

From efficiency to resilience

Recent geopolitical shocks have accelerated this transition. Europe's energy crisis following the loss of Russian gas supply exposed the macroeconomic costs of concentrated dependencies. More recently, tensions in the Middle East and disruptions around the Strait of Hormuz have highlighted the vulnerability of global shipping lanes and energy chokepoints. Even limited disruptions can generate disproportionate effects on freight costs, insurance premiums and inflation expectations.

At the same time, the rise of artificial intelligence (AI), industrial reshoring and electrification is materially increasing demand for dependable power systems. AI data centers and electrified industrial systems are creating a new phase of capital intensity across grids, storage, generation and energy infrastructure. As Morgan Stanley notes, there is increasingly "no AI without energy security."¹ The result is a structural repricing of resilience, redundancy and dependable energy systems after decades in which efficiency dominated corporate and policy decision-making.

1. [Asia's Race to Power AI](#), Morgan Stanley, 9 June 2026

Figure 1: The structural shift from efficiency to resilience

Transition force From efficiency to resilience	Expected impact on asset returns – Next five years	Key investment beneficiaries Asset/sector/industry	Robeco view Strategic importance
1  AI-driven power demand and grid modernization Lean grids resilience grids	VERY HIGH  Structural demand + policy + long-duration capex	 Utilities  Grid infrastructure  Power equipment  Engineering & construction	Top priority Central to AI, electrification & energy security
2  Storage & system flexibility No buffer capacity reliable flexibility	VERY HIGH  Enables resilience, renewables and AI demand	 Storage  Pumped hydro & flexibility  Hydrogen & e-fuels  Software & optimization	Very high Critical for reliability & system redundancy
3  Strategic redundancy in energy supply Just-in-time flows just-in-case capacity	HIGH  Reduces vulnerability, raises option value	 LNG infrastructure  Pipelines & connectors  Strategic storage  Maritime & logistics	High De-risks chokepoints & supply connections
4  Critical minerals and resource security Global concentration diversified and secure	MEDIUM-HIGH  Inputs for energy transition and defense	 Mining & refining  Metals & materials  Recycling & recovery  Offtake & partnerships	High Strategic input for energy & industrial security
5  Domestic industrial capacity & reshoring Global efficiency strategic autonomy	MEDIUM  Supports security, jobs, and resilience	 Industrial automation  Semiconductors & electronics  Manufacturing equipment  Defense & dual-use	Medium Supports long- term strategic independence
6  Strategic reserves and stockpiles Minimal buffers strategic buffers	MEDIUM  Insurance value, lower tail risk	 Oil & fuel reserves  Food & fertilizer reserves  Critical goods stockpiles  Emergency infrastructure	Medium Important insurance against severe disruption

Source: McKinsey Global Institute, Morgan Stanley Research, Robeco, June 2026.

Note: The estimated impact reflects our assessment of the potential effect on asset class returns over the next five years.

Power security becomes the new energy security

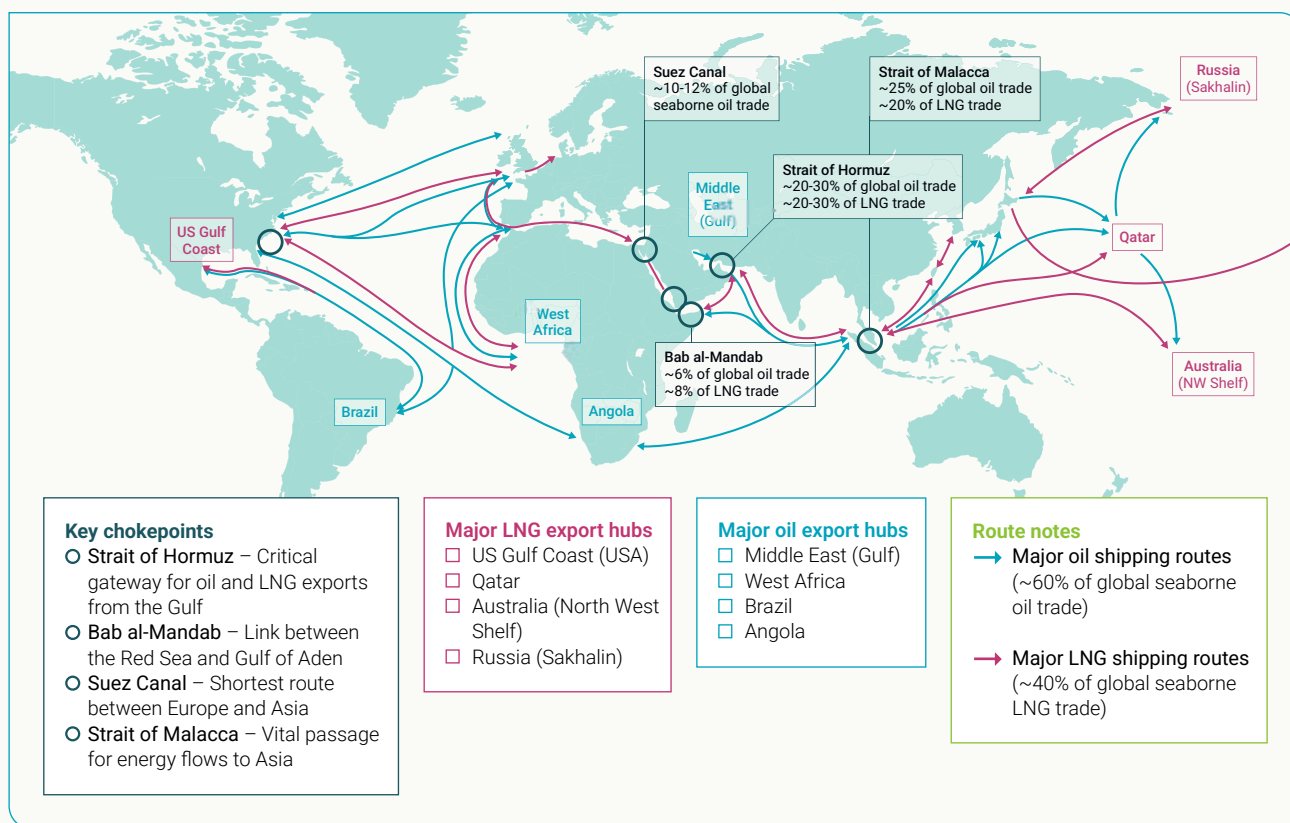
Among the various dimensions of Energy Security 2.0, AI-driven electricity demand and grid modernization appear likely to have the greatest impact on asset returns over the next five years because they combine structural demand growth with strong policy support and long-duration investment requirements.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

This transition carries important implications for expected returns. Resilience is inherently more capital-intensive than efficiency. Strategic reserves, redundant infrastructure, domestic manufacturing and grid reinforcement require substantial investment. As a result, the disinflationary impulse associated with globalization is likely to weaken. In contrast to the pre-pandemic decade, inflation volatility may remain structurally higher, supporting the strategic role of commodities, infrastructure and real assets within diversified portfolios.

Historically, energy markets were characterized by globally integrated trade flows that optimized efficiency and minimized costs. Yet energy insecurity is often experienced locally. The Strait of Hormuz, Bab al-Mandab and the Suez Canal remain critical chokepoints for oil, LNG and broader commodity trade.

Figure 2: Key energy chokepoints and global oil and LNG routes



Source: US Energy Information Administration, IEA, Clarksons Research, Robeco, May 2026

Examples from across the globe

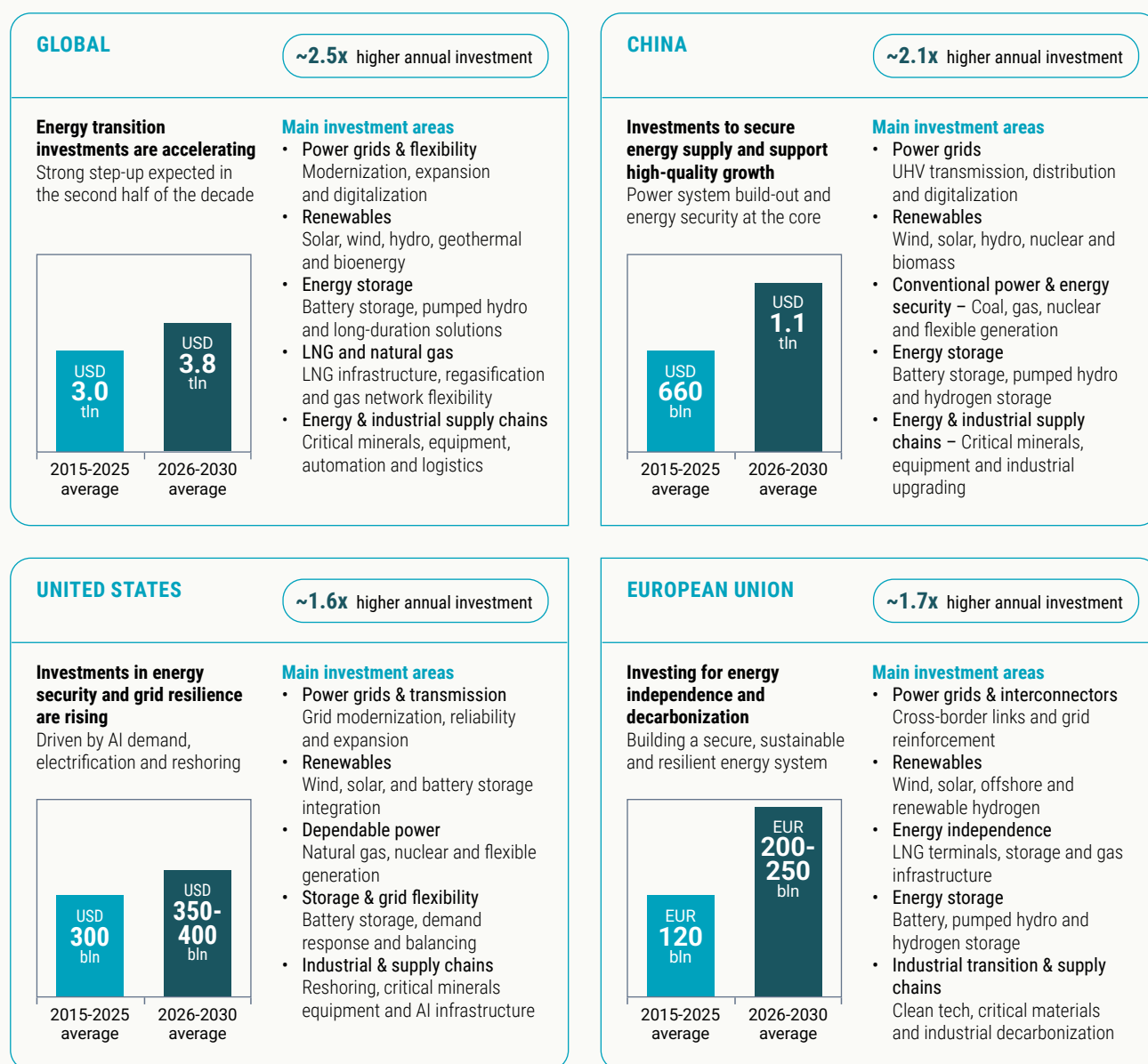
Governments and corporations are increasingly responding through investments in strategic infrastructure. Saudi Arabia's East-West pipeline and the UAE's Fujairah export route illustrate broader efforts to reduce dependency on vulnerable maritime routes. Europe continues to expand LNG import and storage capacity following the loss of Russian pipeline gas. Meanwhile, global economies are increasingly emphasizing energy diversification, domestic supply and strategic reserves.

Morgan Stanley estimates that Asia may require more than USD 5 trillion of energy-related investment through 2030 to strengthen energy security and reduce import dependence.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

The IEA also estimates that global energy investment has surpassed USD 3 trillion annually, while the US and Europe are entering prolonged cycles of grid modernization, storage deployment and power infrastructure investment driven by electrification, AI-related electricity demand and industrial reshoring. Together, these trends point toward a structurally higher infrastructure and industrial capex environment over the coming decade.

Figure 3: Energy investment needed by 2030: Global and regional outlook



Source: IEA (World Energy Investment 2024), BNEF (Energy Investment outlook 2025), S&P, Morgan Stanley Research Estimate, and Robeco research, May 2026.

While these massive investments ultimately increase energy-system resilience and productive capacity, they are unlikely to eliminate geopolitical vulnerabilities within our five-year horizon. Consequently, this structural capex cycle is expected to drive asymmetric returns: supporting robust infrastructure earnings growth while sustaining a structural bid for commodities and real assets as critical inflation hedges within multi-asset portfolios.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

This emerging investment cycle differs fundamentally from the broad-based commodity boom of the 2000s. Rather than maximizing unconstrained supply growth, capital allocation is strictly disciplined by the energy security framework, shareholder capital return policies, and decarbonization mandates. Governments and corporations are assigning a valuation premium to ‘dependable energy’ – systems capable of delivering stable, dispatchable supply during periods of geopolitical friction, cyber disruption, or extreme weather.

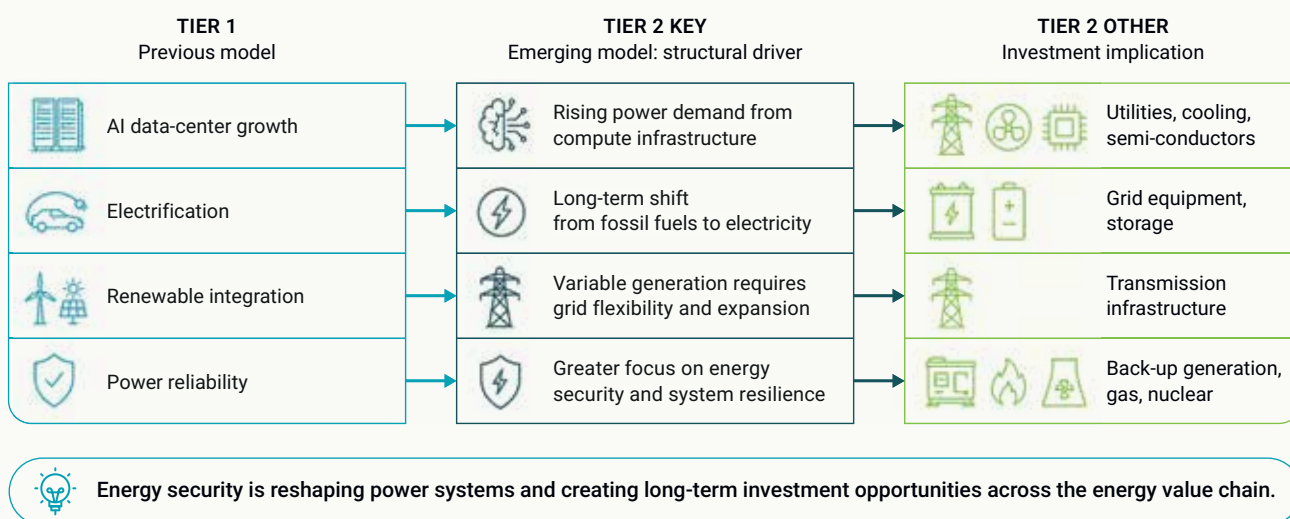
Limited capacity?

This framework transcends the traditional ‘fossil vs. renewable’ binary, positioning natural gas, LNG infrastructure, nuclear power, storage systems, and transmission networks as primary beneficiaries of capital deployment. Because capital expenditure remains highly selective, and because investment in upstream oil and gas and parts of the commodity supply chain has lagged projected demand growth, spare capacity in several key markets remains limited. This increases the probability of supply-driven price shocks. For multi-asset investors, this underwrites a regime of structurally higher commodity volatility, reinforcing the role of real assets as effective portfolio diversifiers.

Furthermore, a tightening affordability-security-sustainability framework is reviving the investment case for nuclear power. As a low-carbon baseload source largely insulated from fuel-import dependencies and maritime chokepoints, nuclear energy is attracting renewed capital allocation across both emerging and developed markets. Alongside expansion programs in China, India and Japan, countries such as France, the UK, the Netherlands, Sweden, Belgium and the US are increasingly positioning nuclear power as a strategic pillar of energy security, industrial competitiveness and decarbonization.

Over the next five years, energy security will increasingly be defined as power security. As transport, heavy industry, and data systems electrify, power shortages transform from localized disruptions into systemic macroeconomic risks. AI serves as the primary structural accelerator of this trend. AI data centers are exceptionally energy-intensive and are emerging as a major new source of electricity demand. Forward-looking institutional estimates indicate that AI-related infrastructure investment could rival or exceed traditional energy investment over the coming years.

Figure 4: AI and electrification are increasing power demand



Source: IEA, Morgan Stanley Research, BloombergNEF, Robeco, June 2026.

Investing in new infrastructure

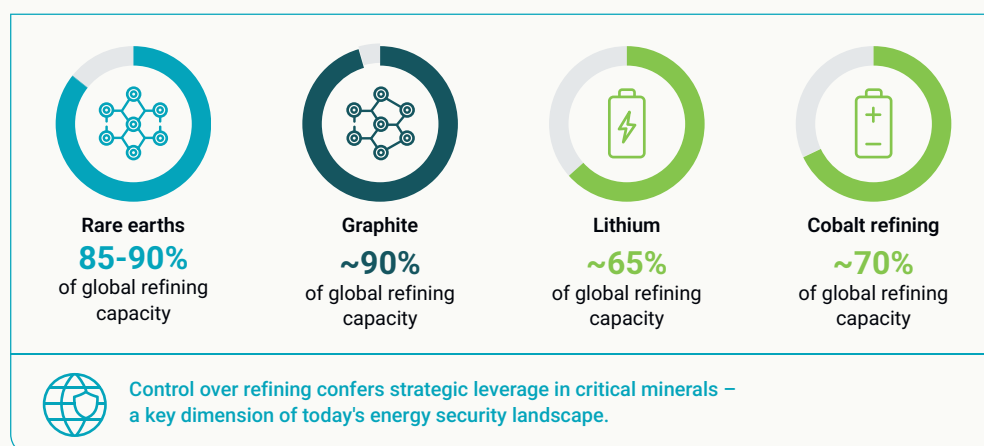
Because intermittent renewable generation alone cannot bridge this compounding demand gap, AI acts as a structural accelerator of power demand. This structural demand deficit cements the long-term cash-flow visibility and return profiles of regulated grids, battery storage, and dispatchable generation. Grid infrastructure, in particular, will benefit from strong political support, higher regulated returns, and robust earnings visibility as utilities race to solve emerging bottleneck constraints.

At the same time, the energy transition is reshaping geopolitical dependencies. Modern energy systems rely heavily on copper, lithium, graphite, nickel and rare earth elements. These materials are essential for batteries, electric vehicles, renewable technologies and grid infrastructure. Yet refining and processing capacity remains highly concentrated geographically, particularly in China.

Figure 5: Global critical-mineral processing remains highly concentrated

China dominates the refining of critical minerals

China's estimated share of global refining capacity



Source: IEA Critical Minerals Outlook, USGS, May 2025.

As a result, governments are placing greater emphasis on domestic mining, strategic reserves, recycling technologies and friend-shoring arrangements. Technology sovereignty is becoming increasingly intertwined with energy security, extending beyond physical resources toward semiconductors, industrial automation and digital infrastructure.

Regional winners and losers

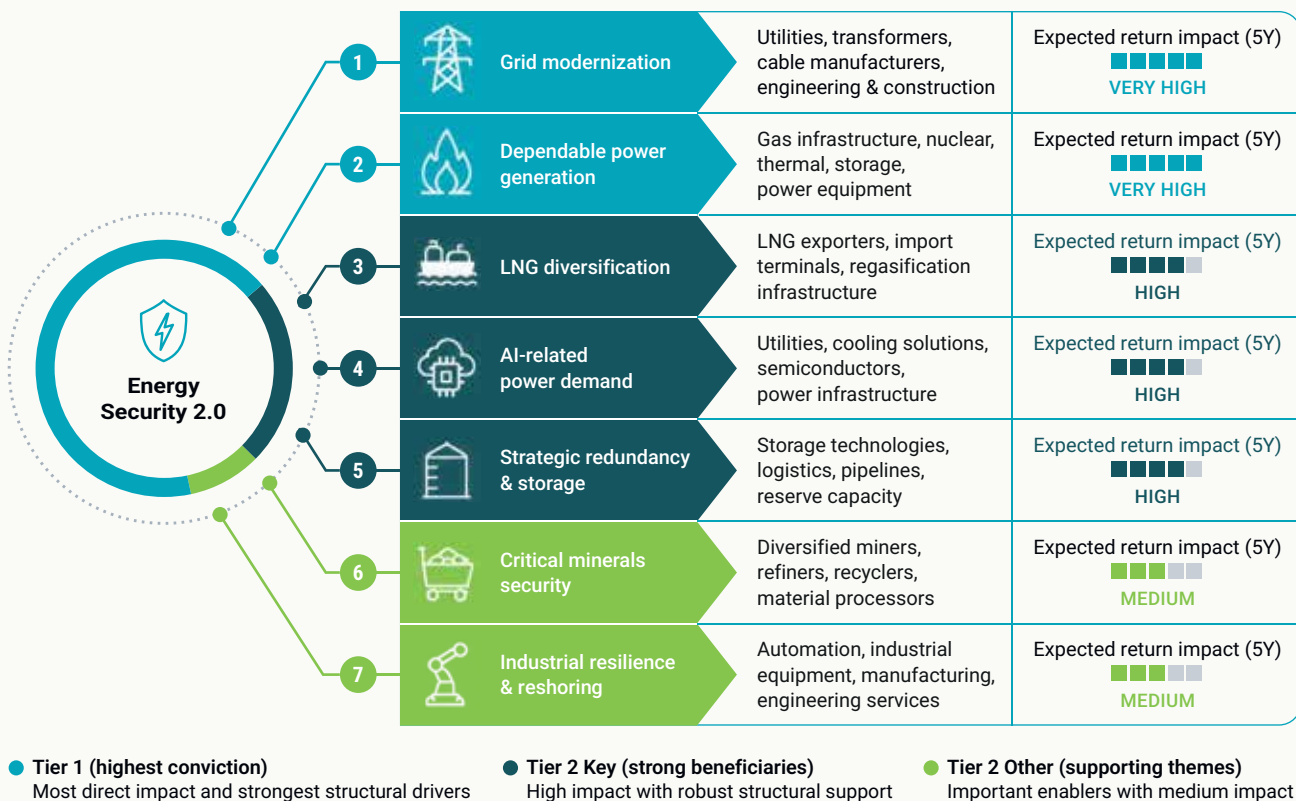
The implications of Energy Security 2.0 differ materially across regions. The US appears relatively well positioned due to abundant domestic energy resources, expanding LNG export capacity and deep industrial ecosystems. Europe remains more vulnerable from an import perspective, although recent shocks have accelerated investment in LNG infrastructure, renewables and storage. Asia faces the greatest exposure to imported energy flows, but also represents the largest source of future investment growth.

From an investment perspective, Energy Security 2.0 reinforces several broader macro themes already embedded within our expected returns framework. First, geopolitical fragmentation and resilience spending are likely to sustain somewhat higher inflation volatility than during the globalization era. Second, infrastructure, industrial automation, utilities and selected commodity-related assets may benefit from a prolonged capex cycle. Third, commodities and real assets may continue to provide valuable diversification properties in a world where equity-bond correlations could remain less stable than during the disinflationary period of the 2010s.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

Figure 6: Ranking the highest-conviction beneficiaries of Energy Security 2.0

Expected influence on asset and sector returns over the next five years



Source: Robeco, June 2026.

Note: Ranking reflects Robeco's assessment of the expected influence of each theme on asset and sector returns over the next five years.

Conclusion

The key question for investors is whether resilience investment ultimately reduces inflationary pressures through higher energy supply and system efficiency, or whether persistent geopolitical and security risks continue to dominate. Table 1 summarizes our assessment of the most likely outcomes over the next five years.

Table 1: Threat effects vs. supply effects – five-year outlook

Scenario	Probability	Inflation	Commodities	Infrastructure	Equities
Threat effects dominate	50%	Higher volatility	++	++	Mixed
Balanced outcome	35%	Moderate	+	+	+
Supply effects dominate	15%	Lower inflation	=	+	+

Source: Robeco, September 2026.

Our base case assigns a 50% probability to a regime where threat effects dominate. Geopolitical fragmentation, climate risks, and strategic competition are likely to keep inflation uncertainty elevated despite heavy resilience spending. In this environment, the strategic value of dependable energy systems will continue to be repriced upward. We believe investors who shift capital toward regulated utilities, infrastructure networks, strategic storage, and selective real assets are best positioned to capture the strongest risk-adjusted returns over the coming five years. ●

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SPECIAL TOPIC | PRIVATE CREDIT

Opportunity, risk and selectivity in a maturing market



Private credit has evolved from a niche segment of alternative finance into a major component of corporate lending markets. Although private debt existed well before the global financial crisis, the post-GFC retrenchment of banks from parts of the lending market created a powerful catalyst for growth. What was once a more specialized source of financing for mid-sized companies has since expanded into a multi-trillion-dollar asset class, attracting significant institutional capital and increasing regulatory attention.

As the asset class matures, investors face a more nuanced landscape. While private credit continues to benefit from powerful structural tailwinds, pockets of risk have emerged in some of its fastest-growing segments. This article maps the landscape, examines where those risks are genuinely building, and makes the case that informed investors can distinguish between the structural strengths of the asset class and the more concentrated problems that have come to dominate recent headlines.

Part one: The architecture of private credit

The three pillars of leveraged finance

To understand private credit, it helps to see where it sits within the broader universe of leveraged finance. Leveraged finance refers to the financing of companies that carry higher risk profiles (for example due to levels of debt relative to earnings) compared to traditional investment grade borrowers. These companies are typically rated below investment grade or are unrated. Financing is provided through three main channels: high yield bonds, leveraged loans, and private credit. While each serves a similar borrower base, they differ in how capital is raised, who provides it and how the debt is structured.

High yield bonds are the most public segment of leveraged finance. They are typically rated in the BB to B range by major rating agencies, and trade on secondary markets like other bonds. Investors can observe indicative prices daily and can enter and exit positions with relative ease. The US high yield market stands at approximately USD 1.4 trillion, with the European market at around EUR 400 billion.¹

1. Bloomberg, ICE Data Services (2025).

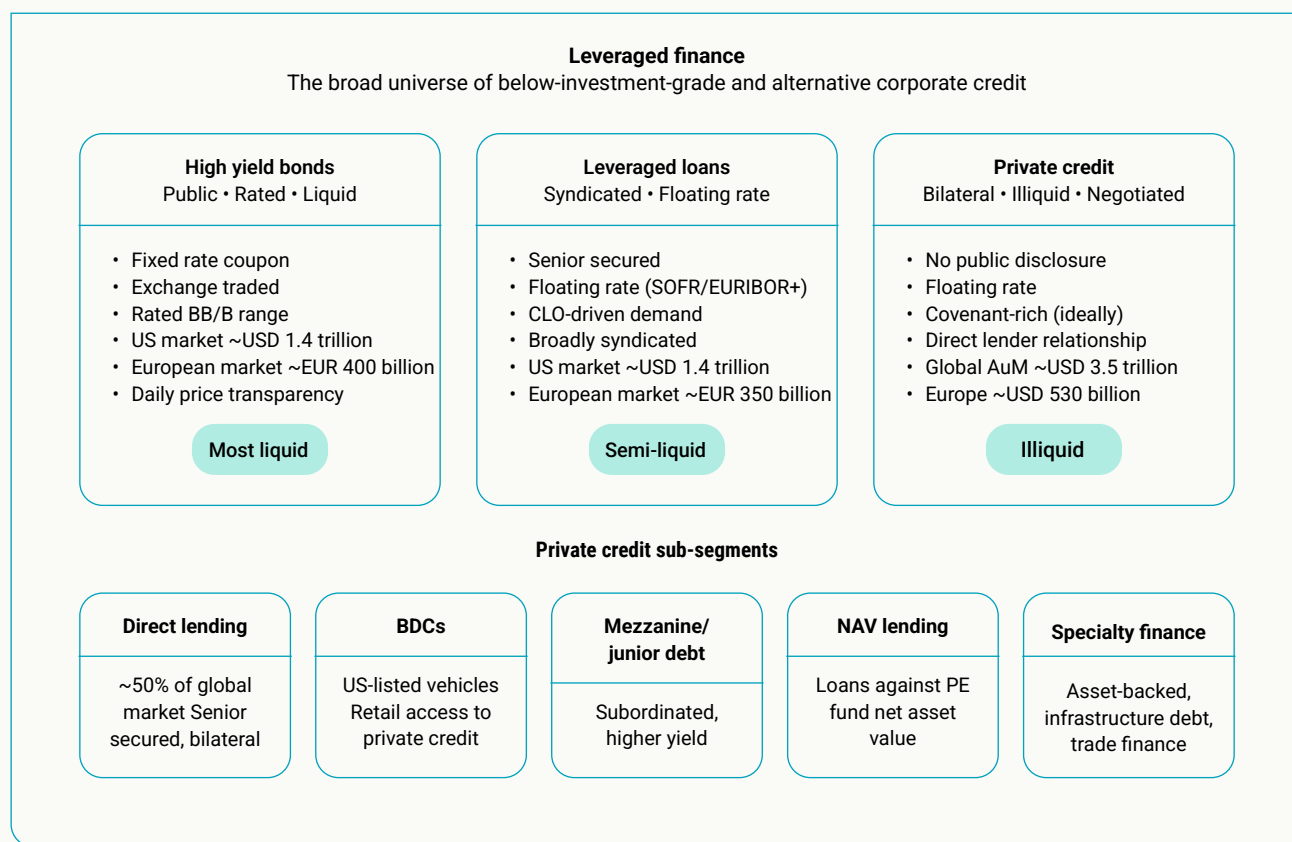
Moving one step closer to the borrower, leveraged loans occupy a middle ground. They share many characteristics with high yield bonds in that they finance below-investment-grade companies, but the structure is different. Loans tend to carry floating interest rates, sit higher in the capital structure as senior secured debt, and are originated through bank syndicates before being distributed to institutional investors. The bulk of leveraged loan demand is driven by collateralized loan obligation (CLO) vehicles, which pool loans into tranchised securities. The leveraged loan market has grown into a major source of corporate financing (see Figure 1).

Private credit takes this evolution further. Rather than being broadly syndicated or traded in public markets, loans are negotiated directly between borrowers and a limited group of lenders. There is no public market, no price discovery and often no external credit rating. With a bespoke pricing model, terms are tailored to the specific borrower and the lender typically maintains a direct relationship with the borrower throughout the life of the investment. This brings advantages and disadvantages, such as greater information access, stronger covenant protection and customized financing solutions, but it also comes with trade-offs, including illiquidity, reduced transparency and less frequent valuation.

While direct lending² remains the largest segment, accounting for roughly half of global private credit assets under management, the asset class now extends far beyond corporate lending. Other segments include Business Development Companies (BDCs), which provide listed access to private credit strategies in the US, and specialty finance, encompassing areas such as asset-backed lending, infrastructure debt and trade finance. Private credit is therefore best viewed not as a single strategy but as a diverse financing ecosystem.

2. Loans negotiated directly between lenders and borrowers, rather than through public markets.

Figure 1: The broad universe of leveraged finance



Source: Robeco, Preqin, Bloomberg, ICE Data Services, May 2026.

A decade of structural growth

The rise of private credit is not simply a story of investors chasing yield. It reflects a fundamental shift in how corporate lending is financed. Over the past decade, private credit has been one of the fastest-growing segments of private markets, nearly doubling over five years to 2023.³ More recently, global private credit assets under management surpassed USD 3.5 trillion, while deployment volumes in 2024 reached approximately USD 593 billion, up 78% from the previous year.⁴

3. Preqin Global Report 2023: Private Debt, December 2022
4. ACC/AIMA (2025).

Several forces have driven this growth. The first is regulation. Following the global financial crisis, successive rounds of Basel capital requirements made it increasingly costly for banks to hold leveraged loans on their balance sheets. As traditional lenders retrenched, private capital stepped in to fill the financing gap.

Investor demand has also played an important role. During the 2022-2024 interest rate hiking cycle, the floating-rate nature of many private credit loans provided protection against rising rates at a time when traditional fixed income portfolios were under pressure. At the same time, private credit historically offered an illiquidity premium over comparable public credit, rewarding investors willing to commit capital for longer periods.

For borrowers, the attraction is different. Beyond capital itself, private lenders can offer execution certainty, tailored financing structures and a more stable funding relationship. These characteristics have helped private credit evolve from an alternative source of financing into an increasingly mainstream part of the corporate lending landscape.

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Demystifying the borrower base

One of the most common misconceptions about private credit is that it consists primarily of financing private equity-backed buyouts. While sponsored transactions remain an important part of the market, they are only one segment of a broader lending universe. Corporate lending accounts for a substantial share of private credit investments, and an important share of that market is made up of non-sponsored borrowers: family-owned businesses, founder-led companies and SMEs seeking growth or acquisition financing. These companies have become a significant source of demand as banks have reduced their lending activity following tighter post-crisis capital requirements.

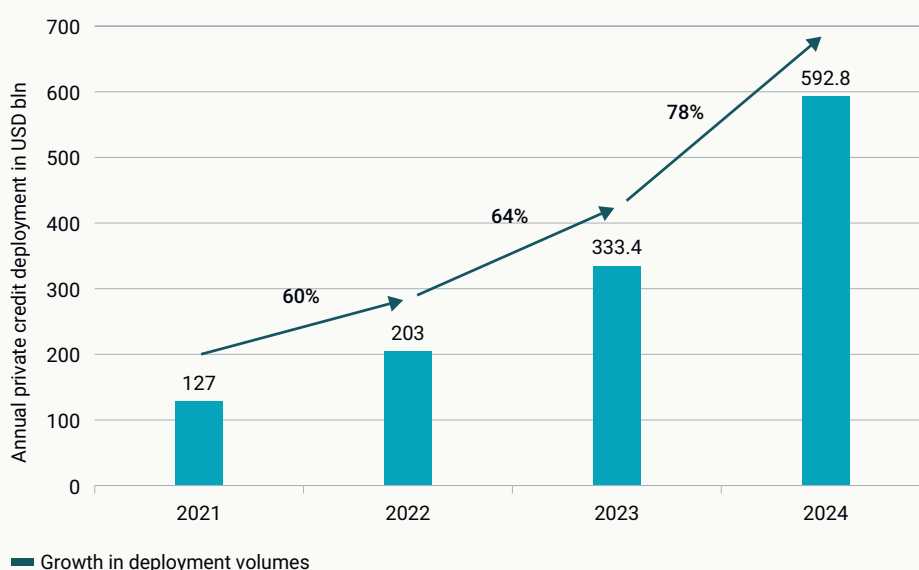
The nature of this opportunity differs significantly between the US and Europe. In the US, private credit has matured into a deep and highly competitive market, where non-bank lenders play a much larger role in corporate lending. Competition for larger sponsored transactions has intensified, compressing spreads and, in some cases, weakening lender protections. By contrast, the non-sponsored segment has been comparatively less affected – though even here, increased capital flows mean competition is no longer absent.

Europe presents a different picture. Banks remain the dominant providers of corporate credit, while non-bank lenders still account for a relatively small share of the market. Private credit is therefore earlier in its development, leaving many borrowers with limited financing alternatives outside the banking system. This is particularly evident in the lower mid-market,⁵ where SMEs and family-owned businesses have traditionally relied on relationship-based bank lending. As banks have gradually retrenched, private capital has increasingly stepped in to fill the gap.

5. Typically refers to companies with EBITDA below EUR 50 million.

For lenders, these borrowers often offer a different risk profile from private equity-backed companies. Leverage is typically lower, relationships tend to be longer-term and covenant protections are often stronger. Because these companies sit below the radar of the largest direct lending platforms, competition can also be less intense, creating a potentially more attractive balance between risk and return.

Figure 2: The amount of capital being invested into private credit transactions each year continues to accelerate



Source: ACC/AIMA, Financing the Economy 2025.

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Part two: Where are the fault lines?

Where risk is building

No assessment of private credit risk would be complete without addressing recent developments that have made headlines, for example related to the software sector. Software companies – particularly SaaS businesses with recurring subscription revenues – became one of the most popular borrower groups for private credit lenders over the past decade. Predictable recurring revenues, high margins and low capital intensity made them appear ideal credit candidates.

That thesis is now being tested. Outstanding loans to SaaS firms grew from less than USD 8 billion in 2015 to more than USD 500 billion by the end of 2025, representing roughly a fifth of total direct lending exposure.⁶ As generative AI challenges aspects of traditional software business models, investors have begun reassessing growth assumptions and valuations across the sector.

6. Doerr et al. (2026).

The concern is not just weaker revenue growth. Many loans were sized against enterprise values that were themselves based on revenue multiples. If AI disrupts the revenue outlook, the collateral base and repayment capacity can deteriorate at the same time. In that context, loans originated under assumptions that may no longer hold become more vulnerable, particularly where covenant protections weakened as competition among lenders intensified. What appears to be a technology story may ultimately prove to be a credit underwriting story.

The software story is perhaps the most visible example of a broader trend within private credit. As the asset class attracted increasing amounts of capital, competition became concentrated in the largest sponsored transactions. In this environment, lenders often found themselves competing less on price than on terms. Leverage levels moved higher, covenant protections became more borrower-friendly and structures that were once reserved for more challenged situations, such as payment-in-kind (PIK) features, increasingly entered mainstream deal documentation.

The result is a segment of the market where risk-adjusted returns may no longer adequately compensate investors for the protections that have been given away. A further complication is valuation. Because private loans are not publicly traded and borrowers disclose limited information, deterioration in credit quality may remain largely invisible until a covenant breach, missed payment or refinancing challenge forces recognition. By that point, lenders often have fewer options available.

Table 1: Not all private credit is the same

Markets	Lower mid-market	Core mid-market	Upper mid-market	Broadly syndicated loans
Investor base/competition	Underserved	Less crowded	More crowded	CLO dominated
Predominant borrower base	Family-owned, founder-led, SMEs	Family-owned, smaller PE sponsors	PE sponsored	PE sponsored
Size of borrower (EBITDA)	EUR < 25 mln	EUR 15-40 mln	EUR > 30 mln	EUR > 75 mln
Leverage	3.0x-6.0x	3.5x-5.0x	>6.0x	> 4.5x
Credit quality	B/B-	BB/BB-	B/B-	B/B+
Interest	Floating/fixed	Floating	Floating	Floating
Lenders	Sole	Club	Sole/Club	Large group of lenders

Source: Robeco, June 2026.

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Why this is not 2008

At this point, a reasonable question is whether stress in private credit could trigger a crisis similar to 2008. The answer is almost certainly no. While losses are likely to emerge in some parts of the market, the structure of private credit is fundamentally different from that of the banking system that sat at the center of the Global Financial Crisis.

Banks transformed short-term deposits into long-term loans and were deeply interconnected through the financial system. Private credit funds, by contrast, are typically closed-end vehicles funded predominantly by institutional investors who knowingly accept illiquidity in exchange for higher expected returns. When losses occur, they are absorbed by pension funds, insurers, sovereign wealth funds and endowments rather than transmitted through retail depositors or the banking system.

This does not mean stress is irrelevant. The transmission mechanism from private credit to public markets is real, but it is likely to be gradual rather than sudden. Companies that struggle to refinance private debt may seek alternative sources of capital, including public high yield, leveraged loan markets or opportunistic private lenders willing to finance the same risk at a different price. This could increase supply and put pressure on spreads, and in a more severe scenario could contribute to tighter credit conditions for weaker borrowers. But unlike a bank-run liquidity shock, this process is likely to unfold gradually and through repricing rather than forced selling. Capital does not disappear; it becomes more selective, more expensive and more concentrated in the hands of lenders with the capacity to underwrite complexity.

Importantly, private lenders often have tools available that public market investors do not. Direct relationships with borrowers, stronger documentation and the ability to negotiate bilateral solutions can provide flexibility when a company encounters difficulties. Amend-and-extend agreements, payment deferrals and debt restructurings can all help preserve value while avoiding forced asset sales.

This is where manager selection becomes critical. The key question is not whether some loans will be impaired, but whether the lender has the underwriting discipline, documentation rights and borrower relationships needed to manage through periods of stress and maximize recoveries.

Looking ahead: The five-year outlook

Private credit enters the coming years from a position of structural strength. The growth runway remains compelling, particularly in Europe, where the transition from bank-led lending to institutional capital is still in its early stages and regulatory developments continue to broaden the investor base.

The risks discussed throughout this article are real, but they are specific rather than systemic. Stress in US software lending and covenant deterioration in parts of the upper mid-market are genuine concerns for investors with concentrated exposure to those segments. They are not, however, a verdict on the asset class as a whole. If anything, a period of differentiation – where disciplined lenders are separated from those that deployed capital aggressively at compressed spreads – may prove healthy for a market that expanded rapidly over the past decade.

For investors with a five-year horizon, the key question is where within the asset class opportunities remain most attractive. The lower mid-market, non-sponsored lending and less sought-after areas of sponsored lending may offer a more favorable balance of risk and return.

This is the segment where Robeco focuses its lending activities, often alongside relationship banks with long-standing borrower knowledge. The emphasis is on capital preservation, covenant protection and conservative underwriting rather than maximizing leverage or yield.

As private credit matures, the opportunity is likely to shift from simply gaining exposure to the asset class toward identifying the segments where lender discipline, structural protections and borrower quality remain firmly aligned. ●

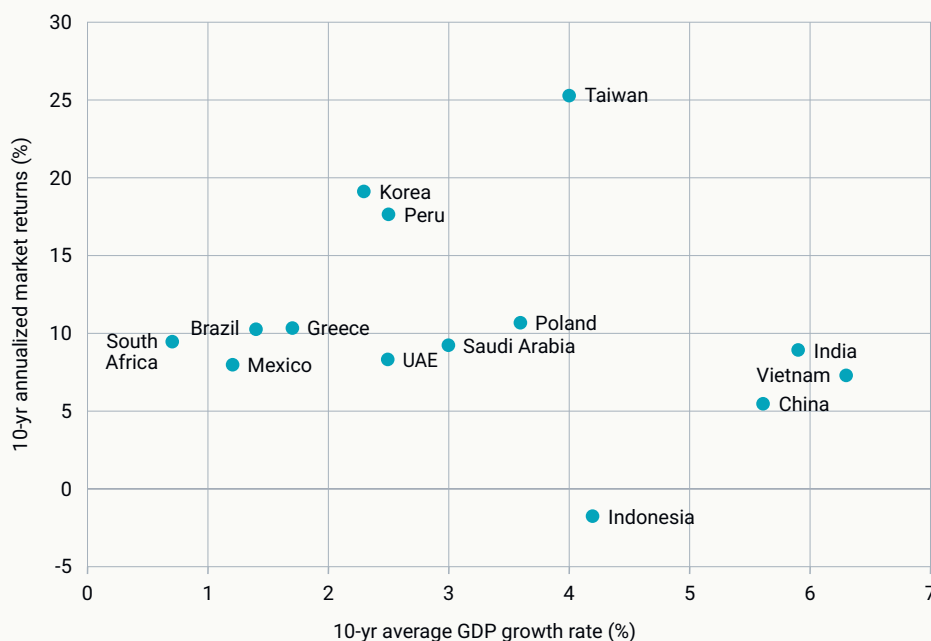
SPECIAL TOPIC | EMERGING MARKETS

A world of different destinies



Emerging markets are often presented as a single asset class united by faster economic growth, favorable demographics and rising participation in the global economy. This description is convenient but increasingly inadequate. The emerging market universe encompasses technology exporters such as Taiwan and South Korea, large domestic economies such as India and Indonesia, manufacturing centers such as China and Vietnam, resource producers such as Brazil and Chile, and capital-rich Gulf states such as Saudi Arabia and the United Arab Emirates. These countries differ profoundly in their economic structures, institutions, corporate sectors and vulnerability to external shocks.

This diversity of emerging markets matters because economic growth does not translate automatically into investment return. Ritter's (2005) cross-country research found no reliable positive relationship between economic growth and subsequent equity returns. Economic expansion can benefit workers and consumers without necessarily enriching the owners of existing listed companies, particularly when growth results from new capital formation, greater labor input or the establishment of new businesses.

Figure 1: Economic GDP growth versus 10-year annualized equity market return (USD)

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Source: IMF, MSCI. End May 2026.

For equity investors, growth must pass through a transmission chain: from economic activity to corporate revenues, from revenues to profits, and from aggregate profits to earnings per share. That chain can be weakened by falling margins, poor capital allocation, state intervention, new-share issuance, weak governance or currency depreciation. Even when earnings grow strongly, an excessive starting valuation can result in disappointing shareholder returns.

For fixed income investors, growth must strengthen government revenues and debt sustainability, while credible monetary and fiscal policy must preserve the real value of coupons and principal. The central question is therefore not which emerging economy will grow the fastest, but which can convert productive growth into sustainable earnings, credible public finances and real investor returns.

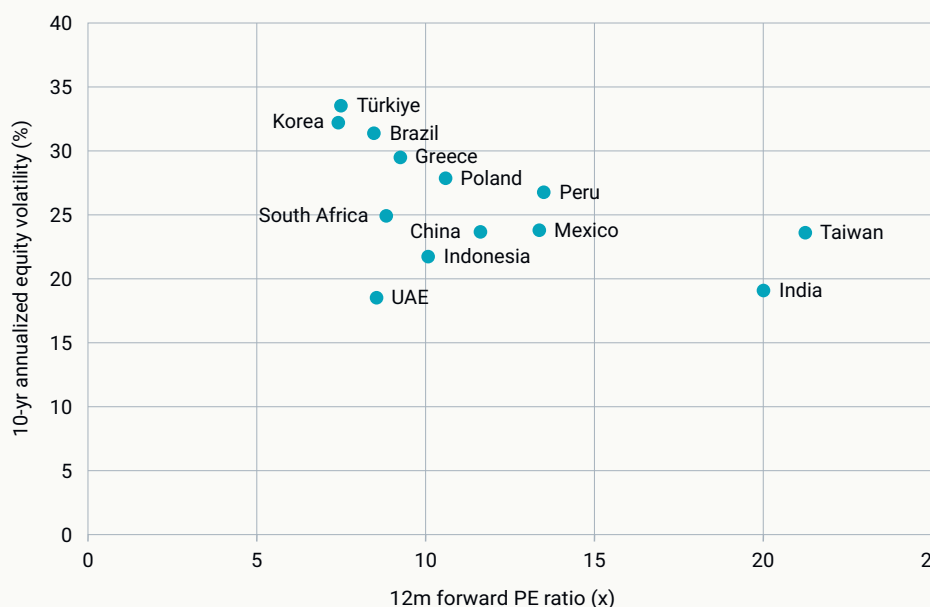
Growth, valuation and volatility

The International Monetary Fund (IMF) expects emerging economies collectively to grow faster than advanced economies, but this aggregate conceals marked differences in productivity, inflation, public debt and policy credibility. It also warns that geopolitical fragmentation, elevated debt and weakening policy buffers leave many emerging economies vulnerable to external shocks (IMF, 2026a).

Starting valuation is equally important. The MSCI India Index traded at approximately 20.2 times 12m forward PE, compared with 11.6 times for China, 11.0 times for Indonesia and 9.7 times for Brazil. Vietnam traded at almost 20 times earnings, despite having a less mature and liquid capital market than the larger Asian economies. Such differences show that investors pay substantially more for economies and corporate sectors perceived to offer dependable structural growth (Robeco, MSCI, 2026b; 2026c; 2026d; 2026e; 2026f).

Volatility is also highly differentiated. Ten-year annualized volatility in US-dollar terms was approximately 19% for India, 22% for Indonesia, 23%-24% for China, Taiwan and Vietnam, and above 30% for Brazil and Korea at the same date. These figures reflect not only macroeconomic instability but also index concentration, sector cyclicality, currency movements and market liquidity. Volatility should thus be treated as an economic characteristic of each market, rather than as a generic feature of the emerging market asset class (MSCI, 2026b–h).

Figure 2: Different markets, different prices and risks



Source: IBES, MSCI. End May 2026.

Asia: The strongest earnings engines, but without a single model

Asia contains the world's most powerful combination of manufacturing capacity, technological expertise, domestic consumption and financial deepening. Nevertheless, its major markets represent fundamentally different sources of return.

China remains the most complex. It possesses a vast domestic market, advanced manufacturing ecosystems and leading positions in electric vehicles, batteries, renewable energy, industrial automation and digital commerce. Its valuation is substantially lower than India's, creating the possibility of strong returns if earnings and investor confidence recover.

However, the adjustment in the property sector, pressure on local government finances, high domestic debt and weak household demand have exposed limitations in China's investment-led growth model. The IMF argues that the country needs to rebalance toward consumption and address unsustainable local government debt and financial sector vulnerabilities (IMF, 2026b). The equity question is therefore whether economic growth will translate to improved corporate returns on capital, and benefit minority shareholders.

China's fixed income market offers scale and diversification, but comparatively low yields reduce its income advantage. China is best viewed as a selective equity value opportunity and a potential bond market diversifier rather than a straightforward high-growth investment.

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India has structural advantages which include favorable demographics, infrastructure investment, digitalization, financial formalization and an expanding domestic consumer economy. These forces create a broad earnings opportunity across banks, industrial companies, consumer businesses, healthcare, logistics and technology services. The IMF describes India's medium-term outlook as resilient, supported by domestic demand and earlier structural reforms (IMF, 2025a).

The primary risk is valuation. At more than 20 times forward earnings in May 2026, the Indian market incorporated significant confidence in sustained profit growth and policy execution. When a favorable future is already reflected in prices, even strong earnings can disappoint investors.

For bond investors, India benefits from strong nominal growth and a substantial domestic savings base. These features reduce dependence on foreign financing and can improve market resilience. However, fiscal demands, food-price volatility and dependence on imported energy remain important risks.

Taiwan and South Korea demonstrate why domestic GDP is an inadequate guide to equity performance. Corporate earnings are driven principally by global technology investment rather than by domestic consumption.

The expansion of artificial intelligence infrastructure has improved the long-term demand outlook for advanced chips and memory products, but it has also increased concentration risk. TSMC¹ represented almost 55% of the MSCI Taiwan Index in May 2026, while Samsung Electronics and SK Hynix together represented more than 60% of the Korean index. Investors purchasing these markets are therefore taking large company- and industry-specific positions (MSCI, 2026g; 2026h).

Taiwan's valuation reflects considerable optimism about semiconductor earnings, while geopolitical risk remains material. Korea's much lower forward multiple suggests greater cyclicity and uncertainty about the durability of current earnings. Governance reform, higher distributions and more disciplined capital allocation could reduce the long-standing Korean discount, but only if corporate behavior continues to change.

Southeast Asia: Domestic development and supply chain reorganization

Indonesia's large population, domestic consumption, commodity resources and efforts to develop downstream industries provide multiple growth drivers. The economy has maintained growth near 5%, supported by investment, services and exports, although commodity dependence and policy execution remain important sources of risk (World Bank, 2025a).

The equity market provides exposure to banks, telecommunications, consumer activity and resources. Its relatively low valuation and high dividend yield suggest that expectations are less demanding than in India or Vietnam. However, the index is narrow and highly concentrated in a small number of financial institutions. Local bonds can provide meaningful income, but the currency remains sensitive to the dollar and changes in international risk appetite.

Vietnam combines manufacturing expansion, trade integration, foreign direct investment and rising domestic consumption. Growth reached 8% in 2025 and was forecast by the World Bank to remain robust in 2026, supported by manufacturing exports, domestic demand and public investment (World Bank, 2026). Vietnam is also increasingly more than a low-cost manufacturing platform. Urbanization, rising incomes, infrastructure investment and financial deepening should broaden the

1. The companies shown on this page are for illustrative purposes only. No inference can be made on the future development of the company. This is not a buy, sell, or hold recommendation

domestic profit pool. Banks, consumer businesses, logistics providers, industrial companies and technology firms may all benefit.

However, foreign-invested manufacturers account for an important part of exports, while the domestic equity market is concentrated in banks, real estate and domestically oriented businesses. The World Bank has emphasized that Vietnam must retain more value domestically, strengthen links between foreign and local companies, and raise productivity (World Bank, 2026).

Credit intensity, property-related financial exposures, corporate governance and liquidity also warrant a higher required return. Vietnam's valuation premium over China, Indonesia and Brazil indicates that investors already expect considerable future growth.

Malaysia and Thailand offer more mature institutions and deeper financial markets but weaker structural growth. The Philippines possesses favorable demographics and consumer potential, although infrastructure deficiencies and external vulnerability can increase volatility. Southeast Asia therefore presents a spectrum ranging from Indonesia's value and income to Vietnam's higher-growth, higher-expectation model.

Latin America: Value and income without dependable compounding

Latin America offers an almost inverse investment profile to much of Asia. Equity valuations and real bond yields are often more attractive, but trend growth is generally slower and macroeconomic volatility higher. Commodity exposure, fiscal credibility, politics and currencies exert a greater influence over returns.

Brazil is the region's central case. It has deep capital markets, sophisticated financial institutions and globally competitive companies in resources, agriculture, banking and industrial production. Its equity market traded at less than ten times forward earnings in May 2026 and offered a dividend yield above 5%, illustrating the substantial valuation discount attached to macroeconomic risk (MSCI, 2026e).

Brazilian bonds' elevated yields partly reflect fiscal uncertainty, inflation risk and currency volatility. The IMF expects structural reforms, including tax reform, to support medium-term productivity, but projects public debt to remain high and emphasizes the need for credible fiscal adjustment (IMF, 2025b).

Mexico's opportunity arises from integration with the US and the reorganization of global production. Nearshoring could raise investment, exports and employment, but the benefits depend on electricity provision, infrastructure, security and institutional consistency. Furthermore, many export-oriented manufacturers are foreign-owned or unlisted, meaning that the national economic opportunity may be broader than the listed equity opportunity. Fiscal consolidation and the financial position of state-owned enterprises also remain significant for bond investors (IMF, 2024).

Chile, Peru and Colombia provide commodity exposure and, at times, attractive real yields. Their currencies help absorb external shocks but transfer volatility to international investors. Latin America's principal advantage is therefore attractive starting valuation and income; its weakness is the difficulty of sustaining productivity, policy credibility and earnings growth over long periods.

EMEA: Convergence, sovereign wealth and macroeconomic friction

Central European markets benefit from varying degrees of integration with European supply chains, institutions and capital. Poland offers the strongest combination of domestic demand, manufacturing and market depth, although fiscal pressures and geopolitical proximity require compensation. Greece provides a banking and investment-normalization story within the eurozone, reducing independent currency risk. These markets offer less structural growth than India or Vietnam but potentially greater institutional anchoring.

The Gulf states represent a different model. Saudi Arabia, the UAE, Qatar and Kuwait possess hydrocarbon revenues and substantial sovereign assets. For fixed income investors, these balance sheets provide resilience. For equity investors, the question is whether resource wealth can be converted into productive and profitable non-oil industries.

Saudi Arabia's large investment program is sustaining non-oil activity, but also increases demands on public capital. The IMF notes that the country retains strong fiscal and external buffers while stressing that structural reform remains essential to sustain diversification (IMF, 2025c). The UAE has developed a broader commercial platform across finance, trade, transport, tourism and real estate, with non-hydrocarbon activity driving much of its growth (IMF, 2025d).

South Africa, Türkiye and Egypt illustrate the cost of macroeconomic friction. South Africa has deep capital markets and competitive private companies, but electricity, logistics and weak investment have constrained potential growth. Türkiye and Egypt offer high nominal yields and growth, but inflation and depreciation can prevent nominal gains from becoming real returns. In emerging market debt, carry is valuable only when policy credibility protects it.

The global financial cycle

No emerging market is fully insulated from global financial conditions. The shift toward local currency bonds has reduced foreign currency mismatches for borrowers, but it has transferred exchange rate exposure to global investors.

BIS research finds that dollar strength is a major global risk signal and return driver for emerging market equities and local currency bonds. In some cases it is more important than interest rate differentials in stimulating flows into and out of EM. A stronger dollar can reduce risk appetite, trigger outflows and tighten domestic financial conditions even where country fundamentals remain relatively sound (Gelos and McQuade, 2024).

Emerging market (EM) local currency and hard currency debt represent different funding formats and, in practice, somewhat different sovereign universes. EM local currency indices tend to be focused on larger, more traditional emerging markets such as Brazil, Mexico, South Africa and Indonesia, which typically have deeper domestic savings bases, more developed local bond markets, stronger monetary policy frameworks and a greater ability to fund themselves in their own currency.

Hard currency benchmarks are typically more diverse, including both large traditional EM issuers and a broader range of smaller frontier sovereigns. For these countries, external financing constraints can be more binding and local market liquidity is often lower. Lower headline public debt therefore does not necessarily imply lower risk, as debt sustainability depends heavily on market access, foreign exchange liquidity, external balances and refinancing conditions.

The transmission of fiscal deterioration also differs across the two asset classes. In local currency markets, weaker fiscal dynamics are often reflected through higher domestic yields, steeper curves, pressure on central bank credibility and FX depreciation. In hard currency markets, the impact is more likely to come through wider sovereign spreads, refinancing pressure and, in more stressed cases, debt sustainability concerns. Emerging economies with deeper domestic investor bases and developed hedging markets tend to experience more resilient bond market liquidity during periods of stress. Those dependent on foreign non-bank investors are more vulnerable to selling, driven by global rather than domestic conditions (Van Doornik et al., 2024).

That said, the frontier hard currency universe has seen a notable improvement in fundamentals since Covid. Many issuers have benefited from stronger commodity prices, external adjustment, IMF-supported reform programs and improved current account positions, while still trading at attractive valuations. The key point is that indebtedness needs to be assessed not only by the level of debt, but also by the currency of funding, domestic market depth, external vulnerability, policy credibility and access to capital.

Conclusion: Growth is not the asset class

Emerging markets should not be treated as a single bet on superior economic growth. They are a collection of fundamentally different return engines: structural compounders, technology exporters, commodity and value markets, reform stories, sovereign balance-sheet plays and high-yield economies attempting to restore policy credibility.

The investment implication is clear. Investors should stop asking whether emerging markets as a whole are attractive and instead ask which countries are currently offering the strongest combination of earnings conversion, policy credibility and valuation.

The same selectivity is required in fixed income. High nominal yields are not, by themselves, evidence of attractive value. The strongest bond opportunities are likely to be found where positive real yields are supported by credible central banks, manageable debt dynamics, deep domestic savings and currencies that are not required to absorb persistent macroeconomic imbalances.

Structural growth should be purchased only at a defensible price, high yields should be accepted only where policy credibility protects their real value, and cyclical or reform-driven markets should offer sufficient upside to compensate for their greater uncertainty.

Emerging market growth remains an important raw material. The decisive variables are who captures that growth, how efficiently it is converted into per-share cash flow, and how much the investor pays for it. In emerging markets, dispersion is not an inconvenience – it is the investment opportunity. ●

SPECIAL TOPIC | PORTFOLIO DESIGN

Beyond sustainability: Generalized 3D investing



Traditional portfolio construction is usually framed as a two-dimensional problem: investors seek the highest expected return for a given level of risk, or the lowest risk for a given level of expected return. This risk-return framework remains one of the most important ideas in modern investing. It is intuitive, mathematically elegant, and highly useful in practice. Much of this thinking originates from Markowitz (1952), who formalized portfolio optimization by jointly considering expected returns and the volatility of stocks, and thereby laid the foundation for modern portfolio theory.

Yet real investors rarely care only about risk and return.

In practice, they often have additional objectives that matter for economic, regulatory, tax, or mission-driven reasons.

A pension fund may care about liability matching; an insurance company about capital efficiency; an income-oriented investor about stable cash flows; and a sustainability-focused investor about carbon footprint or alignment with broader goals. These preferences are not always reducible to expected return or volatility. Rather, they represent additional dimensions of investor utility that are often left implicit in traditional portfolio design.

Sustainability and the birth of 3D investing

Chen and Mussalli (2020) argued that ESG investing should not rely solely on exclusions or reporting overlays, but should instead be integrated directly into portfolio construction. They showed that while investors care about both financial performance and sustainability, the trade-off between these objectives should be made explicit rather than managed indirectly through constraints. This line of thinking led to the concept of an ESG-efficient frontier, in which investors can evaluate how much expected return may be sacrificed to achieve improved sustainability outcomes, or conversely, when the two may reinforce each other. Subsequent contributions, including Sorensen, Chen, and Mussalli (2021), emphasized that quantitative investing is particularly well suited for translating heterogeneous investor preferences into scalable and systematic portfolios.

This observation leads to the core idea behind 3D investing: the traditional risk-return framework can be extended to incorporate another important investor-relevant objective, namely sustainability. The paper '3D Investing: Jointly Optimizing Return, Risk, and Sustainability' (Blitz et al., 2024) formalizes this idea by embedding sustainability directly into the portfolio optimization problem. Their key insight is that when an investor cares about sustainability as well as the risk-return trade-off, incorporating this third objective explicitly into the optimization can lead to better outcomes than treating it as an external constraint.

From integrated ESG to generalized 3D investing

The broader implication, however, goes beyond sustainability. The essential idea is that portfolio construction should reflect the true dimensionality of investor preferences. Sustainability was a natural first application, but it is only one of many possible extensions of the framework.

In its generalized form, 3D investing can be understood as the problem of jointly optimizing expected return, risk, and an additional investor-specific objective. The nature of this third dimension depends on the investor's priorities.

For income-oriented investors, this objective may relate to dividend yield, dividend stability, or distributable cash flow. While traditional portfolio theory typically views income as part of total return, many investors explicitly care about the timing and stability of cash flows. At the same time, this perspective should be interpreted with care. Modigliani and Miller (1961) demonstrated that, under idealized conditions, dividend policy is irrelevant because investors can generate cash flows by selling shares. In practice, however, factors such as taxes, transaction costs, regulatory constraints, and behavioral preferences mean that income remains an important consideration for many investors. A 3D framework allows this preference to be incorporated transparently.

For tax-sensitive investors, the third dimension may reflect after-tax efficiency. This could involve managing turnover, realized gains, or dividend taxation. Rather than treating these considerations as external constraints, they can be incorporated directly into the optimization problem, allowing investors to assess how much expected return they are willing to trade for improved tax outcomes.

For institutional investors, the third dimension may be liability alignment. This idea has a long-standing presence in asset allocation. Sharpe and Tint (1990), for example, proposed evaluating assets relative to liabilities, an approach that is now standard in pension and insurance contexts.

For defensive investors, the third dimension may reflect resilience, including exposure to severe losses, financial distress, or downside risk. Traditional volatility measures may fail to capture these risks, meaning that portfolios that appear similar in risk-return spaces may differ materially in how they behave in stress scenarios.

Finally, some investors may define the third dimension in terms of implementation preferences, including liquidity, turnover, regional exposure, or exclusion rules. In each case, the framework allows for a structured evaluation of trade-offs, helping investors understand what they gain and what they give up when emphasizing a particular objective.

The idea also connects to a broader academic literature. Portfolio theory has long moved beyond a purely two-dimensional perspective. For example, Kraus and Litzenberger (1976) extended the standard asset pricing framework to incorporate skewness, while Harvey and Siddique (2000) showed that conditional skewness helps explain expected returns. These contributions reinforce the notion that investor preferences are inherently multi-dimensional, and that sustainability is simply a modern manifestation of a broader theme.

Objectives are not the same as constraints

A crucial distinction in this framework is the difference between objectives and constraints. A constraint defines a boundary: for example, carbon footprint must stay below a certain level, dividend yield must exceed a minimum threshold, tracking error must remain within a specified range, or a portfolio must avoid certain excluded securities. Constraints are useful and often necessary because they impose discipline, satisfy policy requirements, and ensure that minimum standards are met.

However, an objective is something the investor actively values and wants to improve, subject to trade-offs. If income, tax efficiency, sustainability, resilience, or liability alignment enters the objective function directly, the portfolio construction process can evaluate the marginal cost and benefit of improving that dimension. This is more informative than simply imposing a rule and optimizing around it.

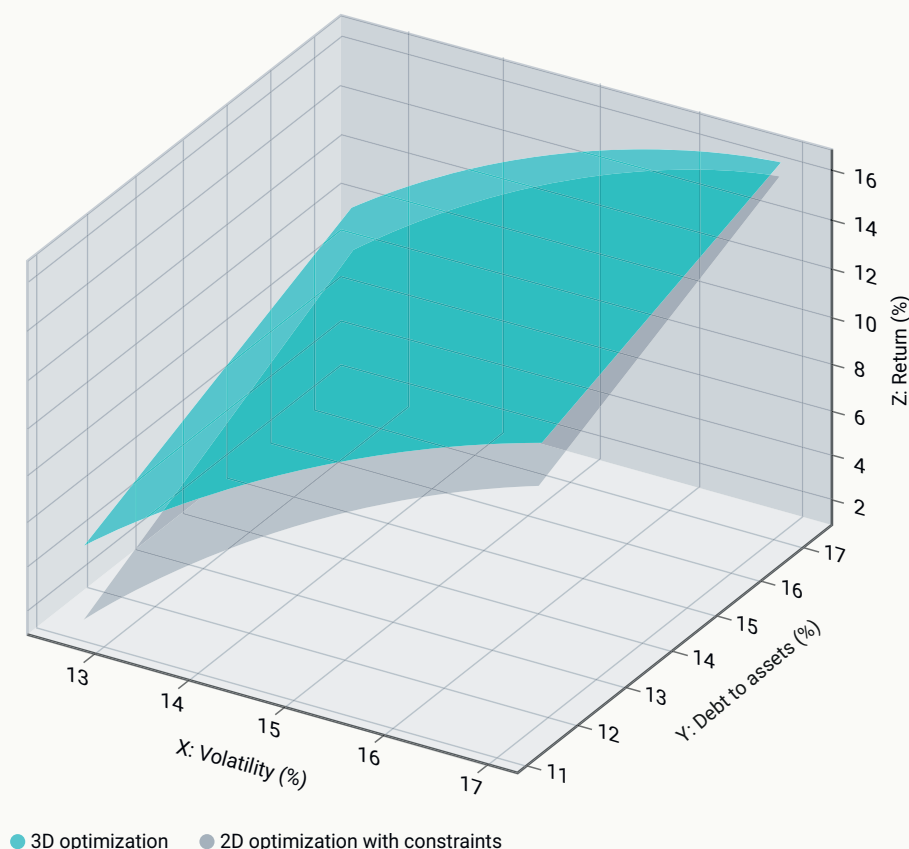
In practice, constraints and objectives should play different roles. Hard requirements belong in constraints, while preferences that admit trade-offs often belong in the objective function. A client may require a minimum sustainability threshold, but may also prefer additional sustainability improvement when the cost in expected return is low. Similarly, an investor may require a minimum income level, but still want to know whether additional income is worth the associated sector exposure, factor tilt, or concentration risk. This distinction makes customization less ad hoc: the investment process remains disciplined, but the objective is expanded to reflect the investor's actual preferences.

Illustration: Financial distress as the third dimension

In this section, we illustrate a simple hypothetical application of generalized 3D investing using GICS industry groups within the S&P 500 universe as the investable assets. The sample spans 20 years from 2005 to 2025. The three dimensions are volatility on the x-axis, debt-to-assets on the y-axis as a proxy for financial distress, and return on the z-axis. Figure 1 compares two approaches to incorporating financial distress into portfolio construction. The grey surface represents a traditional two-dimensional optimization, in which the investor seeks higher return for a given level of volatility while applying constraints related to debt-to-assets. The turquoise surface represents a 3D optimization, in which return, volatility, and financial distress are incorporated jointly in the objective function. The upward slopes with respect to volatility in both surfaces reflect the familiar risk-return trade-off, whereby higher volatility is associated with higher expected return.

In this illustrative example, the 3D optimization surface lies above the constrained 2D surface across the relevant range of volatility and debt-to-assets, indicating that investors can achieve a higher return profile for the same level of volatility and debt-to-assets exposure when the third objective is optimized directly rather than treated solely as a constraint. As the chart suggests, 3D investing does not eliminate trade-offs, but allows for a more efficient use of them by evaluating return, risk, and the investor-specific objective simultaneously.

Figure 1: Hypothetical application of generalized 3D investing



Source: Robeco. The two surfaces display the efficient frontiers under the two scenarios of 2D optimization with constraint and 3D optimization. The underlying assets are the equally weighted industry groups in the S&P 500 index from December 2005 to December 2025.

Why this matters

Investor demand is becoming more heterogeneous. Clients increasingly ask how a strategy can be adapted to their local market, tax situation, income needs, sustainability preferences, implementation constraints, or governance framework. This creates a challenge for quantitative managers. Too little flexibility makes the strategy difficult to adapt to real client needs; too much flexibility can make it appear fully bespoke, hard to govern, and difficult to scale.

Generalized 3D investing offers a middle path. It allows a manager to preserve the discipline of a systematic investment process while adding a controlled and transparent customization layer. The same underlying architecture can support different third dimensions, provided those dimensions are measurable, economically meaningful, and governed appropriately.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

Beyond three dimensions

The term '3D investing' is useful because it moves investors beyond the familiar two-dimensional risk-return plane. But the same logic can extend beyond three dimensions. An investor may want to optimize expected return, risk, income, tax efficiency, and sustainability at the same time.

In principle, this is a multi-dimensional portfolio choice problem. In practice, however, simplicity matters. The more dimensions are added, the harder it becomes to explain portfolio composition. Trade-offs may become less transparent, and small changes in assumptions or weights may lead to materially different portfolios.

The goal is therefore not to add dimensions for their own sake, but to include only those dimensions that genuinely matter to the investor and can be measured and governed with sufficient confidence. In this sense, 3D investing is a useful starting point for broader multi-dimensional portfolio design, not a strict limit on the number of objectives.

Limitations

Expanding the objective function is not without cost. As more dimensions are added, the model may become harder to interpret, communicate, and govern. Investors may benefit from richer objective functions, but they also need to understand why the portfolio looks the way it does.

Additional objectives introduce estimation error, especially when the new dimension is difficult to measure, such as distress risk, income stability, tax efficiency, or liability alignment. They can also create hidden factor tilts. A portfolio optimized for income may unintentionally become a value-, sector-, or interest-rate bet. These exposures may be acceptable, but they should be measured and understood rather than accidental.

These limitations do not weaken the case for generalized 3D investing; they simply mean that each additional dimension should be economically meaningful, measurable, and relevant to the investor's actual preferences.

Conclusion

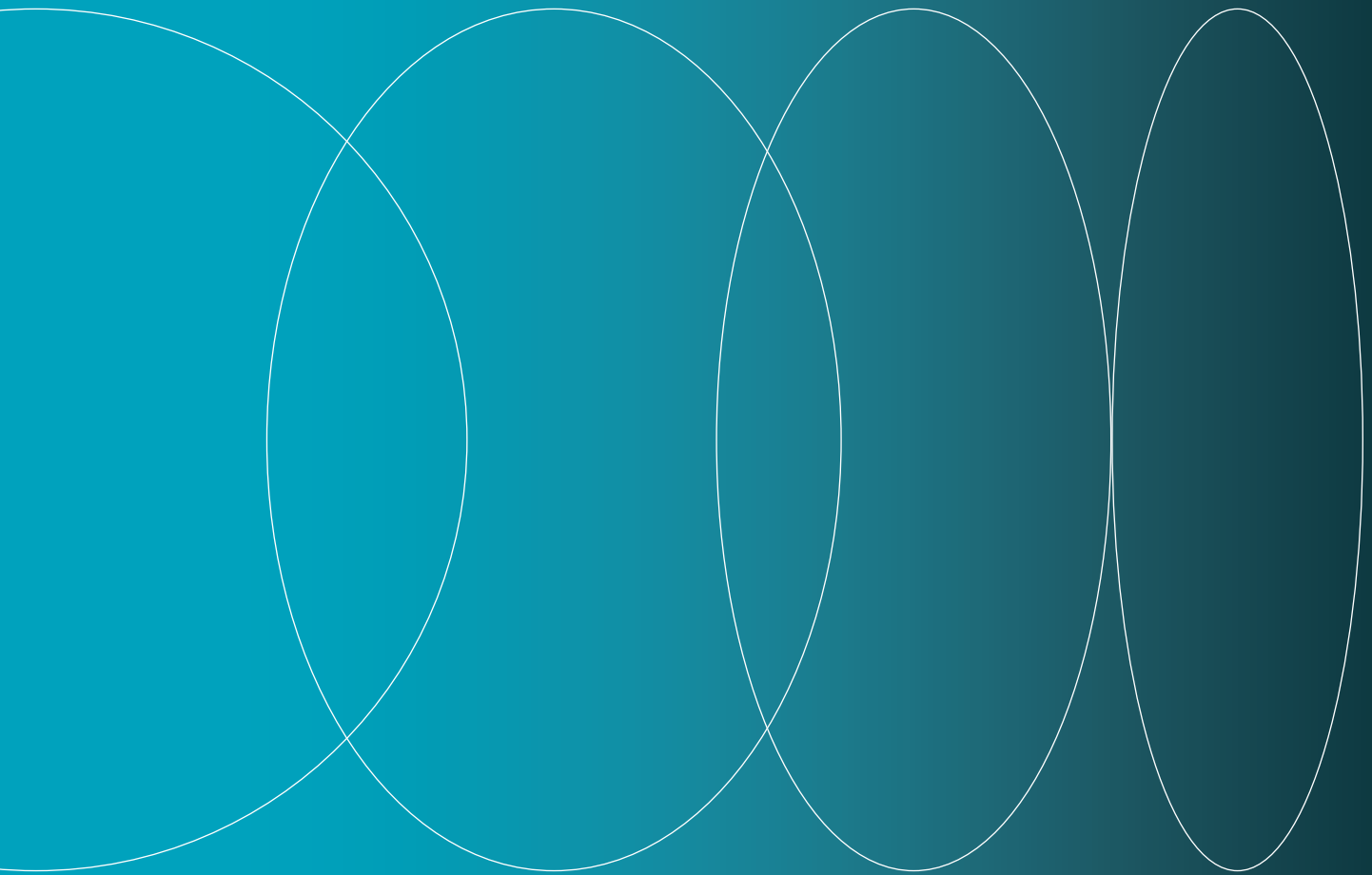
The main insight of 3D investing is not only that sustainability can be added to mean-variance optimization. The deeper insight is that portfolio construction should reflect the actual objectives of investors. Sustainability was an important and natural first application, but the framework is broader. Income, tax efficiency, liability alignment, distress risk, liquidity, and implementation preferences can all serve as additional dimensions when they are economically meaningful and measurable.

Generalized 3D investing is therefore best understood as a flexible architecture for investor-specific portfolio design. Its value lies in making trade-offs explicit, measurable, and implementable. It is designed to help investors understand not only what they are optimizing for, but also what they may be giving up to achieve it.

At the same time, the framework should be applied with discipline. Not every preference deserves to become a separate objective, and not every additional dimension improves the portfolio. The strength of generalized 3D investing lies in combining flexibility with structure: it allows investors to move beyond a narrow risk-return view while still requiring that every additional objective be clearly defined, economically justified, and governable. ●

4. Expected returns

Despite high starting valuations and continued elevated geopolitical risks, equity markets performed remarkably well over the past year. Consistent with this, high corporate bond issuance has been easily absorbed by the market at tight spreads, default losses have been low, and real government bond interest rates have been stable at a positive level, while inflation rates have remained above official central bank targets. Emerging markets equity and bond markets outperformed their developed markets counterparts. All in all, it was a good year for investors. But should investors expect the next five years to be equally favorable?



In Table 4.1, we show our expected returns in four major currencies. There are some notable changes from last year. Expected returns are higher across the board, mainly because of increases in government bond yields. We upgraded the outlook for corporate high yield, real estate and developed equity markets considerably because we expect a more favorable macroeconomic environment over the coming five years.

Table 4.1: Five-year return forecast for the main asset classes

	Long-term	Medium-term influences				Forecast in EUR			USD	JPY	GBP
	Returns	Valuation	Macro	Climate		2027-31	2026-30		2027-31	2027-31	2027-31
Fixed income											
Domestic cash	3.50%		-0.50%		≈	3.00%	3.00%		4.25%	1.50%	4.00%
Domestic bonds	4.00%	-0.50%	-0.25%	0.00%	↑	3.25%	2.75%		5.00%	2.75%	5.75%
Developed	4.25%	0.00%	-0.25%	0.00%	↑	4.00%	3.00%		5.25%	2.50%	5.00%
Emerging debt (local)	5.75%	-0.50%	0.50%	-0.25%	≈	5.50%	5.50%		6.25%	3.25%	6.00%
Emerging debt (hard)	6.00%	-2.50%	0.75%	-0.25%	↑	4.00%	3.75%		5.25%	2.50%	5.00%
Corporate inv grade	5.00%	-1.75%	0.50%	0.00%	↑	3.75%	3.00%		5.00%	2.25%	4.75%
Corporate high yield	6.00%	-2.75%	1.00%	0.00%	↑	4.25%	3.25%		5.50%	2.75%	5.25%
Equity											
Developed	7.00%	-2.00%	2.00%	0.00%	↑	7.00%	6.00%		7.75%	4.75%	7.50%
Emerging	7.50%	-0.75%	1.25%	0.00%	↑	8.00%	7.50%		8.75%	5.75%	8.50%
Real estate	6.00%	-0.25%	1.25%	0.00%	↑	7.00%	5.50%		7.75%	4.75%	7.50%
Commodities	4.00%	-1.00%	1.50%	0.50%	↓	5.00%	5.25%		5.75%	2.75%	5.50%
CPI											
Inflation	3.00%					2.50%	2.50%		3.00%	2.00%	2.75%

Expected performance is no guarantee of future results. The value of your investments may fluctuate.

The scenarios presented are an estimate of future performance based on evidence from the past on how the value of this investment varies, and/or current market conditions and are not an exact indicator. What you will get will vary depending on how the market performs and how long you keep the investment/product. Returns are geometric and annualized. Source: Robeco, September 2026.

The asset allocation challenge of the coming five years differs from that of the previous five years. Over that period, valuation rerating did much of the heavy lifting for investors. Equities benefited from multiple expansion and credit investors from strong spread compression. Global capital increasingly concentrated in a small number of winners. We believe the next phase will be characterized by broader opportunity sets, higher dispersion and a greater reliance on realized earnings and cash-flow growth.

Our three macro themes point in the same direction. Trade rewiring favors a broader distribution of winners across regions. Capital deepening supports sectors and markets with greater exposure to investment spending. AI adoption rewards firms that successfully redesign production processes rather than merely supplying the technology. Together, these forces argue for a less concentrated return environment than investors have experienced so far in this bull market.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

Historically, periods characterized by both strong productivity growth and elevated investment intensity have been favorable for risky assets. Looking across NBER expansions since 1879, realized equity risk premiums averaged more than 10% annually in high-productivity, high-investment regimes, compared with around 6% in low-productivity, low-investment expansions. In addition, we find that US unemployment below 6% is the key threshold at which global equity risk-taking is rewarded, with equities outperforming bonds on an annual basis 75% of the time. As we expect US unemployment not to reach 6% until the 2030s, the implication is that we are still in an environment where risk-taking is likely to be rewarded; bull markets don't die of old age, but more often when too much capital is chasing too few profitable opportunities.

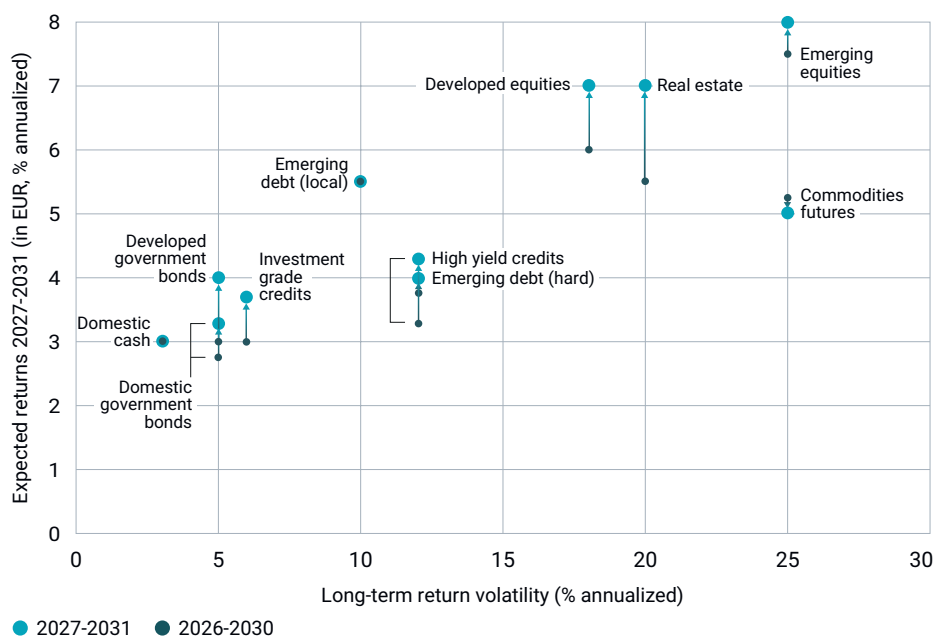
This does not mean valuations no longer matter. Quite the opposite. Risk-premium compression associated with bearing left-tail risk often mean-reverts. Elevated starting valuations remain an important determinant of relative returns across regions and asset classes in the medium term. However, after a period dominated by multiple expansion, we believe investors are moving toward a lower-P/E, higher-EPS environment. Future returns are therefore likely to depend more heavily on earnings delivery, income generation and successful capital allocation. If capital allocation were to give way to excessive misallocation, valuation levels would start to matter greatly again, as we expect in our bear scenario.

At the asset-class level, this leads to three broad conclusions. First, equities should continue to outperform bonds in our base case. While the S&P 500 is already up 238% since the Covid trough, the average bull market return is 343%. Our view of continued global expansion over the next five years is the critical call here. Second, opportunities are likely to broaden beyond the narrow group of companies and markets that dominated the start of this expansion phase. Value transfers from enablers to adopters. Third, real assets should benefit from a world characterized by greater capital intensity, infrastructure spending and demand for productive capacity, and should earn above-steady-state risk premiums.

In short, investors should prepare for a world in which adaptability becomes a source of return. The age of efficiency rewarded concentration. The age of plasticity is likely to reward diversification across regions, sectors and return drivers. The winners may not be those best positioned for a single outcome, but those most capable of adapting to a wider range of outcomes.

Figure 4.1 plots these expected returns against volatility estimates for each asset class for an investor in the eurozone. The analysis in last year's report showed that long-run historical volatility estimates are the best choice for predicting volatility for the coming five years, but that taking the current volatility or valuation environment into account may improve forecasts for the coming year.

Figure 4.1: Five-year return and volatility forecast



Expected performance is no guarantee of future results. The value of your investments may fluctuate.

The scenarios presented are an estimate of future performance based on evidence from the past on how the value of this investment varies, and/or current market conditions and are not an exact indicator. What you will get will vary depending on how the market performs and how long you keep the investment/product. Returns are geometric and annualized. Source: Robeco, September 2026. Vertical axis shows the expected geometric annualized returns for a euro investor over 2027-2031 and 2026-2030. The horizontal axis shows the expected volatility.

It may be tempting to squint and see a mean-variance efficient frontier in Figure 4.1, but doing so would not take correlations between asset classes into account. Assets with low expected returns and high expected volatility could still form part of a mean-variance efficient portfolio as long as they have a low correlation with other asset classes.

4.1 Cash

Cash remains the cornerstone of any portfolio, providing liquidity and stability. The outlook for cash returns is shaped by central bank policy, with most central banks still battling above-target inflation following the post-pandemic recovery. The Great Rewiring, characterized by higher investment in AI infrastructure, electrification, defense and manufacturing, has increased demand for capital and will contribute to a higher neutral interest rate over the next five years (for a more detailed discussion of the neutral interest rate, see Section 2.2). As a result, policymakers are likely to maintain policy rates well above the levels that prevailed during the era of secular stagnation, while balancing support for growth against the need to keep inflation expectations anchored. We believe that the medium-term disinflationary impact of technology booms will incentivize central bankers to show measured flexibility around near-term deviations from target inflation. Ultimately, demand-pull inflation fully catches up (see Figure 2.13), but central banks may discover in the intermediate period that patience is a virtue.¹ This will allow central banks to be less restrictive overall.

1. See, for instance, Aldasoro et al. (2024): "The impact on inflation depends on households' and firms' anticipation of future income growth from AI. In the case of imperfect anticipation, inflation declines in the short run but eventually increases relative to its initial level."

4.1.1 European Central Bank

The ECB operates in an environment where higher investment spending and continued fiscal expansion support activity, while reshoring, the depletion of excess European consumer savings and the rebuilding of strategic autonomy keep some upward pressure on prices. Although inflation gradually moderates as we approach the 2030s, the ongoing expansion means that policymakers remain constrained by a higher neutral real rate than prevailed during the 2010s. We therefore expect the average policy rate over the forecast horizon to be approximately 3.00%. In our bull scenario, the rate is slightly higher at 3.25%, while in the bear scenario it falls to 2.00%.

4.1.2 US Federal Reserve

For the Federal Reserve, stronger productivity growth and continued investment in AI and infrastructure support economic expansion, while inflation remains somewhat stickier, close to but below our 3% steady-state inflation rate for the US. As a result, policy rates are expected to remain above historical norms, reflecting a structurally higher neutral rate. The average Fed policy rate over the forecast horizon is 4.25%. In the bull and bear scenarios, rates average 3.75% and 3.25%, respectively.

4.1.3 Bank of Japan

Japan continues its gradual normalization from the exceptionally accommodative policies that characterized much of the past three decades as the economy moves toward sustainable reflation. Firmer cost-inflation pass-through, higher capital expenditure and especially the recent move toward procyclical fiscal expansion reduce the need for emergency monetary support, although policy rates remain well below those in other developed markets. We expect the average policy rate to be approximately 1.50% during the forecast period. In the bull scenario, it rises to 2.50%, while in the bear scenario it averages 1.00%.

4.1.4 Bank of England

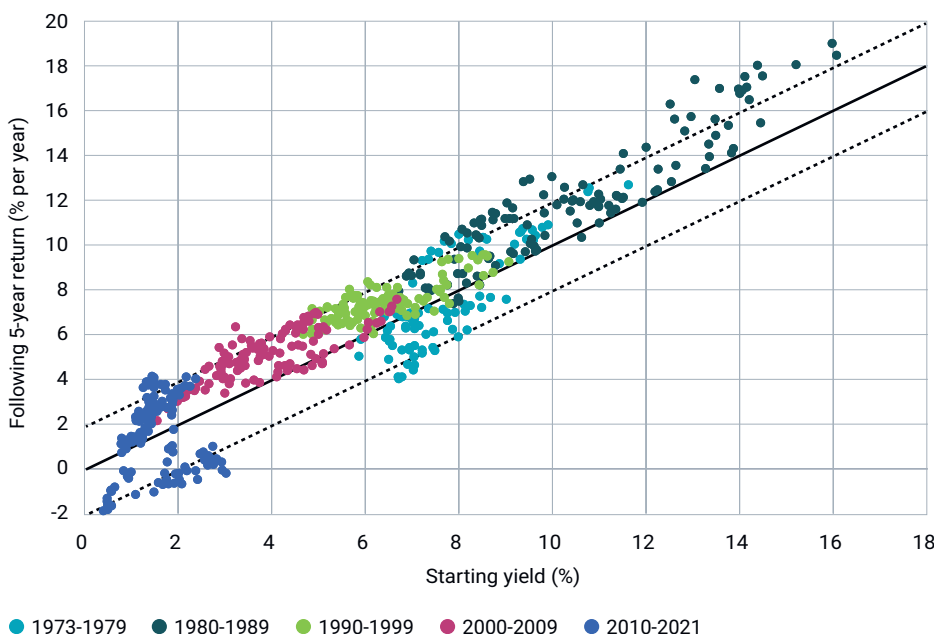
The Bank of England is likely to maintain a relatively restrictive policy stance as persistent domestic inflation pressures are balanced against a bleaker growth outlook than we projected last year. Rates therefore remain elevated by historical standards but are on average 60 bps lower than we estimated last year. We expect the average policy rate over the next five years to be 4.00%. This declines to 3.25% in the bull scenario and 2.75% in the bear scenario.

4.2 Government bonds

The starting yield is an important determinant of expected returns in safe government bond markets over the next five years. For a buy-and-hold position in a five-year zero-coupon bond that does not experience credit losses, the starting yield equals the subsequent five-year realized return. But in the government bond market as a whole, bonds mature and new bonds are issued, with their maturities depending on the term structure of interest rates. Hence, five-year bond market returns are often not equal to the starting yield.

The relationship between the market's starting yield to maturity and subsequent five-year returns for the US Treasury market since 1973 is shown in Figure 4.2. The relation is strongly positive, but far from perfect. Many observations deviate from the solid line by around 2% per year, making it worthwhile to forecast these returns. During this sample period, most dots lie above the 45-degree line, which is consistent with declining interest rates on average and a positive roll yield arising from rebalancing a portfolio while the yield curve is upward sloping. During periods of increasing yields (1973-1979 and 2010-2021), realized returns can also be well below starting yields. Since bond returns can deviate substantially from starting yields, forecasting them is essential for asset allocators.

Figure 4.2: Starting yield and subsequent 5-year realized returns of US Treasuries



Past performance is no guarantee of future results. The value of your investments may fluctuate.

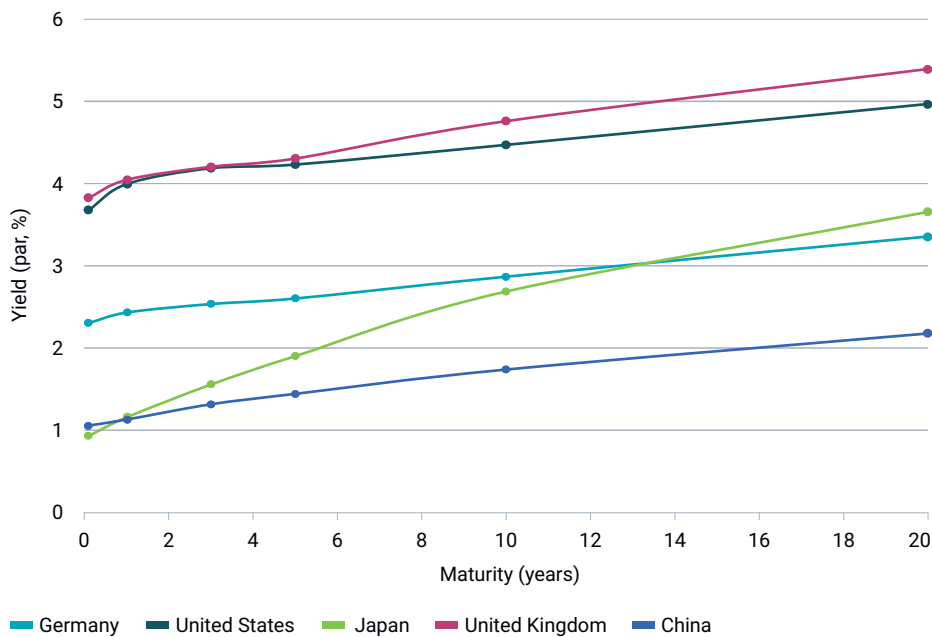
Source: Robeco, Bloomberg. Bloomberg US Treasury index. August 2026. Sample period of the monthly starting yields: January 1973 to June 2021. The solid gray line is the 45-degree line where the starting yield equals the subsequent 5-year average return. The dotted lines are 2% below and above the 45-degree line.

Our approach to determining whether major government bond markets are fairly valued is to compare the yield curve with market expectations for returns on rolling bills and long-term interest-rate levels. Figure 4.3 contains the par yield curves of the major government bond markets. Our long-term equilibrium interest rate for safe nominal government bonds is 4%. This is 0.50% above the equilibrium central bank rate of 3.50%, leading to a term premium of 50 bps.

In addition to the term structure of nominal interest rates, we also examine the real interest rate. Our expected long-term inflation rate in a fiduciary monetary system is 3%, which makes the real interest rate assumption equal to 1%. Figure 4.4 presents this information using forward-looking inflation estimates from inflation-linked bond markets.²

2. China is not included because it does not have an inflation-linked bond market.

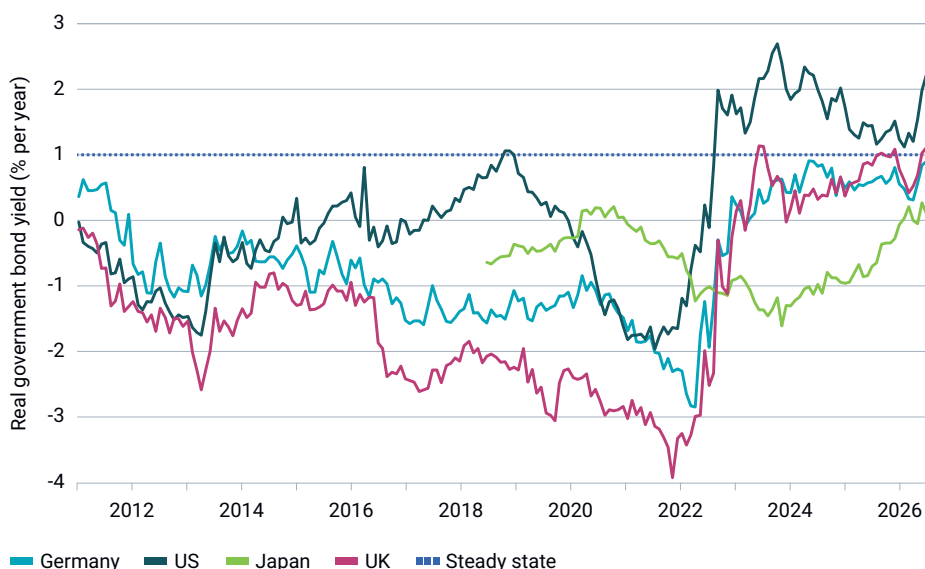
Figure 4.3: Par yield curves for the five main government bond markets



Past performance is no guarantee of future results. The value of your investments may fluctuate.

Source: Bloomberg, Robeco. As at 30 June 2026.

Figure 4.4: Real interest rates



Source: LSEG Datastream, FTSE, Robeco, August 2026. Real interest rates derived from inflation-linked bond and inflation swap markets.

Starting yields remain the dominant driver of medium-term government bond returns. While the era of structurally declining interest rates is unlikely to return, current yields are substantially higher than a decade ago and provide investors with a meaningful income buffer. As a result, we expect government bond returns over the next five years to be broadly in line with starting yields.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

4.2.1 Germany

The German 10-year yield is close to 3%. Combined with medium-term inflation expectations around 2%, this implies a real yield of about 1%, making German government bonds a moderately attractive safe-haven asset. In our base scenario, we expect a return of 3.25% for German government bonds and 3.75% for the eurozone market as a whole. Returns for Germany decline to 2.25% in the bull scenario as yields move higher due to demand for productive capital and decline to 1.50% in the bear scenario as yields move higher due to inflationary pressures.

4.2.2 United States

US Treasury yields remain well above our long-term equilibrium level, as real yields exceed 2%. Compared with previous years, investors demand a higher premium for holding US government debt, reflecting increased policy and fiscal uncertainty. US Treasuries are no longer the safe-haven asset that they once were. The 5-year credit default swap rate for the US is currently around 40 bps, well above the 5 bps recorded in 2022 and the single-digit spread currently priced in for German government bonds.

We expect US government bonds to generate a return of 5.00% in our base scenario. Returns decline to 4.00% in the bull scenario and 3.25% in the bear scenario, where debt sustainability concerns become more pronounced.

4.2.3 Japan

Japanese government bond yields have risen substantially from the levels prevailing during the era of ultra-accommodative monetary policy. Ten-year yields are now close to those in Germany, suggesting that Japan has largely moved beyond its long period of near-zero interest rates.

Our base-case expected return is 2.75%. Returns are lower in both the bull (0.25%) and bear (1.25%) scenarios due to further increases in yields.

4.2.4 United Kingdom

UK government bond yields are close to those of the US, although higher inflation expectations imply lower real yields.

We expect UK government bonds to return 5.75% in the base scenario. Expected returns rise slightly to 6.00% in the bull scenario and decline to 4.75% in the bear scenario.

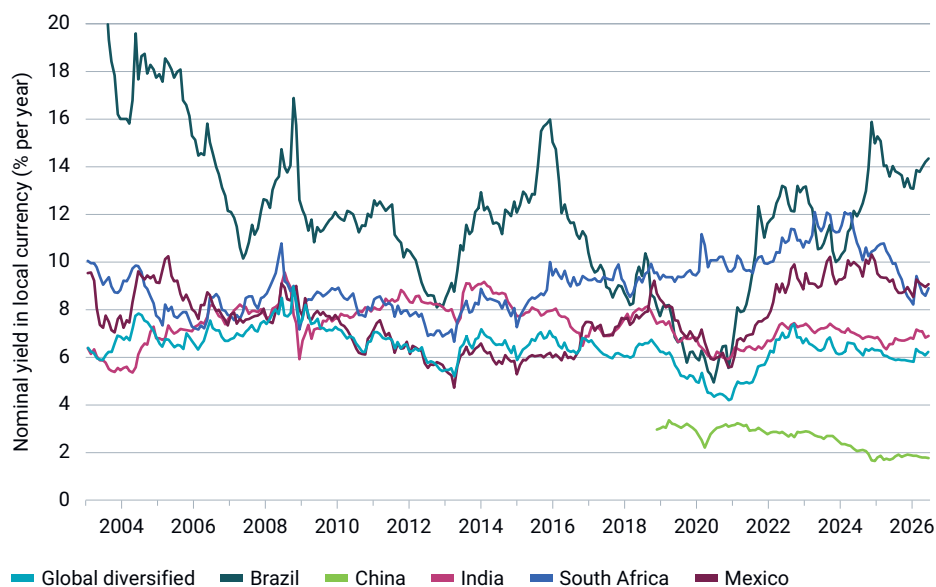
4.2.5 Developed markets

The developed government bond universe is dominated by the eurozone, the US, Japan and the UK. Because returns are considered on a currency-hedged basis, differences in expected cash rates are an important driver of relative performance.

For a euro-based investor, we estimate an expected return of 4.00% for developed market government bonds as a whole, compared with 3.00% in the bull scenario and 2.25% in the bear scenario.

4.2.6 Emerging markets local-currency debt

The yield on local-currency emerging market debt, proxied by the J.P. Morgan GBI-EM Global Diversified Index, has remained close to 6% despite substantial dispersion across countries (Figure 4.5). Higher starting yields than in developed markets remain the asset class's main attraction. Country-specific outcomes will continue to vary, reflecting differences in fiscal positions, institutions and exchange-rate dynamics. For more information on the similarities and differences between countries, see our Special Topic on Emerging Markets on page 70.

Figure 4.5: Yields of local-currency emerging market debt

Source: J.P. Morgan, Robeco. August 2026. The J.P. Morgan Global Bond Index – Global Diversified Index and several important constituents of that index.

Several emerging economies stand to benefit from trade diversion, regional integration and a more fragmented global economy. In our base scenario, stable exchange rates, resilient domestic demand and continued institutional improvements support returns close to current market yields.

We assume market yields remain around 6%. Countries such as Mexico and Poland have overvalued currencies, while Indonesia and India have undervalued currencies. As a whole, emerging market currencies appear slightly expensive versus the euro, resulting in an expected currency drag of 25 bps per year, while downgrade and default losses are estimated at 25 bps. This leads to an expected return of 5.50% for a euro-based investor. For a dollar-based investor, the interest rate carry is lower, but emerging market currencies are expected to appreciate by 50 bps per year.

In the bull scenario, yields converge toward developed-market levels, resulting in an expected return of 6.25%. In the bear scenario, weaker currencies and higher risk premiums reduce the expected return to 1.50%.

4.2.7 Hard-currency emerging market debt

Hard-currency emerging market debt is priced relative to US Treasuries, which is why Figures 4.6 and 4.7 compare sovereign credit spreads with those of corporate bonds. We proxy this market segment using the J.P. Morgan EMBI Global Diversified Index. Many countries represented in this index have historically relied on issuing debt in hard currencies rather than local currencies. This is often because they lack institutions that international investors regard as sufficiently credible, such as independent courts and central banks with strong inflation-fighting credentials; because their economies are heavily influenced by dollar-denominated commodity prices; or because they are relatively small and therefore concerned that international investors may be unwilling to undertake the due diligence needed to assess their institutions and legal frameworks. Credit spreads have narrowed considerably over the past year and are now close to those in corporate credit markets. As a result, the valuation advantage that existed a year ago has largely disappeared.

Our base scenario of continued global expansion and investment-led growth is supportive of emerging market sovereign credit quality. However, current spread levels leave limited room for disappointment. We therefore expect positive returns, albeit lower than those justified by valuations a year ago. Our expected return for a euro-based investor is 4.00%. This remains unchanged in the bull scenario, while in the bear scenario returns decline to 0.75% as higher US yields and wider sovereign spreads increase financing stress and default losses.

4.3 Corporate bonds

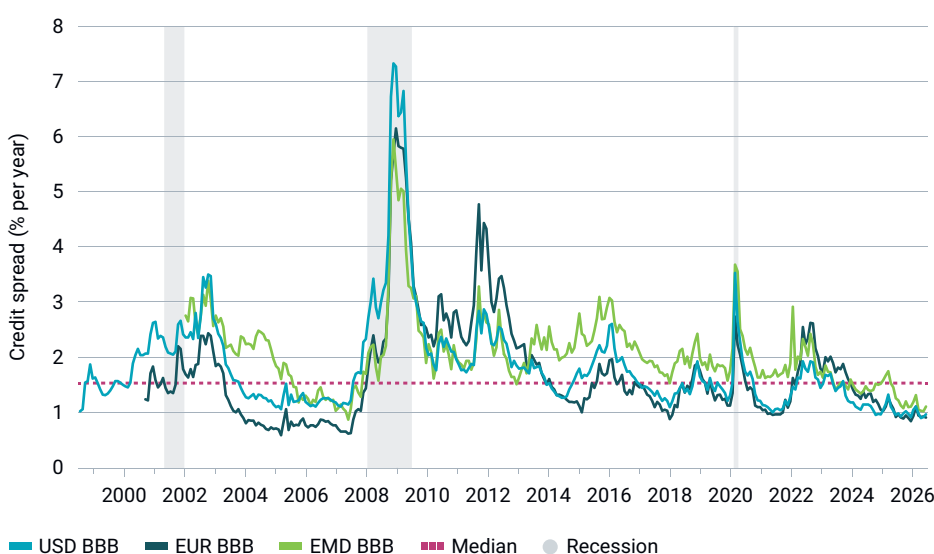
Global corporate bond markets are roughly divided into 70% dollar-denominated and 30% euro-denominated debt, with the high yield market slightly more dollar-heavy than the investment grade market. We do not consider other currencies, as their aggregate market capitalization is small.

4.3.1 Investment grade

Figure 4.6 shows the historical development of the credit component, i.e. the additional spread that an issuer has to pay relative to the corresponding government bond yield. Since the credit quality of the corporate bond index has changed over this period, we display the yield for a specific rating, assuming that the credit quality represented by each rating category has remained constant over time. The investment grade category has become riskier over time, while the high yield category has become relatively safer.

Credit spreads are currently low relative to history, both in the US and Europe (Figure 4.6). As a result, valuations are less attractive. Lower spreads may partly reflect greater risks in government bond markets, given the increase in the credit risk of US government bonds. This does not seem to be the full explanation, as we also see low credit spreads in the eurozone, while the market price of credit risk for Germany has remained low.

Figure 4.6: Credit spreads of BBB-rated corporate and emerging market hard-currency bonds



Source: Robeco, Bloomberg, J.P. Morgan. August 2026.

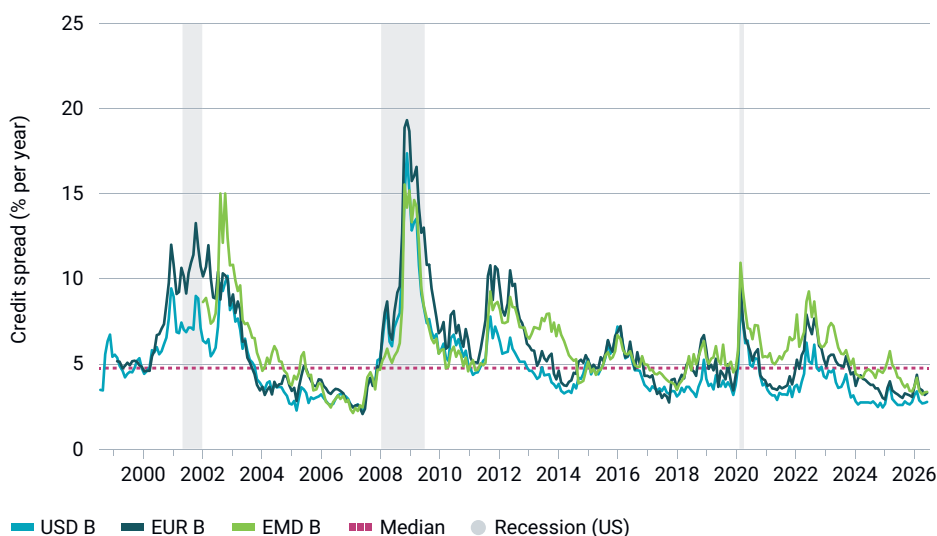
The Great Rewiring is likely to increase corporate borrowing needs as firms invest in AI infrastructure, electrification, defense and manufacturing capacity. While this points to higher issuance and a return to the historical average spread of 120 bps over the next five years, continued economic expansion and healthy earnings growth remain supportive of investment grade credit. We therefore expect investment grade bonds to deliver a moderate premium over government bonds, albeit one below the steady-state level.

In our base scenario, we expect an annual return of 3.75%, around 50 bps above domestic government bonds. Returns rise to 4.00% in the bull scenario and decline to 2.50% in the bear scenario. In both scenarios, expected returns are higher than those on domestic government bonds.

4.3.2 High yield

The high yield bond market has grown much more slowly than other major asset classes. Global equities expanded from roughly USD 40 trillion in 2015 to USD 100 trillion in 2025, while the investment grade bond market grew from USD 18 trillion to USD 28 trillion. By contrast, the high yield market increased only from USD 1.7 trillion to USD 2.1 trillion. Part of this slower growth likely reflects competition from leveraged loans and private credit, segments that have expanded rapidly over the past decade and are now showing signs of strain. More on this can be found in our Special Topic on Private Credit on page 62.

Figure 4.7: Credit spreads of B-rated corporate and emerging market hard-currency bonds



Source: Robeco, Bloomberg, J.P. Morgan. August 2026.

High yield credit benefits from our expectation that the current economic expansion will continue throughout the forecast horizon. Returns on investment in AI infrastructure, electrification and reindustrialization should support corporate revenues and help contain average default losses at around 180 bps, consistent with our GDP forecast. However, these same forces also imply structurally higher financing costs than during the era of ultra-low interest rates, with a potential chokepoint around 2028/2029 as the software sector's refinancing needs peak. Combined with currently tight spreads, this leaves limited room for investor complacency even though we are still at a relatively early stage of a corporate re-leveraging cycle. When liquidity conditions tighten, credit spread widening typically remains below 500-600 bps as long as net debt to earnings remains well below trend. We therefore expect spreads to normalize from today's

compressed levels, averaging around 400 bps (consistent with a low-double-digit EPS growth environment). Default losses are forecasted to rise moderately, while remaining below levels typically associated with recessions.

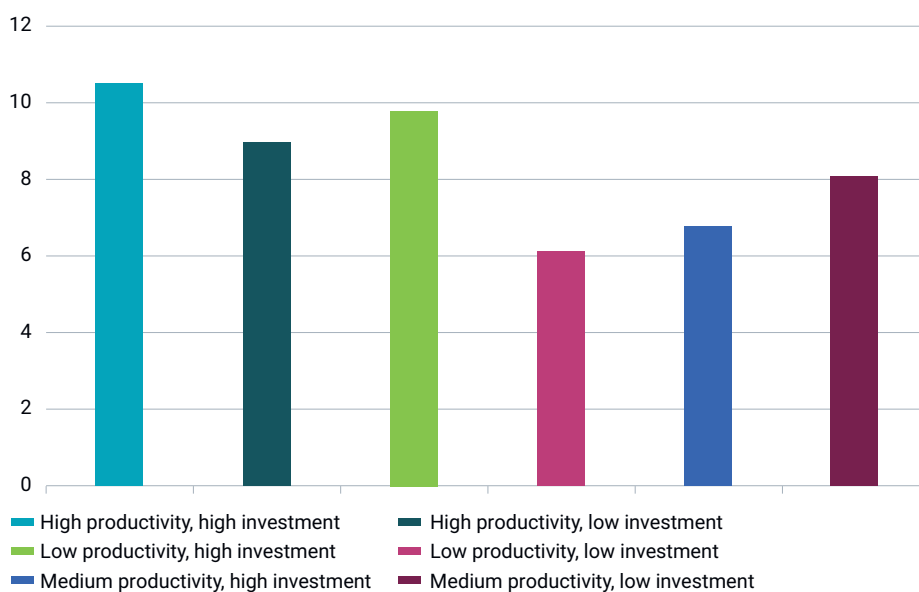
For high yield bonds, carry remains sufficient to support an expected return of 4.25%, or 100 bps above domestic government bonds and 100 bps higher than last year's forecast. In the bear scenario, we expect stress in private credit markets to spill over into broader credit markets, resulting in a public-market credit crunch and an expected return of 3.25%. Despite this, returns remain supported by the relatively short duration of high yield bonds, which limits mark-to-market losses from rising government yields. In the bull scenario, expected returns increase to 5.75%.

4.4 Equity markets

We stick to our call from two years ago that the global equity market is still buzzing rather than in a bubble about to burst.³ This conviction is reinforced by our view of a major shift in real activity growth from consumption-led to more capital-led growth, which will extend the global economic expansion. We find that realized equity risk premiums are strong in this kind of economic setting.

3. See 'Bursting or buzzing bubbles?', p. 52 of Expected Returns 2025-2029

Figure 4.8: Capex and productivity regimes during NBER expansions since 1879



Source: Robeco, Jordà-Schularick-Taylor Macroeconomy Database, Jordà, Schularick, and Taylor (2017) and Jordà, Knoll, Kuvshinov, Schularick, and Taylor (2019). Extracted August 2026.

Yet as in the second half of the 1990s, trading could become choppy, with more frequent drawdowns even as the market reaches new highs. After a strong rerating over the past few years, we enter a phase of the equity cycle where the burden of proof is shifting from the valuation multiple to earnings delivery. The transition from a market driven by P/E to one driven by earnings growth makes the market more vulnerable to both future earnings disappointments and negative discount rate news.

With the US Shiller CAPE at 41 at the time of writing, US equity valuation levels are unusually stretched from a historical perspective. Yet, valuations alone provide an

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incomplete picture. Historically, margins have started to mean revert roughly six quarters before recession. Our expectation of a rejuvenated expansion, together with AI-enabled productivity gains, postpones this process and allows earnings growth to play a larger role than multiple expansions.

In last year's outlook, we argued that markets had climbed a wall of worry while breadth was lacking. That story has evolved as the equal-weighted S&P 500 Index, for instance, has started to hold up better relative to the cap-weighted index over the past 12 months. In our base case, we believe the next five years could see a big rotation in the market as value capture shifts from AI enablers to AI adopters and our macro chapter already documents tentative evidence for this. The current capex-to-free-cash-flow ratio of US hyperscalers is close to 1, a level that has historically been followed by a fairly steep margin erosion five years later. Other historical capex booms, such as those in railroads, telecom and airlines, followed this pattern as well.

Ultimately, value migrates to customers and users as suppliers of the new technology have to compete on price. Therefore, AI may justify stronger and more durable earnings growth across a much broader set of opportunities, extending beyond frontier technology stocks in the US. That is not to say that the US equity rally is exhausted; the average S&P 500 bull market return has been 343%, still more than 100% above the return in the current bull market since the 20 March 2020 trough. Although we upgraded our US equity return forecast compared with last year, we believe investors need to think beyond US exceptionalism in anticipation of a broader return regime.

This is not a trivial rotation. The past decade rewarded investors for owning the scarce companies that could generate growth in a capital-light, low-rate and globally integrated economy. The next five years are likely to reward a different type of scarcity: firms and regions that can adapt to a world being rewired around resilience, capital deepening and technological augmentation. Three decades of globalization wired the world economy for efficiency. The Great Rewiring marks a shift toward plasticity; firms, sectors and countries that can adapt while minimizing efficiency losses are likely to emerge as winners.

For equity investors, this changes the question. It is no longer sufficient to ask whether artificial intelligence will raise productivity. The more relevant question is whether the largest capital deepening cycle in decades can generate enough durable earnings to justify the investment. Buying AI is not the difficult part. Rewiring the organization around AI is. The first phase of the AI boom rewarded the suppliers of the buildout: semiconductors, hyperscalers, infrastructure and the capital-light platforms closest to the technological frontier. The next phase should increasingly distinguish between mere ownership of AI and successful adoption of AI.

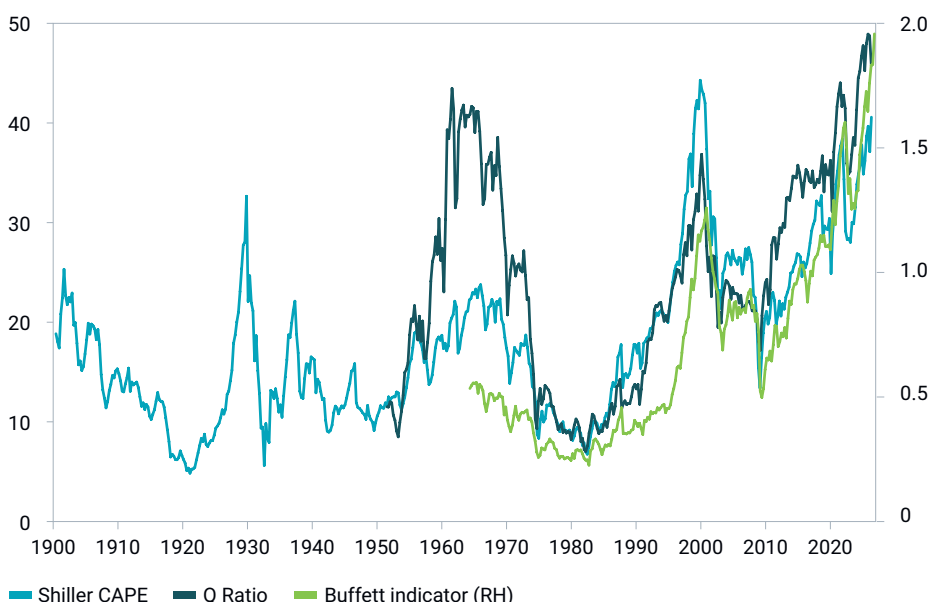
Recent EPS delivery has been unusually strong, and such cyclical earnings surges have often occurred around economic recoveries rather than years into expansion. We find that after these surges, EPS delivery remains healthy. In our base case, a US recession is avoided, labor markets bend but do not break, and the equity cycle remains intact. However, equity valuations are stretched, notably in the US, where the Shiller CAPE has now risen above 40, reaching levels last seen in 1999. Yet, the key threshold is probably not valuation alone, but the path of US unemployment and the Fed's reaction function to deteriorating labor market sentiment. We find that since 1880, whenever US unemployment has remained well behaved and between 4 and 6%, equities have outperformed bonds 75% of the time.

The US remains the powerhouse to beat. It still leads in earnings, capital market depth, AI infrastructure, intangible capital and the ecosystem effects that allow successful innovators to scale quickly. This is why US exceptionalism should fade rather than collapse. Yet the conditions required to sustain it have become increasingly demanding.

The US now needs continued superior EPS delivery, AI capex that keeps paying off, benign disinflation, a sustained global preference for US capital markets and no major deterioration in policy credibility. That is a high bar.

The valuation starting point also leaves little room for disappointment. US valuation metrics remain stretched across CAPE, Tobin's Q and market-cap-to-GDP frameworks.

Figure 4.9: Tobin's Q, Shiller CAPE and Buffett's S&P MV/GDP



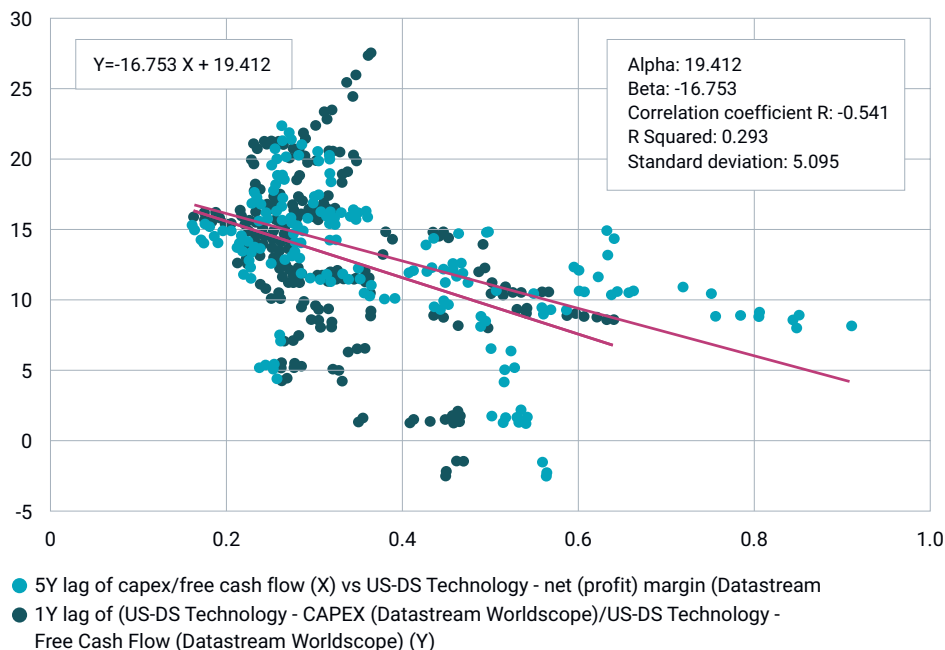
Source: LSEG Datastream, August 2026.

Starting valuations are not destiny, but they matter. They explain only part of subsequent five-year returns, yet high starting valuations increase vulnerability to a turn in the hyperscaler earnings cycle. EPS delivery by the AI leaders has been strong, and the capex cycle has not yet shown evidence of overspending, as some tech companies point out that the majority of spending is committed much closer to deployment and can therefore be scaled back if aggregate demand were to falter. But buzzing bubbles still require an earnings engine. If that engine stalls, the valuation cushion is thin.

The margin outlook is therefore central. US economy-wide margins are at the highest level observed since World War II and have been supported by concentration, pricing power and the winner-takes-most structure of the digital economy. We do not expect full mean reversion toward historical averages. Still, margins face a couple of pressures. First, we expect the gap between real wage growth and labor productivity to narrow in the next five years, as AI may augment labor more than substitute for it, limiting the immediate decline in unit labor costs. Second, we believe we are in the early stages of a corporate re-leveraging phase that could bring greater refinancing pressure and a higher cost of capital. Third, while frontier AI might still see inelastic demand, the commoditization of second- and third-tier models could weigh on future margins.

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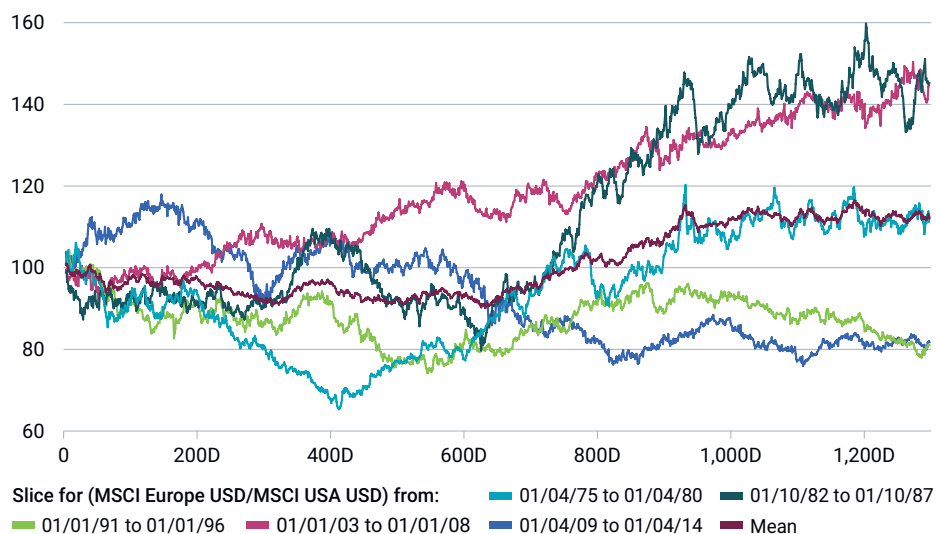
Figure 4.10: High ex-ante capex/free cash flow is followed by lower tech margins five years later



Source: LSEG Datastream, August 2026.

Jevons paradox may help here, though: if cheaper cognition triggers a surge in demand for cognitive tasks – demand for intelligence proves highly elastic – margin erosion may coexist with decent EPS growth in the medium term. We have observed this dynamic among US technology companies in the past.

Figure 4.11: MSCI Europe outperformed the US after shifts from consumption-led to investment-led growth



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Source: LSEG Datastream, August 2026.

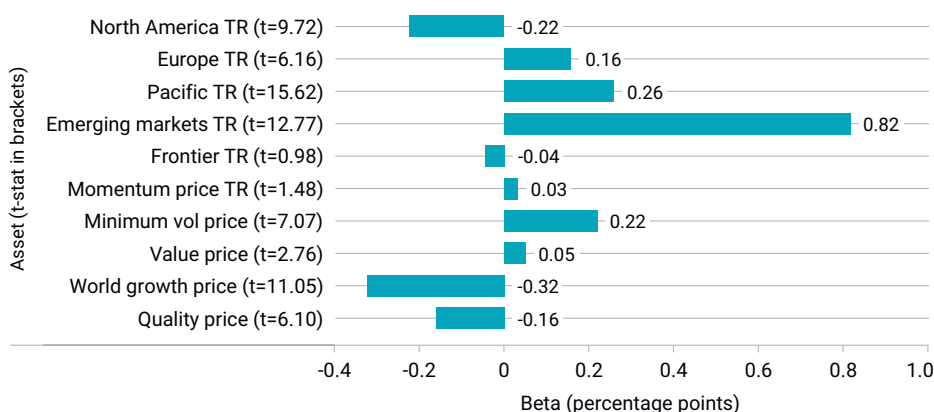
Past performance is no guarantee of future results. The value of your investments may fluctuate.

Europe offers a different opportunity. Last year we argued that Europe had started to get things just right enough to unlock value. That process has further to run even as most investors remain unconvinced. OECD research finds that Europe may still lag the US technological frontier by two to three years, but in a world moving from asset-light globalization toward capital deepening, Europe has greater exposure to the investment cycle than it did during the era of US-led platform dominance. We also find that Europe has outperformed the US during episodes of capital deepening.

The continent also remains considerably cheaper, with its P/E discount to the US still 20% above the historical average. Yet Europe's rerating requires a reduction in relative policy uncertainty. A Russia-Ukraine truce, improved energy security and greater strategic autonomy would help compress risk premiums.

Europe may be part of the rise of middle powers over the next five years. Our macro chapter shows that countries such as Canada, France, Germany, Japan and Korea have seen their external competitiveness improve as currency-adjusted unit labor costs have declined in recent years, while also demonstrating an ability to strengthen energy resilience. These economies have also outperformed the US during periods of capital deepening. As superpowers compete, the middle powers may compound.

Figure 4.12: 5-year forward excess return betas versus MSCI ACWI based on our trade rewiring metric



● β = pp annualized 5Y excess return vs MSCI ACWI per +1 signal unit

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Source: Robeco, MSCI, CPB Netherlands Bureau for Economic Policy Analysis. World Trade Monitor Database, LSEG Datastream. Monthly data over the period 2000-2026. Reported t-statistics are not based on clustered standard errors, so may overestimate statistical significance.

Emerging markets remain the highest-returning equity region in our framework, though the return gap versus developed markets has narrowed compared to last year. The EM case is no longer only a valuation story; it is becoming a regime story. EM equities tend to outperform when the dollar weakens (we expect a secular dollar bear market to continue), when global trade volumes improve (as they continue to do despite increased fragmentation, see Figure 2.1), when industrial activity broadens (we have already seen a synchronized upward shift in global manufacturing activity over the past nine months) and when capital starts flowing toward regions with greater productivity catch-up potential (as evidenced by a broad rerating of emerging market currencies in real terms). These forces have more room to run. In a world in which globalization does not disappear but reorganizes around security, particularly energy security, emerging markets could continue to outperform, in our view. Our trade rewiring metric shows that

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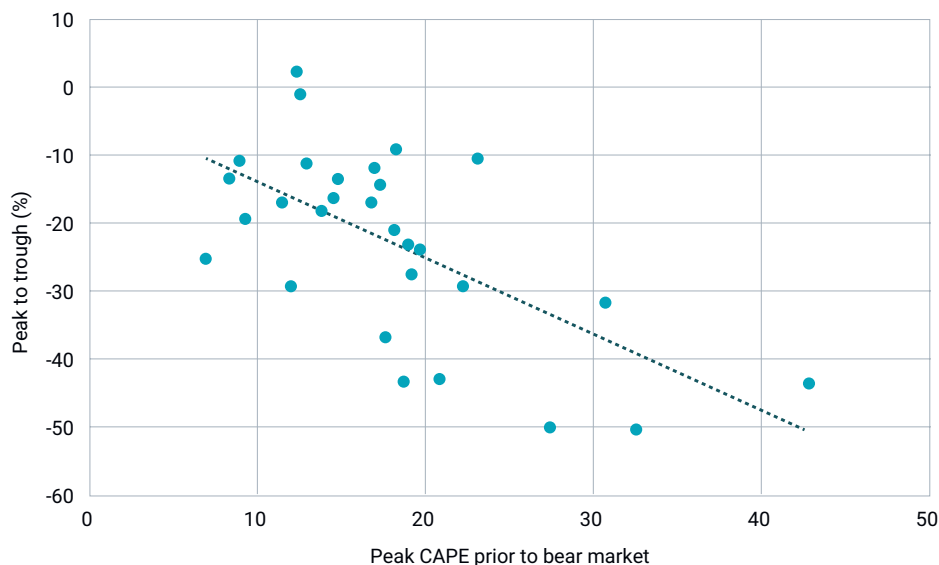
a high degree of ex-ante trade fragmentation points to lower US excess returns and stronger ex-US equity returns in the next five years, notably for emerging markets.

The broader equity opportunity set is therefore becoming less concentrated. If US exceptionalism fades, five opportunities are hiding in plain sight: EM, Europe, small caps, value and low volatility. Each needs a different macro regime. EM needs synchronized global expansion and a weak dollar. Europe needs fiscal revival and risk-premium compression. Small caps need domestic demand and easing financial conditions. Value needs higher capital absorption and a higher real-rate world. Low volatility shines if negative supply shocks become more frequent and the bear case materializes.

In our bull case – Luminous Renaissance – the Great Rewiring becomes productive rather than defensive, energy security is achieved with smaller efficiency losses as energy efficiency improves and supply becomes more abundant. As AI value creation broadens from suppliers to adopters, margin compression among leading US tech companies is less pronounced because demand for frontier AI technology remains high and relatively inelastic as we move closer to AGI. A higher degree of automation relative to labor augmentation than in the base case puts greater downward pressure on unit labor costs, boosting margins more broadly. An easing of tensions between the US and China creates positive technology spillovers. While technological unemployment is higher, cyclical unemployment is much lower, resulting in lower overall global unemployment than in the base case. In that world, equities outperform bonds convincingly, EM leads, Europe and Japan rerate further, and the US continues to compound earnings even as multiples drift lower.

In our bear case – Synaptic Decay – rewiring becomes a rupture rather than a gradual transition. Supply-chain security overwhelms efficiency, policy uncertainty damages investment and risk premiums rise. Moreover, by the end of 2027, financial markets conclude that hyperscalers have overspent on capex. A severe cybersecurity incident in 2027, tighter AI regulation and increased concerns about hidden leverage in the AI ecosystem trigger a US bear market, with the market recovering only by early 2029 after a 45% peak-to-trough decline in the S&P 500 Index, similar to the 44% decline when the TMT bubble burst from comparable valuation levels. The US enters a mild recession in 2028 as capex implodes. Under those conditions, low volatility and defensive equities should shine, while expensive US growth stocks bear the brunt. While earnings recover toward 2030, the P/E undershoots its 40-year average as bond yields rise significantly due to rising term premiums. The aftermath of the US recession reinvigorates bond vigilantes as the US government deficits deviate even further from historical norms by the end of 2028.

Figure 4.13: High ex-ante CAPE levels are associated with steep peak-to-trough declines during NBER recessions



Source: Robeco, Shiller Database, NBER. Period 1871-2026.

4.5 Real estate

Listed real estate has spent much of the post-Covid expansion caught between two narratives and has underperformed global equities by 40%. On the one hand, REITs own tangible assets that retain their usefulness in a world of capital deepening, trade rewiring and accelerating digital infrastructure investment. On the other hand, they remain among the most interest-rate-sensitive equity segments in public markets. This combination has left the asset class in an unusual position: property fundamentals are improving, yet valuations continue to reflect a high degree of skepticism now that the era of negative real rates that prevailed pre-Covid has ended.

Figure 4.14: REITs have lagged equities by 40% since the Covid recession



Source: LSEG Datastream, August 2026.

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We upgraded our expected five-year return for global listed real estate from 5.5% to 7%, which is at the 50th percentile of historical returns for the MSCI World REITs Index. While sitting in the middle of the return distribution, the expected return is unlikely to materialize in a straight line. The return path is likely to be backloaded, with the strongest performance occurring once markets gain confidence that the refinancing cycle has been successfully navigated and long-term bond yields begin to decline after an earlier rise.

Valuation is the starting point. Listed REITs trade at a substantial discount to broader equity markets and remain one of the few major asset classes that have not participated meaningfully in the strong rerating of recent years. On a cyclically adjusted earnings basis, global REITs trade roughly 30% below broader equities. Yet we do not expect a large rerating to drive returns. Real estate valuations have moved sideways for much of the past fifteen years and a strong rerating is not likely if real US Treasury yields average close to 2% over the next five years, as we expect. The investment case therefore depends less on investors' willingness to pay up and more on realized earnings growth and income generation.

The distinction matters. We continue to view REITs primarily as equities with bond-like characteristics rather than bonds with equity-like characteristics. Even so, bond markets remain highly influential because, with net debt currently at around five times earnings, rising financing costs directly affect valuations and earnings. Current capitalization yields remain relatively low compared with government bond yields, suggesting that valuation support alone is insufficient to justify a materially more optimistic outlook.

Fundamentals, however, are improving. Occupancy rates have risen above long-run averages, supply growth is moderating and landlords are gradually regaining pricing power across several property segments. Multifamily housing appears to be moving beyond its recent supply glut, self-storage fundamentals are strengthening and industrial, logistics and data-center assets continue to gain weight within listed property benchmarks. Importantly, these improvements align with the broader themes developed in our macro chapter. Trade rewiring increases demand for logistics and warehousing capacity. Capital deepening supports manufacturing and industrial property. The AI buildout extends beyond semiconductors and hyperscalers, creating demand for data centers, cooling infrastructure and associated facilities.

The recovery in transaction activity is equally noteworthy. During the rate shock of 2022-2023, property-market activity slowed sharply as buyers and sellers disagreed on valuations. As lower-quality assets gradually clear the market and financing conditions stabilize, transaction volumes have begun to recover. Historically, periods following such property-market troughs have often produced attractive subsequent returns as earnings growth and asset values gradually reconnect.

The principal challenge remains refinancing risk. Higher interest rates are a genuine headwind, but likely not an existential one. A significant portion of the valuation adjustment has already occurred. Listed property experienced one of its most severe relative drawdowns in decades as global interest rates repriced higher. Consequently, future refinancing is expected to reduce earnings growth rather than fundamentally derail it. We estimate that refinancing pressures could subtract roughly 0.5-1.0 percentage points from annual earnings growth over the next five years. While meaningful, this remains manageable relative to expected cash-flow growth of 5%.

The path of government bond yields will nevertheless determine the timing of returns. Our base case assumes US Treasury yields continue to rise toward the late stages of the current investment cycle before peaking and subsequently declining as productivity gains from AI become more visible and inflationary pressures moderate. Under such a scenario,

listed real estate may continue to lag broader equities over the next one to two years before becoming a significant beneficiary of lower financing costs later in the forecast horizon.

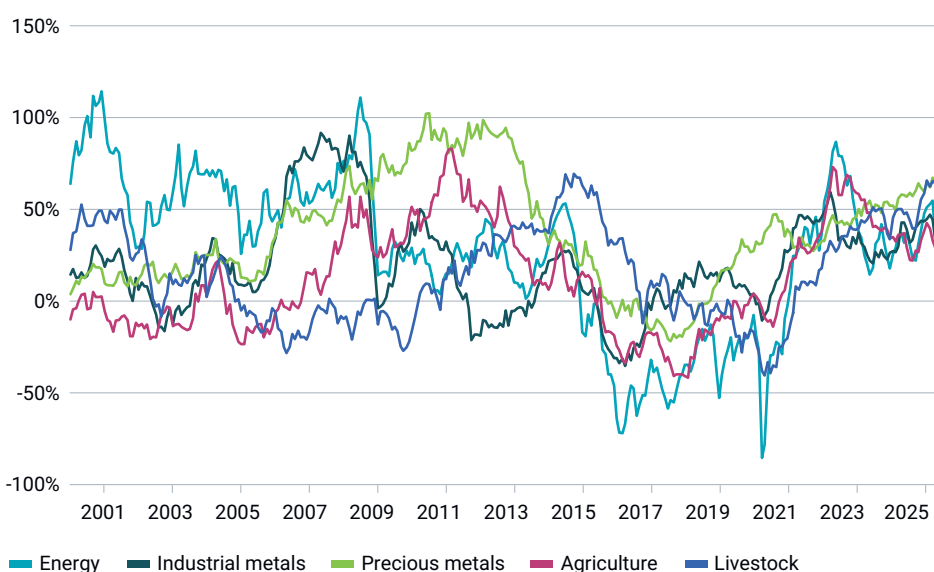
This asymmetry explains why we favor the asset class over a five-year window despite near-term uncertainty. Real estate remains a leveraged expression of our broader macro view: temporary pressure from capital-market tightening followed by eventual support from improving productivity, moderating inflation and declining discount rates. Our 7% return assumption does not require heroic assumptions regarding multiple expansion and even incorporates a modest degree of multiple compression relative to history. Most of the expected return derives from rental income and earnings growth rather than a rerating of the asset class.

In our bull case, lower bond yields arrive earlier than expected as automation-induced labor market weakness prompts a stronger monetary policy response, with the Fed keeping policy rates below neutral. Under those conditions, REIT returns become more front-loaded and valuation support emerges as an additional return driver. In our bear case, long-term yields remain elevated as fiscal deficits and refinancing pressures continue to push term premiums higher. In that environment, listed property would struggle to translate improving fundamentals into shareholder returns despite continued growth in underlying cash flows, even as an era of hoarding spurs demand for warehousing.

4.6 Commodities

Although precious metals have retraced somewhat in recent months, they remain the most expensive commodity segment based on our valuation metrics. Persistent inflation concerns, elevated fiscal risks and growing doubts about the ability of policymakers to maintain price stability have likely contributed to this strength. Agricultural commodities are the only category currently displaying a clear valuation discount, while energy and industrial metals trade close to their levels of five years ago.

Figure 4.15: Valuation signals for the various commodity categories



Source: LSEG Datastream, Robeco, June 2026. The figure shows the natural logarithm of the commodity category price index divided by the average of the same price index from 5.5 to 4.5 years ago, minus one. Monthly data in US dollars.

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4.6.1 Precious metals

Precious metals delivered exceptional returns over the past year as investors sought protection against geopolitical fragmentation, rising sovereign debt burdens and the weakening safe-haven characteristics of government bonds. Continued central bank reserve diversification provided an additional structural source of demand. Gold remains an effective hedge against geopolitical and fiscal risks, although we do not expect a repetition of its exceptionally strong recent performance in our base scenario.

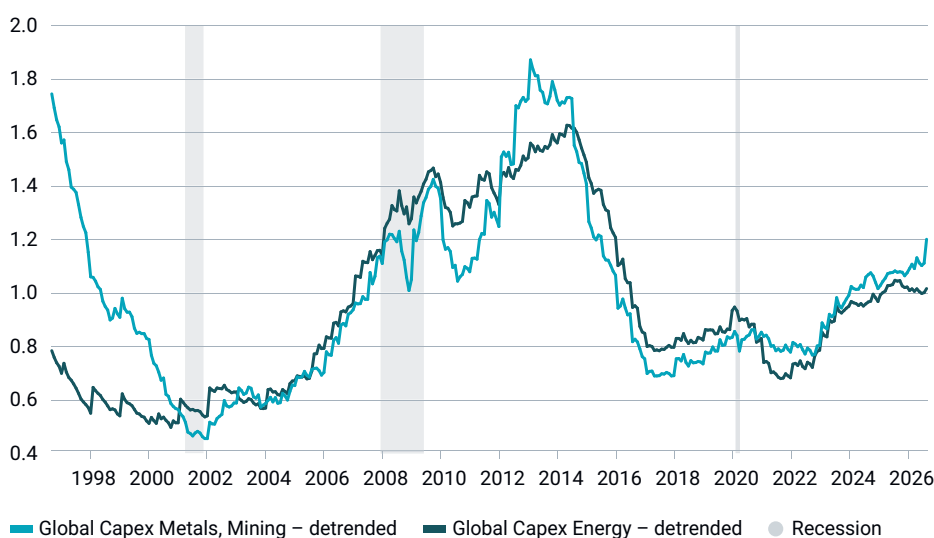
4.6.2 Agricultural commodities

Agricultural prices are likely to remain modestly above their pre-pandemic averages, but we do not anticipate a sustained supercycle. Our trade-rewiring thesis implies a world with greater supply-chain redundancy, more trade frictions and periodic disruptions to global trade flows. At the same time, rising incomes in emerging markets and a resilient global economy support demand. However, unlike AI infrastructure or electrification, agriculture is not a major beneficiary of capital deepening, limiting upside potential. Overall, we expect moderate price appreciation, interrupted by temporary price spikes driven by climate and geopolitical factors.

4.6.3 Industrial metals

Capital deepening through AI infrastructure, electrification, grid expansion, reshoring and defense investment is highly metal-intensive. Copper, aluminum, nickel and other industrial metals should therefore benefit from sustained growth in investment demand. Unlike previous cycles, which were driven primarily by consumption, the current expansion is increasingly investment-led, a pattern historically associated with greater metals intensity. As a result, industrial metals are likely to receive the strongest structural support among the major commodity sectors. However, stronger demand is also likely to stimulate additional mining and processing capacity. Figure 4.16 shows that, over the past couple of years, capital expenditures for energy and metals mining have been at or even slightly above their historical trend. We therefore expect structurally firm prices, but not a prolonged industrial metals supercycle.

Figure 4.16: Capital expenditures for energy and metals mining relative to historical trend



Source: LSEG Datastream, August 2026.

4.6.4 Energy

Energy security concerns, electrification and rapidly rising electricity demand from AI infrastructure and data centers support energy prices. While renewable generation capacity continues to expand, the transition itself requires substantial investment and can create temporary mismatches between supply and demand. Meanwhile, geopolitical tensions continue to create supply-side risks, as discussed in our Special Topic on Energy Security on page 54. We therefore expect energy prices to remain elevated relative to the 2010s, accompanied by considerable volatility and periodic supply-shock-driven price spikes.

Taken together, we expect commodities to deliver annual returns of 5.00% for a euro-based investor in our base scenario. Returns are higher in both alternative scenarios: 6.25% in the bull scenario, driven by stronger demand, and 7.00% in the bear scenario, where inflation concerns and debt-sustainability risks provide additional support for commodity prices.

4.6.5 Summary

The introduction to this chapter provides a full overview of our return expectations for the main asset classes in our base case scenario. In the table below, we show these returns alongside our expectations for the other two scenarios, both for euro and US dollar investors. In our bull scenario, we expect high returns for risky asset classes, whereas in our bear scenario, we forecast below-steady-state returns for most risky asset classes. The exception is commodities, which benefit from higher inflation in the bear case. ●

Table 4.2: Five-year return forecasts for asset classes in our three macroeconomic scenarios

	Expected Returns 2027-2031 (EUR)				Expected Returns 2027-2031 (USD)		
	Bull	Base	Bear		Bull	Base	Bear
Fixed income							
Domestic cash	3.25%	3.00%	2.00%		3.75%	4.25%	3.25%
Domestic bonds	2.25%	3.25%	1.50%		4.00%	5.00%	3.25%
Developed	3.00%	4.00%	2.25%		3.50%	5.25%	3.50%
Emerging debt (local)	6.25%	5.50%	1.50%		7.25%	6.25%	3.50%
Emerging debt (hard)	4.00%	4.00%	0.75%		4.50%	5.25%	2.00%
Corporate inv grade	4.00%	3.75%	2.50%		4.50%	5.00%	3.75%
Corporate high yield	5.75%	4.25%	3.25%		6.25%	5.50%	4.50%
Equity							
Developed	11.50%	7.00%	-0.25%		12.50%	7.75%	1.75%
Emerging	11.25%	8.00%	-4.25%		12.25%	8.75%	-2.25%
Real estate	8.50%	7.00%	2.00%		9.50%	7.75%	4.00%
Commodities	6.25%	5.00%	7.00%		7.25%	5.75%	9.00%
CPI							
Inflation	2.00%	2.50%	2.75%		2.00%	3.00%	4.25%

Expected performance is no guarantee of future results. The value of your investments may fluctuate. The scenarios presented are an estimate of future performance based on evidence from the past on how the value of this investment varies, and/or current market conditions and are not an exact indicator. What you will get will vary depending on how the market performs and how long you keep the investment/product. Returns are geometric and annualized. Source: Robeco, September 2026.

Past performance is no guarantee of future results. The value of your investments may fluctuate.

References

Note that many of the papers listed below are available at scholar.google.com or www.ssrn.com

Literature Chapter 2 – Macro (p. 16-43)

Acemoglu, D. (2024). The Simple Macroeconomics of AI. NBER Working Paper No. 32487. Cambridge, MA: National Bureau of Economic Research.

Acemoglu, D., and Restrepo, P. (2019). Automation and New Tasks: How Technology Displaces and Reinstates Labor. *Journal of Economic Perspectives* 33(2), 3-30.

Acemoglu, D., Autor, D., and Johnson, S. (2026). Building Pro-Worker Artificial Intelligence. *NBER Working Paper* 34854.

Aghion, P., and Bunel, S. (2024). AI and Growth: Where Do We Stand? *Federal Reserve Policy Note*.

AIOE-Data (2021). AIOE and Related Datasets. GitHub repository.

Ambrosino, L., Chan, J., and Tenreyro, S. (2024). Trade Fragmentation, Inflationary Pressures and Monetary Policy. BIS Working Paper No. 1225. Basel: Bank for International Settlements.

Autor, D., Chin, C., Salomons, A. M., and Seegmiller, B. (2022). New Frontiers: The Origins and Content of New Work, 1940-2018. NBER Working Paper No. 30389. Cambridge, MA: National Bureau of Economic Research.

Bain & Company (2025/2026). \$2 trillion in new revenue needed to fund AI's scaling trend. Bain Global Technology Report.

Baldwin, R. (2025). Did the Hack break the world trade order? CEPR Press Book Chapters, in: *The Great Trade Hack: How Trump's trade war fails and the world moves on* 1(1), chapter 9, Centre for Economic Policy Research.

Bhatt, A., Diercks, A. M., Eyal, B., and Skaperdas, A. (2026). The Causal Effect of Debt on Interest Rates. Finance and Economics Discussion Series 2026-031. Washington, DC: Board of Governors of the Federal Reserve System.

BNEF / BloombergNEF. Energy-transition investment estimates used in the capital-deepening chapter.

Brynjolfsson, E., Li, D., and Raymond, L. R. (2023). Generative AI at Work. NBER Working Paper No. 31161. Cambridge, MA: National Bureau of Economic Research.

Carney, M. (2026). Special Address at the World Economic Forum Annual Meeting. Davos, 20 January 2026.

Chesterton, G. K. (1909). *The Club of Queer Trades*. London: Harper & Brothers.

Cobb, C. W., and Douglas, P. H. (1928). "A Theory of Production." *American Economic Review*, 18(1), 139-165.

Corrado, C., Haskel, J., Jona-Lasinio, C., & Iommi, M. (2023). INTAN-Invest: Intangible Capital Database.

Cui, K., Demirer, M., Jaffe, S., Musolf, L., Peng, S., and Salz, T. (2026). The Effects of Generative AI on High-Skilled Work: Evidence from Three Field Experiments with Software Developers. *Management Science* (forthcoming).

David, P. A. (1990). "The Dynamo and the Computer: An Historical Perspective on the Modern Productivity Paradox." *American Economic Review Papers and Proceedings*, 80(2), 355-361.

EU KLEMS Database. EU KLEMS & INTAN-Invest Consortium. (2024). EU KLEMS & INTAN-Invest Database. Growth, productivity, labour, capital and intangible asset accounts by industry. Available at the EU KLEMS database.

European Central Bank (2026). Global trade redirection: tracking the role of trade diversion from US tariffs in Chinese export developments.

European Commission (2026). EU-Mercosur Agreement.

Felten, E. W., Raj, M., and Seamans, R. (2021). "Occupational, Industry, and Geographic Exposure to Artificial Intelligence: A Novel Dataset and Its Potential Uses." *Strategic Management Journal*, 42(12), 2195-2217.

Ferreira, T., and Shousha, S. (2020). Scarcity of Safe Assets and Global Neutral Interest Rates. International Finance Discussion Paper No. 1293. Washington, DC: Board of Governors of the Federal Reserve System.

Ferreira, T., Lott, M., and Richards, K. (2025). Real-Time Global Longer-Run Neutral Rates. FEDS Notes, 9 April 2025. Used as an updated Fed source on longer-run neutral-rate estimates and their decomposition.

Filippucci, F., Gal, P., and Schief, M. (2024). Miracle or Myth? Assessing the macroeconomic productivity gains from Artificial Intelligence. OECD Artificial Intelligence Papers, No. 29. OECD Publishing, Paris.

Fishman, E. (2025). *Chokepoints: American Power in the Age of Economic Warfare*. New York: Portfolio/Penguin.

Gartner (2026). Global AI spending forecast.

Ghods, M., Grubler, J., and Stehrer, R. (2016). Import Demand Elasticities Revisited. wiiw Working Paper No. 132. Vienna: Vienna Institute for International Economic Studies.

Google / Brilyant (2025). Google State of AI Infrastructure 2025 Research Report.

Google Cloud (2025). Google Cloud Infrastructure Report.

Gould, S. J. (1989). *Wonderful Life: The Burgess Shale and the Nature of History*. New York: W.W. Norton & Company.

Grover, A., and Vézina, P.-L. (2025). World Bank research on geopolitical alignment and investment allocation.

Haskel, J., and Westlake, S. (2017). *Capitalism without Capital: The Rise of the Intangible Economy*. Princeton: Princeton University Press.

- Holston, K., Laubach, T., and Williams, J. C. (2017). "Measuring the Natural Rate of Interest: International Trends and Determinants." *Journal of International Economics*, 108, S59-S75. Used via the Laubach-Williams / Holston-Laubach-Williams neutral-rate framework.
- International Energy Agency (2026). Data-centre and electricity-demand projections.
- International Energy Agency (2026). The Middle East and Global Energy Markets.
- International Labour Organization (2023). *Generative AI and Jobs: A Global Analysis of Potential Effects on Job Quantity and Quality*.
- Jevons, W. S. (1865). *The Coal Question: An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal-Mines*. London: Macmillan.
- Jordà-Schularick-Taylor Macrohistory Database.
- Kharazian, A., Simon, L., and Stevens, R. (2026). A New Look at AI's Impact on Jobs: Firm-Level AI Spending and Workforce Adjustment. Ramp Economics Lab.
- Krugman, P. (2026). "The New Global Order." Lecture at Erasmus University, 19 May 2026.
- Loaiza, I., and Rigobon, R. (2025). The EPOCH of AI: Human-Machine Complementarities at Work. *MIT Sloan Research Paper* 7236-24.
- LSEG Datastream. Data source for multiple charts in the trade, capital and production chapters.
- McKinsey & Company (2025). Research on organizational rewiring, workflow redesign, governance and retraining.
- McKinsey & Company (2026). Data-centre investment estimate. MSCI, LSEG and Robeco. Related diversification work and charting.
- Noy, S., and Zhang, W. (2023). "Experimental Evidence on the Productivity Effects of Generative Artificial Intelligence." *Science*, 381(6654), 187-192.
- Reuters (2026). "Geopolitical shifts drive sovereign funds towards national priorities, study finds."
- Ricardo, D. (1817). *On the Principles of Political Economy and Taxation*. London: John Murray.
- Robeco (2023). Expected Returns 2023-2027.
- Robeco (2024). Expected Returns 2024-2029.
- Robeco (2025). Expected Returns 2025-2029.
- Robeco (2026). Expected Returns 2026-2030.
- Rotunno, L., and Ruta, M. (2025). Trade Partners' Responses to US Tariffs. IMF Working Paper No. 2025/147. Washington, DC: International Monetary Fund.
- S&P Global (2026). Data-centre electricity demand / US electricity-growth reference.
- Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. New York: Harper & Brothers. See Chapter VII, "The Process of Creative Destruction."
- Solow, R. M. (1987). "We'd better watch out." *New York Times Book Review*, 12 July 1987.
- Straub, L. (2025). Fiscal Drivers of r^* . Presentation at the Federal Reserve Bank of New York AMEC Symposium.
- Szoke, B., Xavier, I., and Vazquez-Grande, F. (2024). Convenience Yield as a Driver of r^* . FEDS Notes, 3 September 2024.
- Tainter, J. A. (1988). *The Collapse of Complex Societies*. Cambridge: Cambridge University Press.
- Taleb, N. N. (2012). *Antifragile: Things That Gain from Disorder*. New York: Random House.
- Warsh, K. (2025). The Federal Reserve's Broken Leadership. *Wall Street Journal*, November 2025.
- World Intellectual Property Organization and Luiss Business School (2025). *World Intangible Investment Highlights 2025*.

Literature Chapter 3 – Climate (p. 44-55)

- Azlen, M., Gostlow, G., and Child, A. (2022) The carbon risk premium. *Journal of Alternative Investments* 25(1), 33-64.
- Beirne, J., Renzhi, N., and Volz, U. (2021) Feeling the heat: Climate risks and the cost of sovereign borrowing. *International Review of Economics and Finance* 76, 920-936.
- Bilal, A., and Känzig, D. (2026) The macroeconomic impact of climate change: global versus local temperature. *Quarterly Journal of Economics* 141(2), 889-944.
- Boehm, S. (2022) Physical climate change and the sovereign risk of emerging economies. *Journal of Economic Structures* 11, 31.
- Burke, M., Hsiang, S., and Miguel, E. (2015) Global non-linear effect of temperature on economic production. *Nature* 527, 235-239.
- Cameron, A., and Baudry, M. (2023) The case for carbon leakage and border adjustments: where do economists stand? *Environmental Economics and Policy Studies* 25, 435-469.
- Cappiello, L., Ferrucci, G., Maddaloni, A., and Veggente, V. (2026) Creditworthy: Do climate change risks matter for sovereign credit ratings? *Journal of International Money and Finance* 167, 103628.
- Chen, H., Di Gregorio, M., Paavola, J. (2026) Carbon leakage in emissions trading systems: a systematic review and meta-analysis of ex-ante and ex-post evidence. *Climate Policy* (forthcoming).
- Clayton, J., Devaney, S., Sayce, S., and Van de Wetering, J. (2021) Climate risk and real estate prices: What do we know? *Journal of Portfolio Management* 47(10), 75-90.
- Equinor (2026) Energy Perspectives: Global macroeconomic and energy market outlook.

- Forbis, D., Patricola, C., Bercos-Hickey, E., and Gallus, W. (2024)** Mid-century climate change impacts on tornado-producing tropical cyclones. *Weather and Climate Extremes* 44, 100684.
- Giesta, J. and Swinkels, L. (2025)** Exploring emerging markets debt: Bond voyage? *Journal of Asset Management* 26(7), 847-862.
- Hasan, M., Haque, R., Jahurul, M., Rasul, M., Fattah, I., Hassan, N., and Mofijur, M. (2025)** Advancing energy storage: The future trajectory of lithium-ion battery technologies. *Journal of Energy Storage* 120, 116511.
- Keen, S. (2021)** The appallingly bad neoclassical economics of climate change. *Globalizations* 18(7), 1149-1177.
- Keen, S. and Hanley, B. (2023)** Supporting Document to Loading the DICE Against Pension Funds: How did we get here? Carbon Tracker.
- Koekkoek, R., and Swinkels, L. (2026)** Better decarbonization incentives with a shorter bond maturity profile. Working Paper.
- Kotz, M., Levermann, A., and Wenz, L. (2025)** Author correction of "The economic commitment of climate change". Working paper.
- Markwat, T., Hanauer, M., and Swinkels, L. (2026)** The illusion of the carbon premium. Working paper.
- Markwat, T. and Swinkels, L. (2024)** Corporate carbon emissions data for equity and bond portfolios. *Managerial Finance* 50(1), 118-139.
- Mehling, M., Dolphin, G., and Ritz, R. (2025)** The European Union's CBAM: averting emissions leakage or promoting the diffusion of carbon pricing? *Journal of Environmental Policy and Planning* 27(6), 687-705.
- Neal, S., and Swinkels, L. (2026)** Narratives and numbers when retirement faces climate risks. Working Paper.
- Neal, T., Newell, B., and Pitman, A. (2025)** Reconsidering the macroeconomic damage of severe warming. *Environmental Research Letters* 20(4), 044029.
- Penn, M. (2025)** Natural capital and tipping points. Absolute Strategy Research (5 December).
- Pietersma, M., Markwat, T., Rein, B., and Swinkels, L. (2026)** Pricing Sustainability. Working Paper.
- Robinson, S., and Zheng, S. (2026)** Managing Physical Risk in Commercial Real Estate. CREDA Research Foundation.
- Swinkels, L. and Yang, J. (2023)** Investing in carbon credits. *Journal of Alternative Investing* 26(2), 28-59.
- Thompson, J., Wilby, R., Hillier, J., Connell, R., and Gunn, N. (2026)** Flood-affected homes in England lose value and are owned longer than those in unaffected areas. *Communications Earth and Environment* 7, 530.
- Tu, J., Wen, J., Yang, L., Reimuth, A., Young, S., Zhang, M., Wang, L., and Garschagen, M. (2023)** Assessment of building damage and risk under extreme flood scenarios in Shanghai. *Natural Hazards and Earth System Sciences* 23(1), 3247-3260.
- Vriz, G., Cojoianu, T., Fischer, C., and Taschini, L. (2026)** Early signs that the EU carbon border adjustment mechanism is reshaping EU-India steel trade. *Nature Climate Change* 16, 737-741.
- Zhu, B., and Fuerst, F. (2026)** The Transmission of Climate Hazard Exposure to Equity Risk: Evidence From Real Estate Firms. *Journal of Real Estate Finance and Economics* (forthcoming).

Literature Special topic – Energy (p. 58-65)

BloombergNEF (2025), Global Grid and Storage Investment Outlook.

Clarksons Research (2025), Shipping Review & Outlook.

Copley, G., Pickford, A., Bodansky, Y., & Archibald, D. (2011), Energy Security 2.0: How Energy is Central to the Changing Global Balance in the New Age of Geography.

European Commission (2024), European Industrial Alliance on Small Modular Reactors (SMRs).

International Energy Agency (2024), World Energy Outlook.

International Energy Agency (2025), Critical Minerals Outlook.

International Energy Agency (2025), The Path to a New Era for Nuclear Energy.

McKinsey Global Institute (2024), Geopolitics and the Geometry of Global Trade.

Morgan Stanley Research (2026), Asia Energy Security and AI: Energy Meets Compute – Supercycle Recharges.

OECD Nuclear Energy Agency (2025), Nuclear Energy Outlook 2025.

S&P Global Market Intelligence (2025), Surging Energy Demand Puts US Utility Capex Forecast Near \$1.3 Trillion in 2026-30.

US Geological Survey (2025), Mineral Commodity Summaries.

Wood Mackenzie (2025), Why Upstream Companies Might Break Their Capital Discipline Rules.

World Nuclear Association (2025), Nuclear Power in the World Today.

Literature Special topic – Private credit (p.66-73)

Alternative Credit Council (ACC), & Houlihan Lokey. (2025). Financing the Economy 2025. Alternative Investment Management Association (AIMA). <https://www.aima.org/static/e18bf558-90f4-4551-9d3fc002b498afc4/b0234dc6-4f8e-4f82-96fdd5dcae2a382/Financing-the-Economy-2025.pdf>

Doerr, S., Eren, E., Krohn, I., & Todorov, K. (2026, March 16). Private credit's software lending meets AI disruption. BIS Quarterly Review. Bank for International Settlements. https://www.bis.org/publ/qrtrpdf/r_qt2603v.htm

Literature Special topic – Emerging markets (p.74-81)

Gelos, G. and McQuade, P. (2024) 'The US dollar and capital flows to EMEs', *BIS Quarterly Review*, September 2024. Basel: Bank for International Settlements.

International Monetary Fund (2024) *Mexico: 2024 Article IV Consultation*. IMF Country Report No. 24/317. Washington, DC: IMF.

International Monetary Fund (2025a) *India: 2025 Article IV Consultation*. IMF Country Report No. 25/314. Washington, DC: IMF.

International Monetary Fund (2025b) *Brazil: 2025 Article IV Consultation*. IMF Country Report No. 25/194. Washington, DC: IMF.

International Monetary Fund (2025c) *Saudi Arabia: 2025 Article IV Consultation*. IMF Country Report No. 25/223. Washington, DC: IMF.

International Monetary Fund (2025d) *United Arab Emirates: 2025 Article IV Consultation*. IMF Country Report No. 25/327. Washington, DC: IMF.

International Monetary Fund (2026a) *World Economic Outlook, April 2026: Global Economy in the Shadow of War*. Washington, DC: IMF.

International Monetary Fund (2026b) *People's Republic of China: 2025 Article IV Consultation*. IMF Country Report No. 26/44. Washington, DC: IMF.

International Monetary Fund (2026c) *South Africa: 2025 Article IV Consultation*. IMF Country Report No. 26/34. Washington, DC: IMF.

MSCI (2026b) *MSCI India Index*. Index data as at 29 May 2026. New York: MSCI.

MSCI (2026c) *MSCI China Index*. Index data as at 29 May 2026. New York: MSCI.

MSCI (2026d) *MSCI Indonesia Index*. Index data as at 29 May 2026. New York: MSCI.

MSCI (2026e) *MSCI Brazil Index*. Index data as at 29 May 2026. New York: MSCI.

MSCI (2026f) *MSCI Vietnam Index*. Index data as at 29 May 2026. New York: MSCI.

MSCI (2026g) *MSCI Taiwan Index*. Index data as at 29 May 2026. New York: MSCI.

MSCI (2026h) *MSCI Korea Index*. Index data as at 29 May 2026. New York: MSCI.

Ritter, J.R. (2005) 'Economic growth and equity returns', *Pacific-Basin Finance Journal*, 13(5), pp. 489–503.

Van Doornik, B.F.N., Frost, J., Guerra, R., Tombini, A. and Upper, C. (2024) 'Towards liquid and resilient government debt markets in EMEs', *BIS Quarterly Review*, March 2024. Basel: Bank for International Settlements.

World Bank (2025a) *Indonesia Economic Prospects: Digital Foundations for Growth*. Washington, DC: World Bank.

World Bank (2026) *Viet Nam Economic Update: Sustaining Reforms, Navigating Uncertainty*. Washington, DC: World Bank.

Literature Special topic – Portfolio design (p.82-87)

Blitz, D., Chen, M., Howard, C. and Lohre, H. (2024). 3D Investing: Jointly Optimizing Return, Risk, and Sustainability. *Financial Analysts Journal*.

Chen, M., and Mussalli, G. (2020). An Integrated Approach to Quantitative ESG Investing. *Journal of Portfolio Management*.

Harvey, C. R., and Siddique, A. (2000). Conditional Skewness in Asset Pricing Tests. *Journal of Finance*.

Kraus, A., and Litzenberger, R. (1976). Skewness Preference and the Valuation of Risk Assets. *Journal of Finance*.

Markowitz, H. (1952). Portfolio Selection. *Journal of Finance*.

Modigliani, F., and Miller, M. (1961). Dividend Policy, Growth, and the Valuation of Shares. *Journal of Business*.

Sharpe, W. F., and Tint, L.G. (1990). Liabilities: A New Approach. *Journal of Portfolio Management*.

Sorensen, E., Chen, M. and Mussalli, G. (2021). The Quantitative Approach for Sustainable Investing. *Journal of Portfolio Management*.

Literature Chapter 4 – Expected returns (p. 88-109)

Aldasoro, I., Doerr, S., Gambacorta, L., & Rees, D. (2024). "The impact of artificial intelligence on output and inflation" *Bank for International Settlements Working Papers* 1179.

Jordà, O., Knoll, K., Kuvshinov, D., Schularick, M., and Taylor, A. M. (2019). "The Rate of Return on Everything, 1870–2015." *Quarterly Journal of Economics*, 134(3), 1225-1298.

Jordà, O., Schularick, M., and Taylor, A. M. (2017). "Macrofinancial History and the New Business Cycle Facts." In *NBER Macroeconomics Annual 2016*, Vol. 31, edited by M. Eichenbaum and J. A. Parker, 213-263. Chicago: University of Chicago Press.

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