Institute Capital Market Assumptions

ANNUAL EDITION – MARCH 2023

A rocky net zero pathway

Medium- to long-term expected returns with climate and social considerations

Confidence must be earned

Amundi
ASSET MANAGEMENT

Marketing material for professional investors only

Monica DEFEND
Head of Amundi Institute

CLIMATE AND SOCIALLY-AWARE CAPITAL MARKET ASSUMPTIONS

Detecting inflation and macro-financial regimes will be key in the next decade as higher average inflation and lower growth will reduce the overall risk-return potential.

TOWARDS A NEW DECADE

Bonds are heading back to the future at a secular turning point, as expected returns for the next decade are above those of the past 20 years. However, also expect higher volatility amid more macro-economic uncertainty in the transition.

Vincent MORTIER
Group Chief
Investment Officer

Matteo GERMANO
Deputy Group Chief
Investment Officer

MULTI-FACETED PORTFOLIOS

With a more challenging risk-return profile across risky assets, investors will have to enhance diversification, adding real assets and exploring regional diversification with a higher tilt towards Emerging Market assets.

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What's new

Climate and socially-aware capital market assumptions: what's new in this year's edition

The **NEW** *sticker will signal what's new in our 2023 Capital Market Assumptions*

Dear Client,

In last year's edition, we enhanced our Capital Market Assumptions approach to consider the impact of climate change both on the economic variables that drive our forecasts (GDP growth, inflation, productivity, etc.) and the way we model the behaviour of asset classes (particularly with regards to earnings growth).

This year, we took another step forward, by adding other important elements of analysis for investors. In particular, we are:

- *Starting to address the need to balance the climate transition with the social dimension, by considering the potential impact of a rebalancing of labour / profit on earnings;*
- *Enlarging the investment universe, which now comprises 40 asset classes and for the first time includes hedge funds and Indian equities, to account for the increasing need for diversification in an environment of higher inflation and a more uncertain growth path;*
- *Enhancing real assets modelling by including physical risk estimates for real estate and infrastructure, and estimates of an illiquidity premium for private debt;*
- *Adding information on volatility, correlation and shortfall risk to properly assess the role of different asset classes (particularly real and alternative assets) in portfolio construction;*
- *Adding results on the possible dispersion of expected returns to showcase the uncertainty surrounding certain asset classes;*
- *Introducing more in-depth analysis of strategic asset allocation implications, alongside the annual update of expected returns for the main asset classes, by running optimised portfolios in different currencies (EUR and USD) and with different risk profiles over the next decade.*

I would like to thank all of the colleagues that have contributed to this collective project. I wish you a pleasant and informative reading,

Monica Defend
Head of Amundi Institute

In loving memory of Federico Dolcino, in the 15th anniversary of his death. We continue to follow in your footsteps experimenting new research fields and modelling expected returns.

KEY INSIGHTS

Key insights

A rocky net zero pathway

Key highlights on long-term scenarios and 10-year return forecasts

Monica DEFEND
Head of Amundi Institute

Vincent MORTIER
Group Chief Investment Officer

Matteo GERMANO
Deputy Group Chief Investment Officer

In 2022, the war in Ukraine impacted the energy supply outlook and also had implications for the net zero path. Security, affordability (in volume and prices) and sustainability of the energy supply were challenged, driving the need to diversify the energy supply mix. While this has somewhat accelerated the shift towards greener energy sources, it has also led to a more uncoordinated response, as each country moved to secure its own needs. These developments come on top of inflation remaining high, having originally stemmed from the Covid-induced supply bottlenecks, which are becoming less sticky.

Taking a long-term view of these disruptive trends, and their implications on long-term asset class forecasts and strategic allocation, we are pleased to share with you the annual update of our capital market assumptions (CMA) publication. Here are ten key takeaways from this year's edition:

1 **Moving towards a «Rocky net zero path» with diverging policies.** While the spike in energy costs is adding a sense of urgency to the transition, greater focus on national strategic independence as a consequence of the war in Ukraine is increasing the likelihood of a move towards a disorderly scenario, which is predominant in characterising our baseline.

2 **Short-term higher inflation and a more uncertain future path.** The transition implies a weaker but more sustainable growth path ahead. In the short term, high inflation episodes will occur, driven by rising carbon prices (although the implementation of carbon pricing remains an issue) and higher commodity prices, structurally supported by the transition's demand for investment.

3 **Central banks to fight inflation while seeking to aid the transition**. Central banks will have to carefully handle their balance sheets in the future to help finance green investments, while short-term interest rate management will continue to be policymakers' key tool for combating inflationary swings. Hence, central banks could stay dovish on balance sheets but hawkish on short-term rates.

4 **Limiting the induced social costs of the transition will be key.** Corporations could manage a rebalancing of profits towards labour. A potential rebalancing in the labour-profit share of income (with a 7% increase in the former's favour), could result in a cumulated 10% decrease in profits over the next 20 years (with regional differences) and reverse a trend that started in the 2000s.

-1.9%	+0.8%	+1%	1/3	1/6
Average lower expected returns across equity, HY and EM bonds for the next decade vs 2002-2022.	Average extra return compared to the past 20 years for government and IG credit bonds.	Average increase in expected volatility across all asset classes for the next decade vs 2002-2022	Allocation to EM in the equity bucket needed to target returns similar to the old US 60-40 portfolio.	Allocation to real and alternative assets needed to target returns similar to the old US 60-40.

Key insights

5 **Bonds are heading back to the future, after a 'lost decade'.**
Bonds' return profile is starting to move back to its long-term trend, but we expect uncertainty – deriving from the transition and a weaker macro scenario – to cause higher volatility over the next decade. Investment grade credit will also benefit from higher government bond valuations, while the relative appeal of HY and EM bonds will be challenged by potentially higher default rates.

6 **Equity returns will be lower compared to the past decade, but better than last year's forecasts, with regional diversification in focus.** Expectations are only marginally higher than in 2022, despite the widespread reset in valuations, as the many challenges implied by the macro-financial backdrop are weighing on the earnings path. China and Emerging Markets are expected to top the equity returns ranking, but their returns' improvement is relatively mild in risk-adjusted terms.

7 **Value investing and energy transition themes will remain in the spotlight over the coming decade.**
Looking at sectors' expected returns, the outlook for value investing is positive, and Financials are expected to top the 10-year returns scoreboard. Leaders in the green transition will also be favoured. On the other hand, defensive sectors are losing attractiveness.

8 **Real and alternative assets and commodities will be important tools for building inflation-resilient portfolios.**
Real and alternative assets, in particular, offer a complementary risk-return profile to traditional asset classes, but they bring higher liquidity risk compared to public markets. Private equity is at the top of the expected returns ranking while, on a risk-adjusted basis, global private debt is favoured. Hedge funds also offer an appealing risk-return profile, similar to that of the credit space, but with more appealing returns.

9 **The coming decade will call for enhanced diversification**.
Moderate risk portfolios (6% volatility target) could achieve around 5% annual returns in EUR (6.6% in USD), with a 70% bond / 30% equity type allocation. USD investors will be more tilted towards aggregate bonds, while EUR investors will have to count more on equity as well as real and alternative assets.

10 **To target higher returns, investors will have to count on EM equity, as well as real and alternative assets.**
Over the next decade, dynamic risk profiles (12% volatility target) will continue to count on equity in a 60-40 style of allocation. One-third of the equity allocation will be tilted towards EM equity, while adding real and alternative assets can help reduce the equity tilt and achieve higher returns with the same level of risk. Trends in the FX world could also offer opportunities to seek additional sources of return, in a more challenging investment backdrop.

Amundi Institute's view on structural changes at play

	2010s	2020s
ECONOMY	▪ Financial capitalism	▪ Redistribution of income
	▪ Deflation	▪ Inflation
	▪ Peace with limited geopolitical hotspots	▪ A new era of geopolitical risk
	▪ Globalisation	▪ Regionalisation
	▪ Inequality	▪ Inclusion
MARKETS	▪ Large caps	▪ Equal weight – no mega caps
	▪ Growth	▪ Value
	▪ Tech	▪ Financials and green tech
	▪ Govies & Credit	▪ Cash, Govies, EM bonds
	▪ Developed favoured vs Emerging Markets	▪ Emerging favoured vs Developed Markets
	▪ King dollar	▪ De-throning of dollar possible
	▪ 60-40 paradigm	▪ New 60-40 paradigm with real and alternatives assets and commodities

Source: Amundi Institute.

Asset class & portfolio views for the next decade

Bonds

Bonds are back as a key portfolio engine, with a focus on quality

UP

- US and Euro aggregate space will be favoured, but expect higher volatility.
- In the search for higher yields, EM bonds will be favoured.

DOWN

- Japanese govies will still offer lower returns with higher volatility.
- High yield will be challenged by higher expected defaults.

Equity

A challenging risk-return profile will call for increased diversification.

UP

- Chinese and EM equity will help boost returns.
- US remains favoured in the developed world.
- Value sectors + IT + green transition leaders.

DOWN

- Expect higher volatility.
- Lower returns vs history for DM.
- Japanese equity is the laggard.
- Defensive sectors.

Real & Alternatives

A key tool to enhance portfolio risk-adjusted returns.

UP

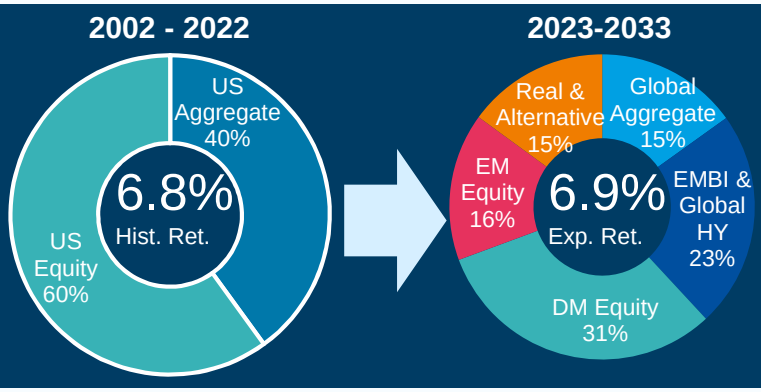
- All asset classes are valuable diversifiers, particularly infrastructure.
- Hedge funds are favoured in the medium-volatility space, private equity in the high-volatility space.

DOWN

- Real estate and infrastructure return expectations have been downgraded to incorporate physical risks.
- Liquidity and shortfall risk are factors to monitor.

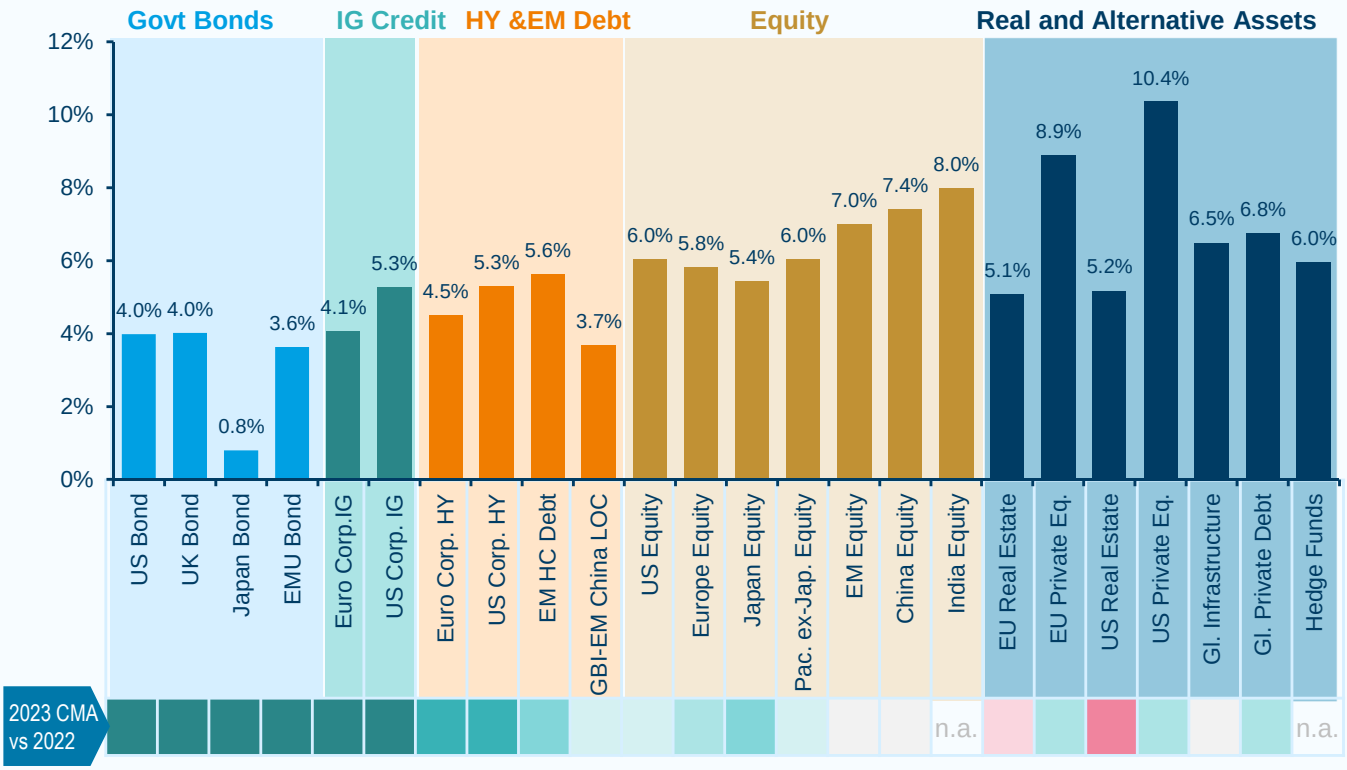
The new 60-40

Go global and add real assets to target returns similar to a 60-40.



Source: Amundi, Bloomberg for historical data and Amundi Quant Solutions Team portfolio optimization on CMA for expected returns and allocations. Data as of 31 December 2022. For illustrative purposes.

10-year Capital Market Assumptions (CMA) have improved vs last year's forecasts, particularly for bonds

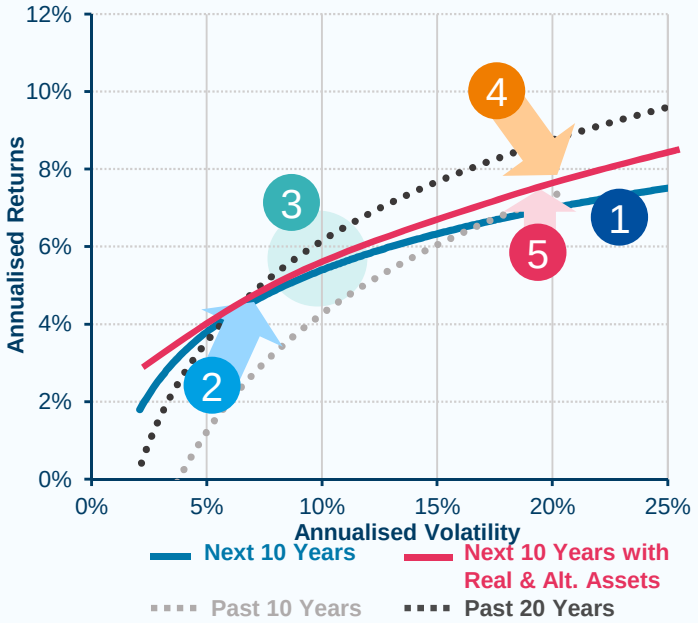


Source: Amundi CASM Model Data as of 30 December 2022. Colours indicate higher (dark green) to lower (dark red) expected returns for the next decade compared to last year edition of the CMA. Data are in local currency and show the 10-year annualised expected returns Dec 22 – Dec 32.

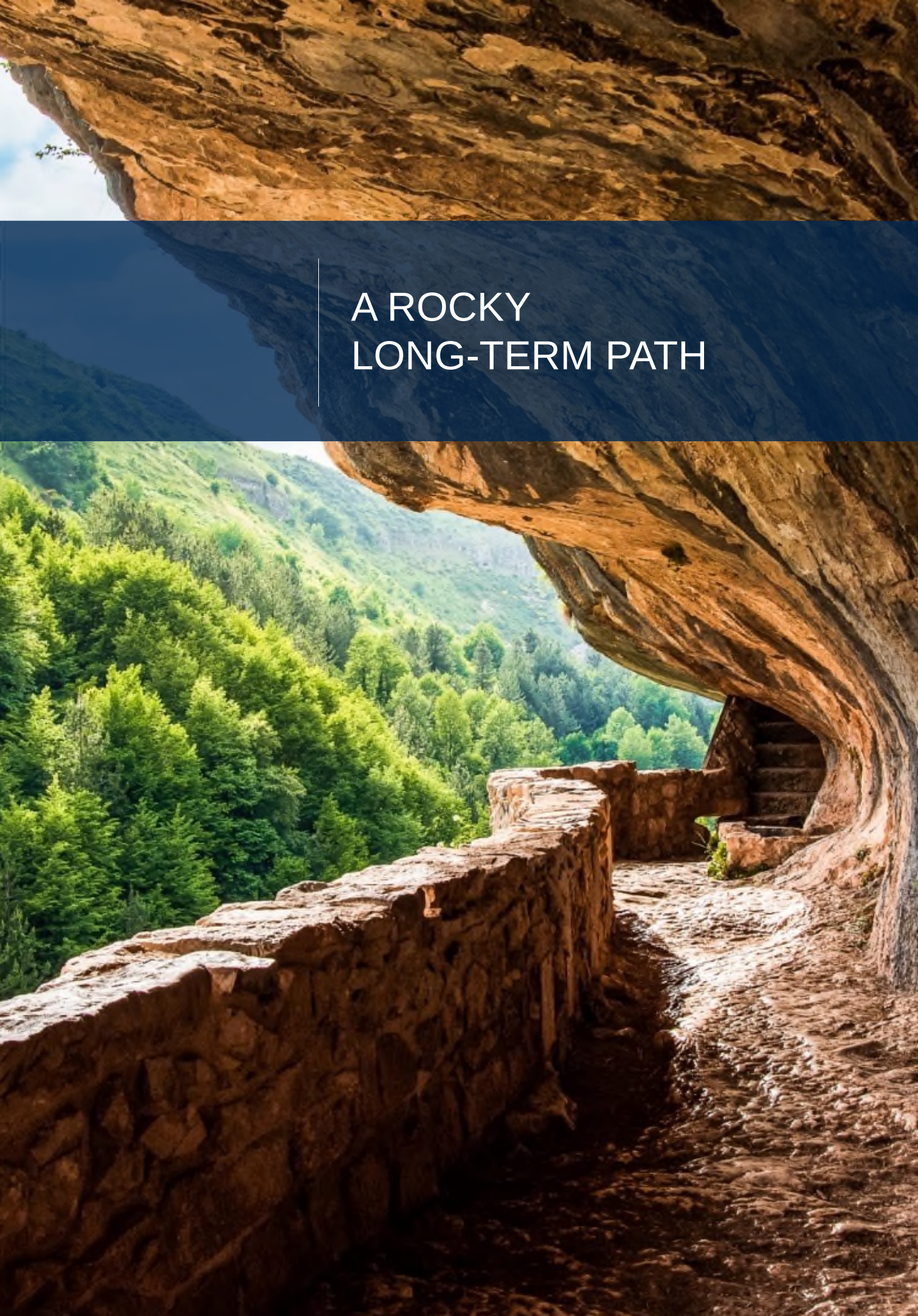
Five main changes: next decade vs past decades

1. **Moving to a flatter risk-return profile vs history.** This means that additional risk taken will be less remunerative than in the past.
2. **Aggregate bonds are back and shining.** After a decade of meagre returns, bonds' expected returns are moving up, even above their long-term average.
3. **High yield and EM bonds are stuck in the middle**: their risk-return profile is improving vs the past decade, but is still below their long-term average. EM bonds are favoured over HY in the search for higher yield.
4. **Lower equity returns and higher volatility vs the past amid climate change impact**. Equity still key for portfolio construction, look for regional diversification.
5. **Real and alternative assets help enhance portfolio returns**. They offer an interesting risk-return profile, to target higher returns with similar levels of volatility.

Illustrative risk-return curves for main asset classes
2023 Capital Market Assumptions vs past 10 & 20 years

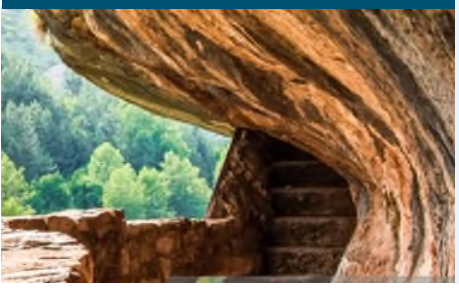


Source: Amundi CASM Model for forecasts and Amundi Institute on Bloomberg data for historical data. Data as of 30 December 2022. The lines fit the spatial distribution of risk-return profiles of the traditional asset classes, from government bonds (on the left side), to equities (on the right). For additional information see the 'Sources and Assumptions' section at the end of this document. The forecast returns are not necessarily indicative of future performance, which could differ substantially. Data are in local currency.



A ROCKY LONG-TERM PATH

Social awareness



Social awareness to drive more inclusive growth with limited impact on earnings

Lorenzo PORTELLI
Head of Cross Asset Strategy, Head of Research at Amundi Italy, Amundi Institute

Real wage growth slowed substantially over the course of this century, diverging consistently from its historical average. Besides weak labour productivity, wages also suffered from a declining labour share of national income (i.e. the amount of GDP paid out in wages, salaries and benefits) and wage inequality. This decline has been accelerating for the last two decades, as shown by the case of the US, where it fell 6.5% since 2000 representing 75% of the total decline after WW2.

This phenomenon has been observed globally, although at different degrees and to a lesser extent in emerging economies compared to developed ones. The economic impact of labour's share decrease is clearly huge, with several repercussions for the social environment: it contributed to the middle-class wealth crisis and caused a less-balanced allocation between labour and capital factors.

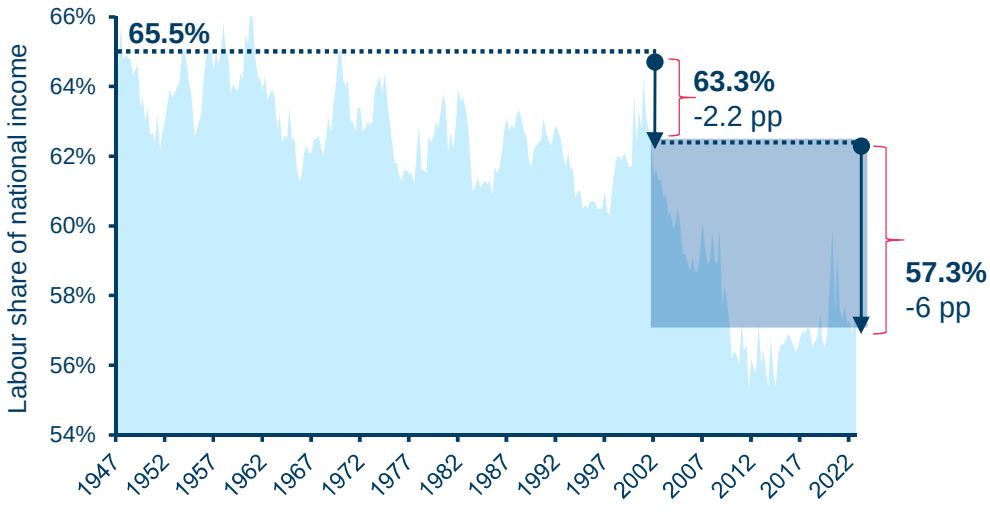
The transition to a more social and inclusive growth model, as well as climate change policies, requires a proper framework to **preserve a healthy degree of corporate stability and efficiency**. We believe political and economic agents can achieve this 'just' transition in the long run without catalysing marked downturns for the economy, the corporate and the financial sectors, for the following reasons:

We believe political and economic agents can achieve this 'just' transition in the long run without catalysing marked downturns for the economy.

- While the significant share of national income in favour of capital versus labour dramatically increased margins' contribution to profits, it also **boosted leverage and corporates' vulnerability to external economic shocks. This mechanism is not necessarily optimal in terms of long-run profits equilibrium.** In other words, an optimal factor allocation might be more balanced than the current one, purely for economic reasons.
- **Technology has not been disruptive in absolute terms**. It engendered greater flexibility in combining the factors of the production function, lowered the constraints and widened the scope for active policies to achieve social transition targets at a reasonable cost. **Technological developments aimed at the green transition, for instance, can help boost total productivity without compressing the labour share.**

Since the 2000s the labour share of income has been declining.

The declining labour share of income in the United States



Source: Amundi Institute on Bureau of Labor Statistics. Data as of 31 December 2022.

Social awareness

A 'just' transition may lead to a more balanced labour-profit allocation, helping to boost disposable income with a contained impact on profits.

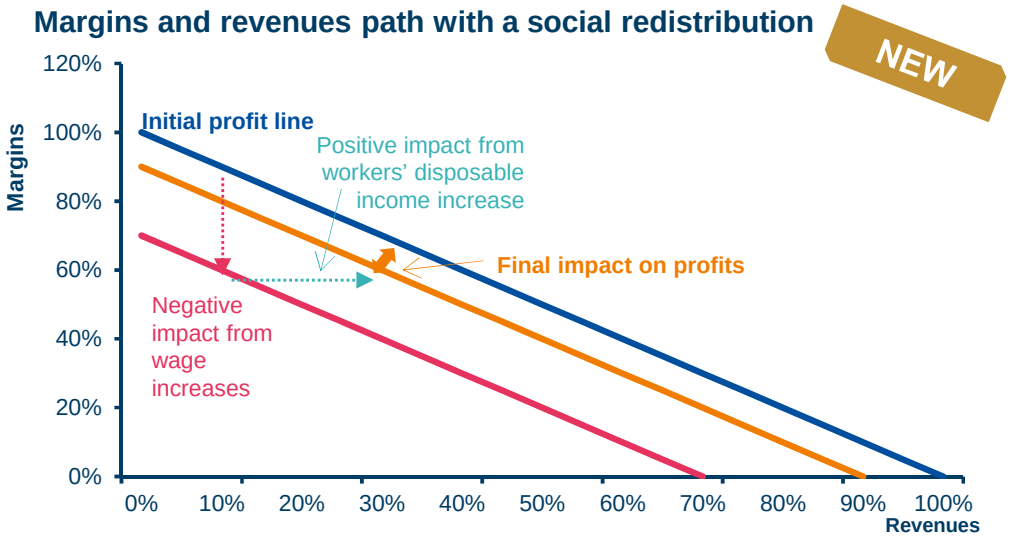
Due to its relevance and pervasive social, political, economic and financial implications, academic research has focused on uncovering the root causes of this long-lasting decline. These macro and micro factors include: technology, globalisation, the consolidation of sectors through mega caps, a greater focus on a capital-intensive production function (for instance, intangible goods), and super trends which are materialising in important segments such as commodities and real estate, which are structurally capital-intensive.

In particular, we notice that:

1. The declining labour share, relating to a more extreme labour / capital allocation, has important consequences in terms of a less inclusive growth model and greater social inequality;
2. The factors underlying labour's share decline are many and heterogeneous: they are economic and political, macro and micro, global and specific;
3. The increasing importance of capital-intensive versus labour activities favoured a shift in factor remuneration away from wages and towards profits;
4. The labour share declined in relative terms: while all factors favoured more capital, this is not necessarily disruptive for the labour factor in absolute terms.

A shift away from margins and towards wages obviously has a negative impact on profits due to increasing unit labour costs. However, it **also has a second, important and positive effect on revenues**. Higher disposable income should increase household consumption and consequently corporate revenues, while also reducing inequality, thereby mitigating the total negative impact on profits. Moreover, the shift would produce a more balanced mix of margins and revenues.

Margins and revenues path with a social redistribution



Source: Amundi Institute. For illustrative purposes.

A rebalancing towards labour, with a 7% increase in labour share, could result in a cumulated 10% decrease in profits over the next 20 years, with regional differences.

Our findings, based on econometric models for developed countries*, confirm that under certain specific assumptions a social transition towards a more balanced and inclusive growth model is manageable for both public and corporate sectors. In particular, results suggest that a 7% increase in labour share via higher wages should be achievable in most developed countries, while triggering less than a 10% decrease in cumulated profits over a 20-year span. The final estimated results differ by country, mainly due to country-specific elasticities of final consumption to real disposable income and the sensitivity of profits to labour costs.

The underlying assumptions of this simulation include: (i) a gradual 10% increase in the unit labour cost component over the next 20 years, with the entirety of the increase in disposable income deriving from higher wages; (ii) a negligible impact on the cash management and liquidity conditions of the corporate sector; (iii) constant elasticity of consumption to real disposable income; (iv) no specific active fiscal policies; (v) no specific link or interaction with active climate policies.

* Australia, Canada, France, Germany, Italy, Japan, Spain, US and UK.

Macro focus

A rocky net zero path: sustainable growth gains versus short-term inflation pain

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Head of Emerging Macro Strategy, Amundi Institute

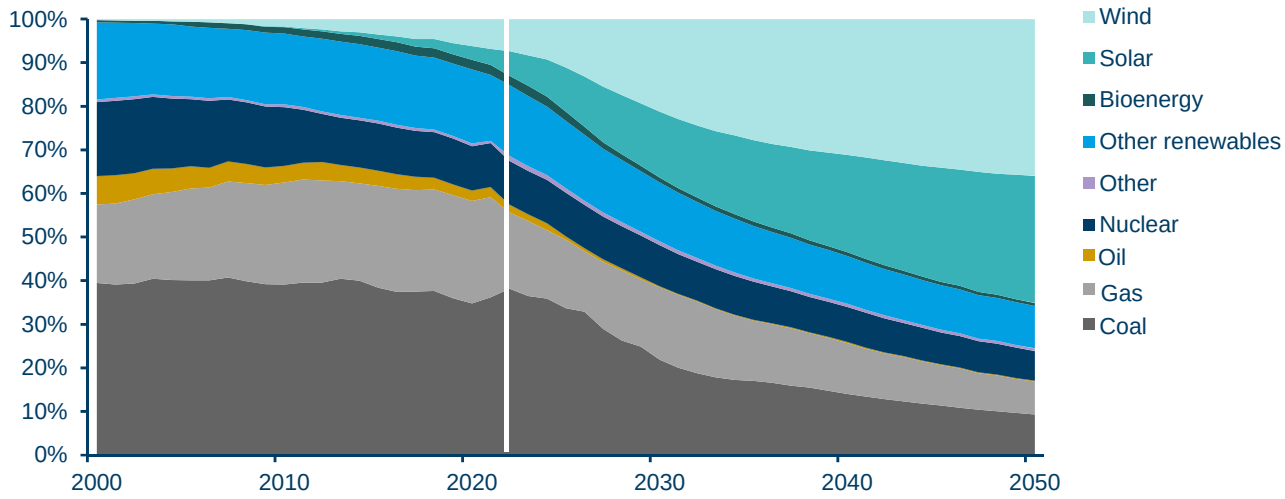
Annalisa USARDI
Senior Macro Strategist, Amundi Institute

In order to reach global net zero (NZ) CO2 emissions by 2050, an ambitious transition across all sectors of the economy is necessary. **Converting the energy supply towards green sources requires a significant investment plan**. The Network for Greening the Financial System's (NGFS) scenarios show that, under a successful net zero transition scenario, renewables and biomass would deliver 70% of the global primary energy mix by 2050. Despite its recent drawbacks, an immediate and coordinated transition will prove less costly than either not acting altogether or implementing a disorderly transition. An important point to keep in mind is that while the transition itself will not lead to higher growth, it will make growth more sustainable. In order to fully kick-start and expedite the process, policymakers should hasten the introduction of emission costs as an incentive.

As in last year's edition, **our central scenario for the transition is a combination of the 'orderly' and 'disorderly' scenarios devised by NGFS**. While we believe that the pandemic and the ongoing war in Ukraine have conveyed a sense of urgency to the transition, they have also led to increased fragmentation and a greater national focus on reaching strategic independence in key sectors such as energy. The US Inflation Reduction Act and Europe's subsequent response via the proposal of the 'Green Deal Industrial Plan' to enhance competitiveness in the production of net zero technologies are good examples of the sense of urgency, as well as the lack of coordination and tendency to favour national interests. Meanwhile, other important players such as China and India have confirmed their pledge to achieve NZ by 2060 and 2070 respectively.

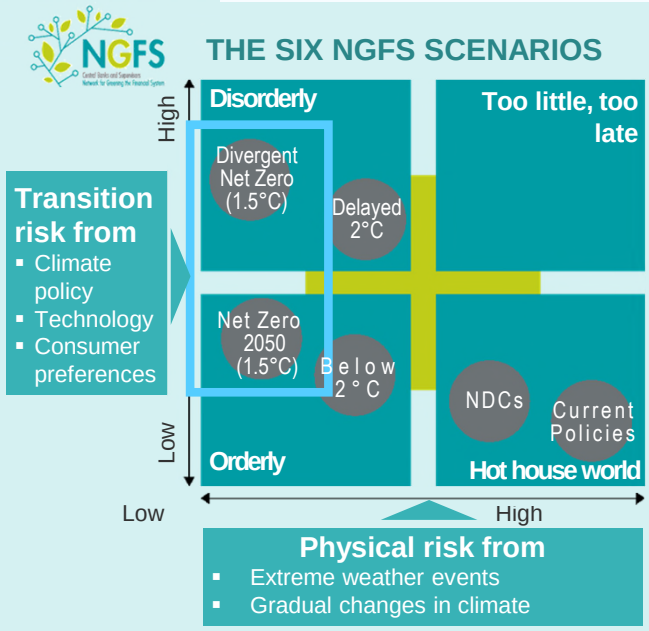
As a result, while containing the climbing temperatures to within 1.5-2C over the NZ horizon is still the end game, the **'orderly' scenario of coordinated, immediate and gradually more stringent policy actions has been assigned a lower probability**. In turn, the 'disorderly' scenario requiring divergent and therefore stronger policy actions implies a rockier path to NZ and more volatile economic consequences across countries and sectors.

Power generation by technology



Source: New Energy Outlook 2022, Bloomberg NEF.

A rocky net zero transition path: macroeconomic implications



Amundi Institute

CENTRAL SCENARIO

Rocky Net Zero

Limits climate warming to 1.5°C with higher transition risk compared to the net zero baseline scenario amid more fragmented policy responses.

High probability

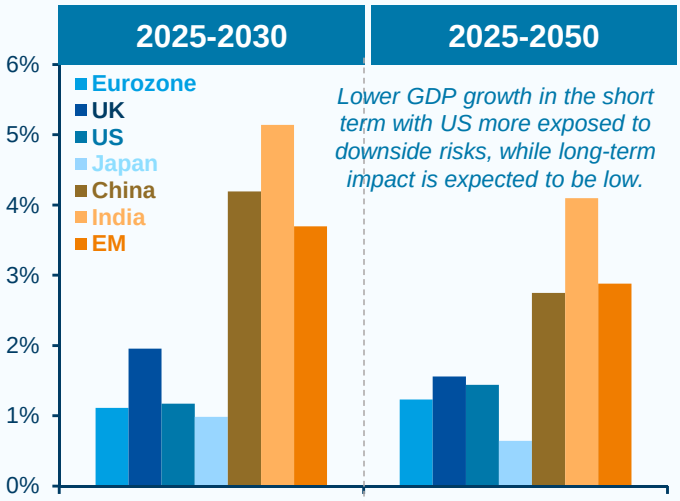
Divergent net zero reaches net zero around 2050 but with higher costs due to divergent policies introduced across sectors leading to a quicker phasing-out of oil use.

Low prob.

Net zero 2050 limits global warming to 1.5°C through stringent climate policies and innovation, reaching global net zero CO_2 emissions around 2050.

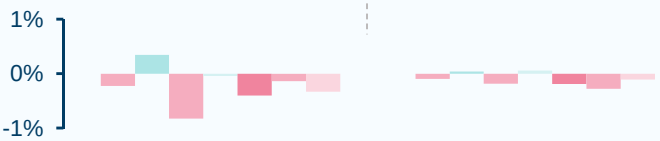
Growth

Amundi Central Scenario Growth Projections



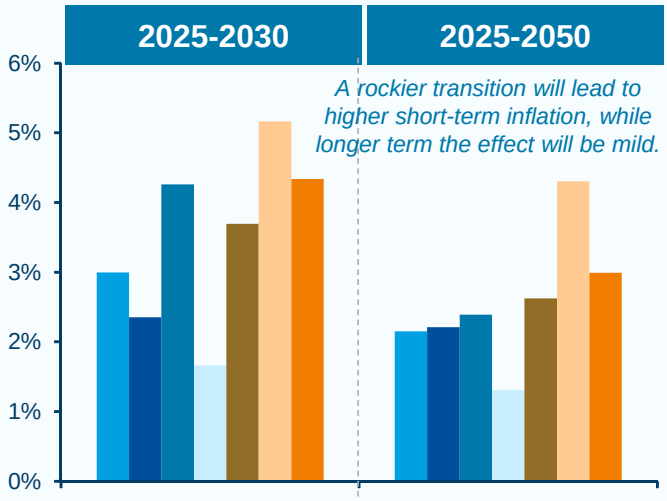
GDP growth differential vs no transition

(Amundi central scenario GDP - NGFS baseline GDP)



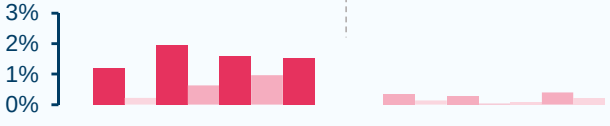
Inflation

Amundi Central Scenario Inflation Projections



Inflation differential vs no transition

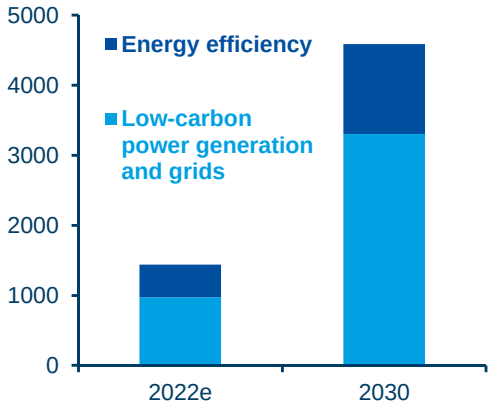
(Amundi central scenario inflation - NGFS baseline inflation)



Source: Amundi Institute on NGFS data from the 2022 release. The positioning of scenarios in the top right charts are approximate, based on an assessment of physical and transition risks out to 2100. NDCs= Nationally Determined Contributions (includes all pledged targets). The baseline is a hypothetical scenario with no transition nor physical risk.

Estimated share of OECD GDP spent on energy end-use* (% of GDP)

Global annual green energy investment (billion USD)



Source: Amundi Institute on OECD economic outlook, IEA.*Expenditures on coal, oil, natural gas, electricity.

The spike in energy costs triggered by the Ukraine war is adding urgency to act, accelerating investments in green energy necessary to drive the transition.

Short-term higher inflation and a more uncertain future path

The macroeconomic consequences of the NZ transition should imply a weaker but more sustainable and inclusive growth path ahead, with a lower misallocation of capital. **However, in the very short term, high inflation episodes are going to negatively impact domestic demand, while over the medium-to-long term, the NZ transition shouldn't feed price rises in line with the more subdued overall economic trend**.

The outlook for higher short-term inflation is driven by rising carbon prices, high commodity prices that are structurally supported by the greater electrification process for instance, slow technological adaptation to the transition and initially low productivity.

The most challenging mechanism is the implementation of carbon prices even though resistance at the global level is slowly waning. While the final agreement reached by the EU Parliament and Council on the Carbon Border Adjustment Mechanism (CBAM) has broadened its scope, it still implies a slow and very gradual implementation timeline. Moreover, developed economies are less carbon-intensive and through the composition of their exports will be able to abide by the mechanism or build a comparable one, reducing if not entirely avoiding the carbon fee. In this sense, the burden will be higher for some emerging and frontier economies that are not technologically equipped to promptly remove sources of carbon dioxide.

Negative growth impact could be offset by government measures

The NZ transition is expected to be negative for growth due to initially higher inflation deriving from higher carbon prices, high energy and commodity prices dampening demand, and lower productivity. Protracted geopolitical tensions, exacerbated by the search for national strategic independence, may also raise the transition cost. However, the negative impact on growth may gradually be offset by recycling carbon revenues into climate-related activities for Corporates (Public and Private) as well as for Households. While the first type of initiative will increase future productivity, the second will help manage the transition, limiting the induced social costs and the consequent pushback by the most vulnerable parts of the population*.

The investment plan should start with adaptation measures to accompany the phasing-out of fossil fuels in countries where their legacy is stronger, and across different sectors: extraction, mining, shipping of fossil fuels, transmission and distribution of gas, and oil transport and refining. Such countries may in fact experience a more pronounced negative impact on growth, amplifying the rocky disorderly scenario. Even among countries that are more advanced in implementing the Carbon Tax framework, more efforts are needed to clarify and fully commit to using these revenues to support the green transition.

* See Amundi Institute working paper, The Impact of Climate Risks on Social Inequality.

Energy mix

1 year into the war: the changing face of the European energy supply mix

Jean-Baptiste BERTHON
Senior Cross Asset Strategist, Amundi Institute

The green transition was only briefly overshadowed by more pressing supply and economic concerns after the war in Ukraine started.

Renewables are likely to get further traction, thanks to an intensifying political push, investment opportunities and greater tax incentives.

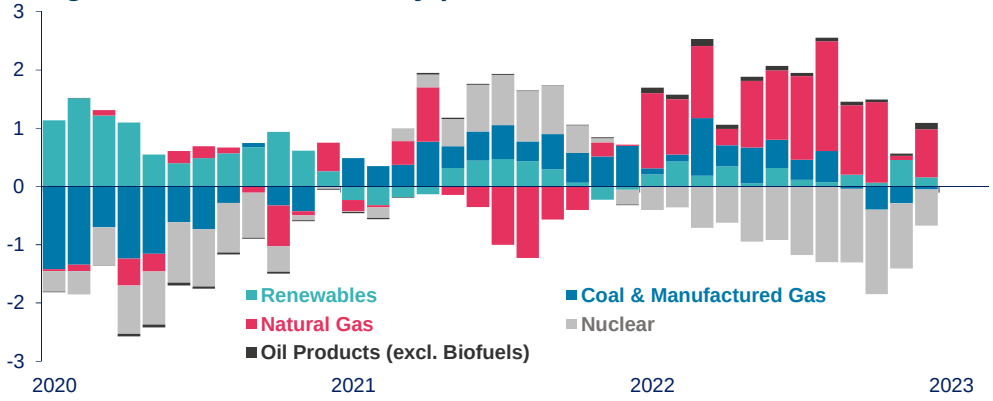
European energy markets have been under heavy stress since the Ukraine war started. The weaponisation of gas flows sent prices flying, with Europe's energy bill ballooning up to an extra €45bn/month cost. Supply diversification, demand destruction and record temperatures helped restore gas stocks. As its flows to Europe dried out, Russia's leverage over gas markets declined, bringing prices below pre-war levels.

The green transition was initially overshadowed by more pressing supply and economic concerns. Industries that could switch energy sources favoured cheaper coal and oil, and Germany revived its coal production. This did not last; since the war's start, the European energy mix has not deteriorated much. The bloc's energy balance is complex with several sources of energy, a third of which is produced domestically (40% renewables, 30% nuclear, 15% coal, 10% oil and gas), and the rest being imported (mainly oil and gas). This energy is then transformed and made available for consumption as oil (40%), gas (22%), electricity (20%), renewables (11%), as well as heat, coal and waste (7%).

We find that most of the natural gas lost from Russia, and France's lower nuclear output, have been replaced by LNG from abroad and especially the US, Algeria, the UK, Norway and Egypt. Lower energy consumption also played a role, initially from industries due to prohibitive prices, then because of record winter temperatures. The input from renewables has been net positive, but modestly so. Solar energy and biofuels made up for the low hydro production due to drought. After briefly rising, oil imports and coal production shrank, resulting in a negligible contribution. **Diversification thus came from cleaner fossil fuels and lower consumption. Neither renewables nor heavier fossil fuels played a big role**.

As of mid-2022, households' **greenhouse emissions declined slightly**, suggesting a limited environmental impact. Weaker growth further limited emissions. **Going forward, the share of renewables is set to increase**. Ambitious targets to replace Russian gas with decarbonised energies, investment opportunities in segments such as hydrogen and biofuels, as well as greater tax incentives are all promising. Yet, **given Europe's persisting vulnerability** until Russian fuels can be sustainably replaced, **authorities are likely to remain pragmatic**, as shown by the latest electricity reform proposal: while it seeks to boost renewables and reduce gas price volatility, it is still far from the previously announced complete overhaul.

Change in EU 27 net electricity production



Source: Amundi Institute. Data as of 31 December 2022. Data in Billion cubic meters/month, showing the 3-month moving average of the 12-month change.

Long-term rate views

Lower long-term interest rates to help finance the transition

Lorenzo PORTELLI
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Central banks will remain dovish on balance sheets as a necessary condition to achieving the green transition.

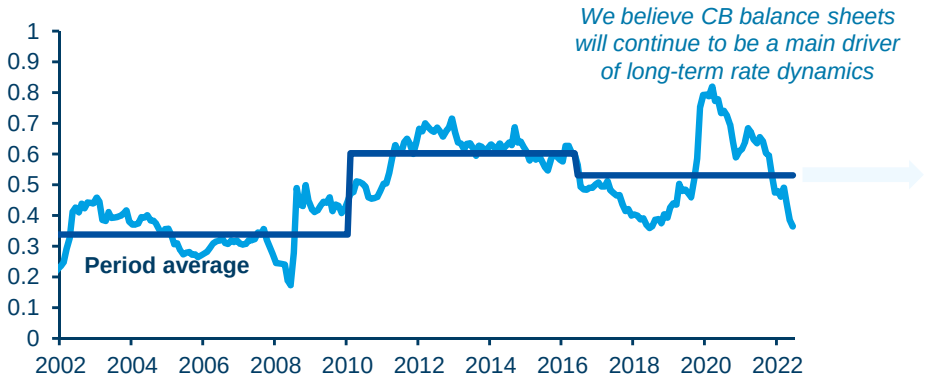
Central bank targets often differ in terms of their objectives and the time over which to pursue these. Policymakers have a varied and flexible toolbox at their disposal in order to adapt to circumstances and tackle different challenges.

Over the past 20 years, central banks have gradually reviewed the policies and tools at their disposal in order to cope with a more globalised world and increasingly interconnected financial markets. The expansion of central bank balance sheets through the direct purchase of securities helped mitigate the effects of the GFC and kept long-term rates at non-explosive levels. It has become the crucial, long-term driver for rates even during the Covid pandemic, particularly considering the growing debt mound around the world. Compared to the past, interest rates now tend to be tied to more structural variables requiring unconventional solutions, rather than to cyclical inflationary dynamics.

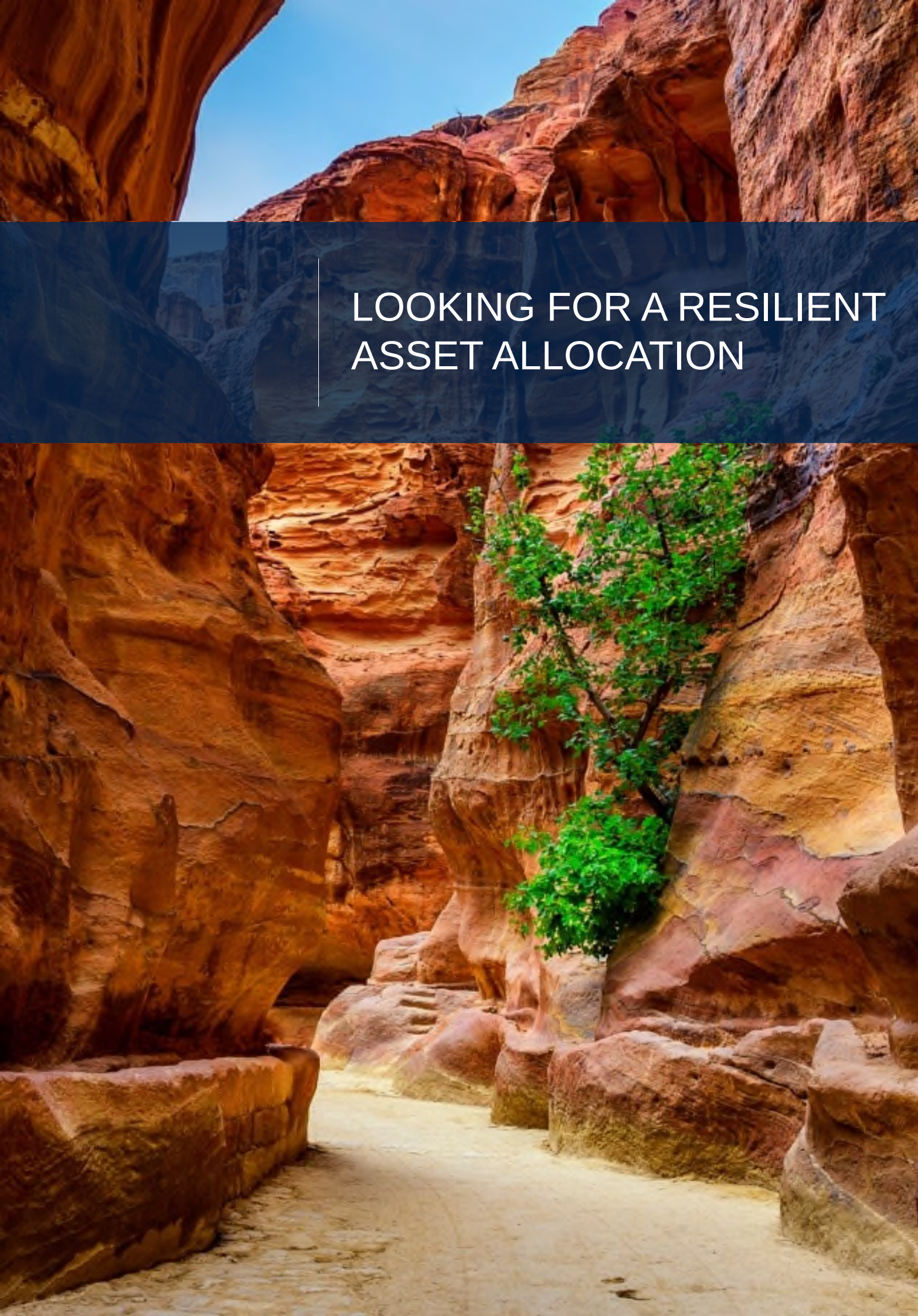
Achieving net zero by 2050 and a more inclusive growth model requires a rapid green transition and huge public and private investment. **Monetary policy will be geared toward preventing debt levels from becoming unmanageable while keeping long-term interest rates under control.** Therefore, central bank balance sheet normalisation is unlikely in the future. Green investment financing will require an active approach on the balance sheet side, while short-term interest rate management will remain policymakers' key tool for counteracting inflationary swings and riding out economic cycles (as in 2022). Central banks are likely to continue to act hawkishly on short-term rates, but dovishly in terms of quantitative tightening, with very mild reductions of balance sheets. This will have multiple investment implications, including:

1. **Yield curves should be flatter over the long run**, assuming policymakers will adjust interest rates to control inflation in the short term while trying to keep long-term rates at historically low levels;
2. **The sectors most linked to the green transition will benefit from central bank support**, particularly on the investment and credit fronts and in terms of yields adjusted for default risk.
3. For equities, the central bank 'effect' is less direct and will combine with a situation whereby profits and margins come under pressure. **Quality names and leaders in the green transition will be the most favoured.**

Fed balance sheet contribution to US long-term rates



Source: Amundi Institute. The chart shows the percentage of long-term rates movement explained by movements in the Fed balance sheets. Data as at end of December 2022.



LOOKING FOR A RESILIENT ASSET ALLOCATION

Portfolio construction

New long-term cross asset paradigm: fixed income, real and alternatives are the assets to add

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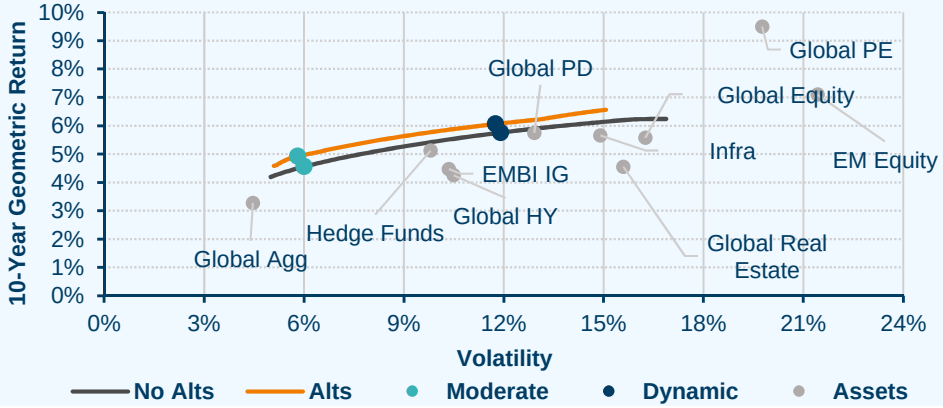
This section presents the details of a strategic asset allocation (SAA) exercise for a global investment universe that includes fixed income, equity and real and alternative assets over a 10-year horizon. We assess the SAA from the perspective of US dollar and euro investors. For each base currency, we consider two risk profiles: moderate (around 6% volatility) and dynamic (around 12% volatility). Moreover, as the UK pension funds' September 2022 LDI crisis showed, it is key to put a constraint on illiquid assets, coherent with the investor's profile. Thus, we set an illiquidity tolerance which penalises real and alternative assets relative to public ones, as illustrated in the methodology box.

Strategic asset allocation for a euro-based investor

A moderate risk profile for euro investors can be associated with an expected return of 4.6%. Allowing for investments in real and alternative assets, the return increases to 4.9%. The most important pillar of the SAA is the global aggregate, demonstrating the importance of exposure to IG credit and government bonds to match a milder risk appetite. The remaining portion is distributed in credit-related assets, particularly global HY, and exposure to equity which provides upside potential and allows for diversification benefits. If investors are willing to add real and alternative assets to the mix, a diversified basket of these illiquid exposures can partly replace the equity building block. This will provide a **higher Sharpe Ratio and lower tail risk**.

Moving to the more aggressive risk profile, we see return expectations increasing by around 1%, to the range of 5.8% to 6.1%. As expected, exposure to high-quality fixed-income securities decreases significantly; in fact, an investor with a higher risk tolerance can accept more exposure to equities to capture higher expected returns. Within the alternative basket, **private equity and debt should be the preference of a moderate-risk investor**, while a dynamic portfolio favours infrastructure over private debt. It is interesting to note that, for a dynamic risk investor, the optimal exposure to alternatives is reduced by 4% due to the inclusion of an illiquidity ceiling constraint, which penalises asset classes with several characteristics (time horizon, cash flow curve, secondary market / liquidity, etc.). Thus, investors with a higher risk appetite could substitute some private equity with exposure to public equity under the assumption of a liquidity constraint.

A euro investor's efficient frontier



Source: Amundi Quant Solutions based on CASM model simulations. Data as of 30 January 2023. The efficient frontier is obtained by minimising portfolio CVaR, while respecting diversification constraints and the liquidity appetite of the fictional investor. When plotting the portfolios in the mean-volatility space, the frontier could exhibit an irregular pattern. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

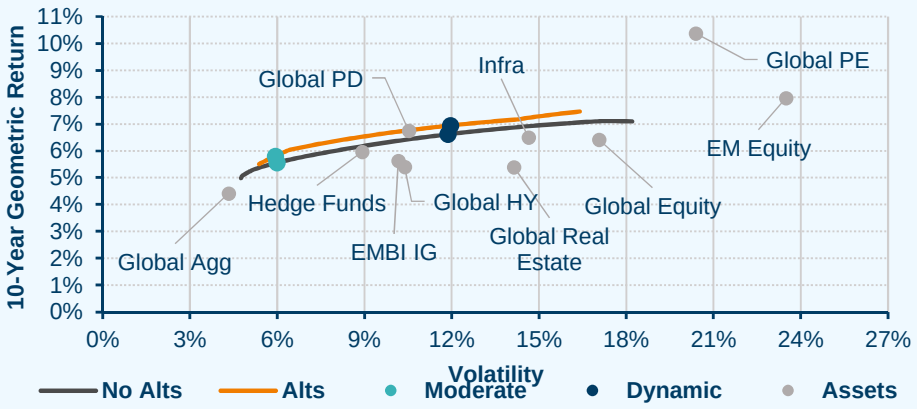
Fixed income assets are back in the driving seat of cross asset portfolios, but equity and alternatives are fundamental to being able to deliver superior results.

Strategic asset allocation for a US dollar-based investor

We assigned an expected return of 5.6% to a portfolio with a moderate risk profile for a **US dollar**-based investor. The expected return increases to 5.8% when real and alternative investments are added to the SAA. As with the euro investor, **the main portfolio building block is the global aggregate**, while the remaining wealth can be distributed across credit-related assets and equity, almost in equal proportions. The inclusion of real and alternative assets is financed by a reduction in high-quality fixed income and equity, which are replaced by a combination of private equity and infrastructure.

Moving to the dynamic risk profile, return expectations reach almost 7% with alternatives. The allocation to the global aggregate now accounts for slightly more than one-fifth of the total allocation, while equity is the asset class with the most exposure. An investor willing to gain exposure to more **alternatives** will have to sacrifice their exposure to both the global aggregate and equity in favour of a diversified portfolio of private equity, debt, infrastructure, real estate and hedge funds. **The benefit is evident from the increased expected Sharpe Ratio, while tails risks are constant**.

A US dollar investor's efficient frontier



Source: Amundi Quant Solutions based on CASM model simulations. Data as of 30 January 2023. The efficient frontier is obtained by minimising portfolio CVaR, while respecting diversification constraints and the liquidity appetite of the fictional investor. When plotting the portfolios in the mean-volatility space, the frontier could exhibit an irregular pattern. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Compared to a US dollar investor, euro-based investor will probably need a higher tilt to equities, but could benefit more from the addition of real assets.

A euro vs US dollar-based investor comparison

For the same volatility levels, a US dollar-denominated investor can access higher returns. However, this pattern is reversed when considering the risk-free rate. In fact, **portfolios denominated in euros show higher expected Sharpe Ratios due to the lower risk-free rate and lower relative volatility.**

- The **inclusion of a diversified basket of real and alternative assets is beneficial in terms of the Sharpe Ratio and diversification**, as shown by the drop in the simulated CVaR.
- The positive effect of having alternatives in the portfolio diminishes for a US dollar-denominated investor or when the risk profile increases from moderate to enhanced. The first phenomenon is mostly explained by the higher correlations between asset classes in the portfolio of a US dollar investor. The second is a function of the illiquidity ceiling constraint.
- The enhanced euro portfolio is more tilted towards equity than the US dollar one, with the latter having more exposure to the global aggregate. This can be explained by the volatility and correlations of unhedged equity for a euro investor, which are lower compared to those for a US dollar investor.

Euro and US dollar strategic asset allocation results

NEW

Investor Currency	Euro				US Dollar			
Risk Appetite	Moderate		Dynamic		Moderate		Dynamic	
Asset Universe	No Alts	With Alts	No Alts	With Alts	No Alts	With Alts	No Alts	With Alts
Portfolio Statistics								
Geometric Exp. Return	4.6%	4.9%	5.8%	6.1%	5.6%	5.8%	6.6%	6.9%
Exp. Volatility	6.0%	5.8%	11.9%	11.8%	6.0%	5.9%	11.9%	12.0%
Sharpe Ratio	0.40	0.48	0.30	0.33	0.39	0.44	0.29	0.31
CVaR 95%	8.4%	7.4%	18.7%	18.1%	7.5%	7.2%	17.8%	17.8%
Arithmetic Exp. Return	4.7%	5.0%	6.3%	6.6%	5.6%	5.8%	7.2%	7.5%
Portfolio Composition								
Global Aggregate	56%	50%	17%	10%	59%	51%	23%	15%
EMBI & Global HY	20%	20%	20%	23%	20%	23%	20%	23%
DM Equity	16%	8%	42%	35%	14%	8%	38%	31%
EM Equity	8%	3%	21%	17%	7%	2%	19%	16%
Real and Alternative Assets	0%	19%	0%	15%	0%	16%	0%	15%

Source: Amundi Quant Solutions based on CASM model simulations. Data as of 30 January 2023. The efficient frontier is obtained by minimising portfolio CVaR, while respecting diversification constraints and the liquidity appetite of the fictional investor. When plotting the portfolios in the mean-volatility space, the frontier could exhibit an irregular pattern. Real and Alternative assets include Global Private Equity, Global Real Estate, Infrastructure Equity, Global Private Debt, Hedge Funds. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Amundi methodology for determining strategic asset allocation

The investment universe is global top-down and includes fixed income, equity and real and alternative assets. We consider the SAA from the perspective of US dollar and euro-based investors. The fixed-income assets are fully hedged, while equity and alternatives are unhedged against the investor's currency. The currency hedging is obtained by applying the expected cash yield differential (local minus foreign) to foreign asset prices. Unhedged expected returns are obtained by incorporating the currency cross's expected return to foreign asset prices. For each asset class, we simulated 10,000 scenarios over a 10-year horizon using the Amundi CASM model.

The scenarios are consistent with Amundi's medium and long-term macroeconomic forecasts and climate transition model. The underlying return distributions are modelled with fat tails, tail co-dependence and heteroskedastic volatility, which are important elements when modelling portfolios containing alternative asset classes. Our optimisation framework minimises the Conditional Value at Risk (CVaR) of an expected return distribution to build an efficient frontier. The tail risk, which is peculiar for real and alternative asset classes, motivated our choice of a CVaR minimisation approach.

A liquidity rank is assigned to each asset class.

The investor's liquidity preference is reflected by a linear constraint whereby the total liquidity budget of the optimal portfolios cannot exceed a specified level. Every asset class is given a liquidity rank based on several characteristics, including time horizon, cash flow curve and liquidity among others. The investor's liquidity preference for this exercise is set to medium; this choice allows careful control of the allocation to alternative asset classes, thereby aligning the SAA to the investor's market and liquidity risk profile.

Additionally, we have included group constraints to limit the exposure to alternative fixed income (EMBI, global high yield and private debt), as well as to EM and to real and alternative assets. These constraints are equal for euro and US dollar investors and represent a medium-risk appetite. We also included some diversification constraints to balance the real and alternative baskets. The different SAA are simulated assuming a yearly rebalancing rule, selected as a compromise between different rebalancing frequencies according to asset class liquidity. Finally, each return statistic comprises a rebalancing premium ranging from 40 to 60 bps depending on the portfolio.

ASSET CLASS VIEWS 2023 - 2033

Cross asset

Asset class long-term views: bonds are back, Emerging Market assets favoured

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KEY TAKEAWAYS

- Fixed income's expected returns are more appealing compared to last year due to higher carry and more attractive initial valuations resulting in higher return expectations versus the 10-year historical average.
- In the credit space, we expect a boost in returns due to the positive trend in the government component. Credit spreads are now hovering around our long-term target, offering a supportive picture compared to last year.
- In equity, expectations are marginally above last year's, but generally lower compared to the past 10 years. The many challenges implied by the macro and financial backdrop driven by the transition partially offset the potential upside from more supportive valuations. Regionally, Japan, the US and Europe saw the greatest upward revisions versus last year.

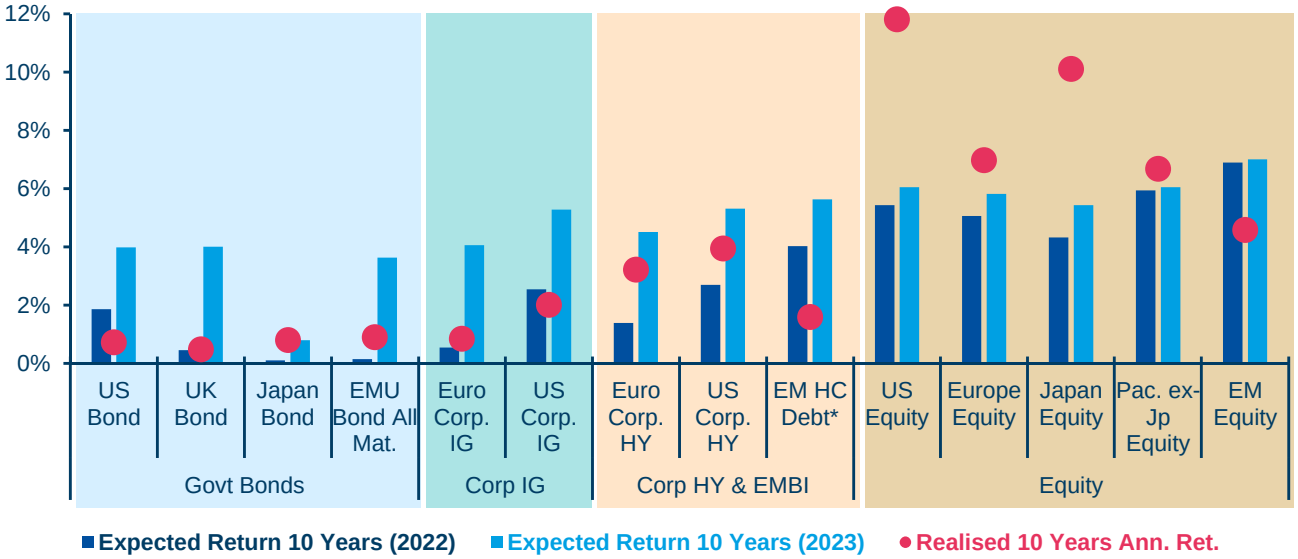
Better return profile across the board compared to last year, particularly for bonds

Government bonds are back in focus as monetary policy decisions marked a turning point for fixed-income securities. Elevated yield curves are expected to return to equilibrium levels over the long term. As a result, government bonds, especially in the **UK and Eurozone, should benefit from higher carry and the positive valuation effect** compared to last year. JGBs are expected to provide positive returns close to what was experienced over the last 10 years, although still significantly below other DM sovereign bonds.

Credit asset returns will benefit from higher carry, where the government component is now predominant. For **high yield (HY),** higher forecast default rates significantly reduce (particularly in the US) the relative appeal of this asset class versus investment grade (IG) credit. In fact, only **marginally higher expected returns** are **not sufficient to balance the risk associated** with this asset class.

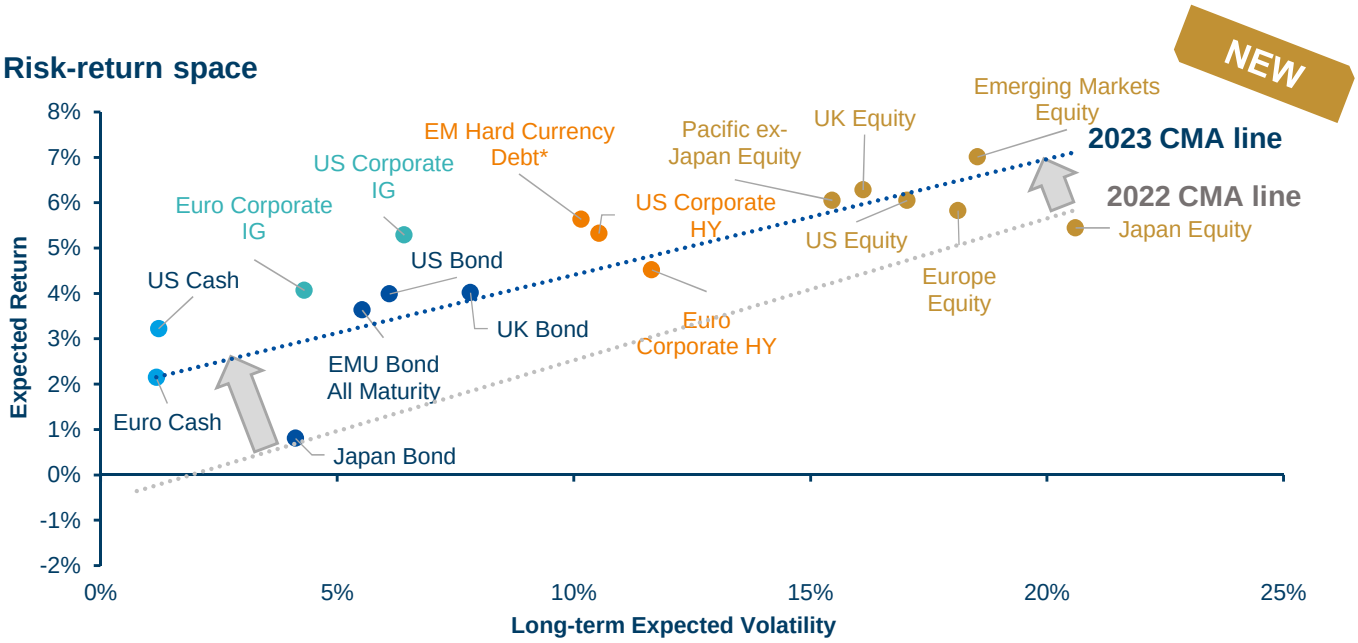
We confirm a **positive stance on EM hard currency debt**, notwithstanding a gloomier scenario on default risk. While we expect a **more mixed picture for EM sovereign local yields**, decent expectations but not enough to balance the risk taken.

Expected returns vs last year's forecasts and past decade realised returns



Source: Amundi CASM Model. Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Risk-return space



Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Equity's expected returns are higher than last year's forecasts thanks to more appealing valuations, but the **overall improvement is somewhat suppressed** by the worsening macro-financial picture characterised by the **abrupt inflationary transition and subdued earnings growth** which, among other factors, are affected by **lower economic growth and a more labour-oriented redistribution of profits**.

In the forecast **risk-return space**, cash instruments and government bonds (with the exception of Japan) are expected to deliver mildly positive returns. **Government bonds are dominated by IG credit assets that provide attractive returns with a similar risk profile**.

On the right-hand side of the space, equity returns have been marginally revised upwards, while their moderate-to-high risk assessment was confirmed.

Overall, as a consequence of the fixed income returns upgrade, **the future landscape exhibits a marked reduction in the appeal for adding risk**.

In fact, the additional reward granted for an additional unit of risk is limited, as the 2023 CMA trend-line (drawn on the chart) flattens compared to the 2022 CMA one. Therefore, **investors should expect to reach similar returns in their portfolios with more conservative risk profiles**. However, to target higher returns, investors will need to rely on risky assets.

Turning to our **correlation assumptions**, we still **believe in the government bond diversification feature** and allocating to this asset class remains a major building block of multi-asset portfolios. Among real and alternatives, we expect private equity's correlation with cyclical assets, such as equities and global HY, to remain strong in line with history. On the other hand, **real estate and infrastructure investments exhibit a low correlation with the remaining asset classes**. This emphasises the view of these assets as diversifiers and also displays an inflation-hedging dynamic.

Simulated long-term correlation assumptions

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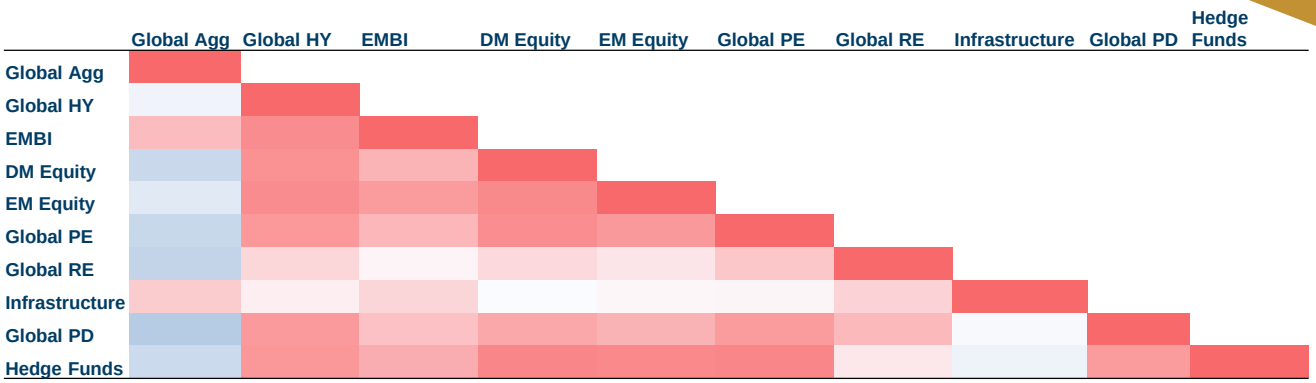

Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. Red (blue) represents high (low) correlation.

Mind the dispersion of potential outcomes

Point estimates for assets' returns corresponding to our central scenario only showcase a tiny portion of the wide range of possible future scenarios.

For this reason, we rely on our proprietary stochastic simulation tool to generate thousands of economic scenarios from which we obtain a distribution of asset class returns. The chart reports the difference between the 5th and 95th percentile of the 10-year annualised return distribution for some assets (the inter-percentile range). This represents a measure of the dispersion of expected outcomes around the central scenario.

Unsurprisingly, **fixed-income assets** have a much **lower dispersion range** compared to risky assets, such as equity and alternatives. Within **equities**, there is a clear difference between DM and EM. Most importantly, investors should be aware that there is still **a 5% chance of negative average returns over the next decade**. The **heterogeneity of the real and alternative assets** space also appears in **their different dispersion profiles.** Hedge funds display a relatively contained dispersion range, although larger than fixed income, while the range for infrastructure and private equity is wide, with the low end being close to zero.

Inter-percentile range of expected returns

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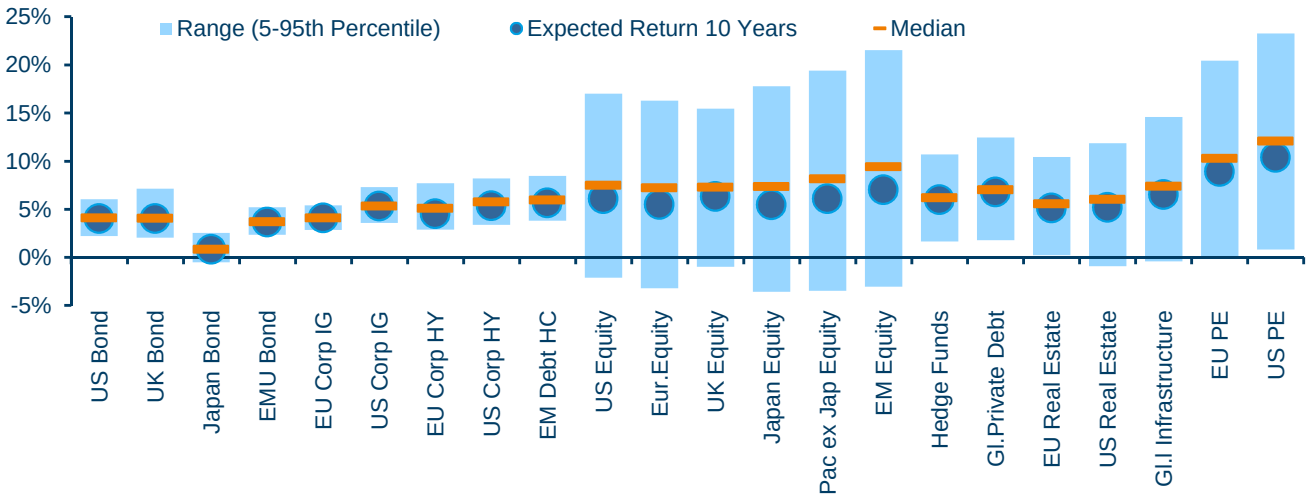


Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Five main assumptions and limitations of our long-term approach

These results are strictly dependent on our central 'rocky' transition scenario, defined on the basis of the reference scenarios established by the Network for Greening the Financial System (NGFS, a consortium of climate scientists, economists, supervisors and central banks), which offers a flexible framework to explore the risks present in a number of distinct possible pathways. Below we list some of the assumptions and limitations of our model-based approach, which are particularly relevant to interpreting the final results:

1. We assume a '**business-as-usual'** case for macro-financial dynamics **over a 1-3 year horizon**, with more aggressive policy action starting from 2025 onwards.
2. We maintain our **modular approach**, providing a cascade architecture that insulates the numerous models and explanatory variables, while spotting the logical nodes-relating elements of the narrative to one another.
3. The **macro scenarios** we simulated are **coherent with different active climate policies**. These will define the patterns for macro fundamentals (therefore incorporating climate transition), and will eventually be used to derive expected returns.
4. Our analysis largely **relies on first-order effects**. **Second-order effects and potential tipping points are complex to estimate and are excluded from this analysis**. Additional data and future game-changing technological innovations are not visible, although these could alter the results we describe in this report.
5. The detailed **methodology may somewhat limit our field of visio**n, as the outlook for the granular variables becomes more blurred **moving into the long term**. This is especially true for the **pessimistic scenario**, deliberately taken to an extreme to highlight climate effects in case of an unsuccessful transition.

Alternative scenario

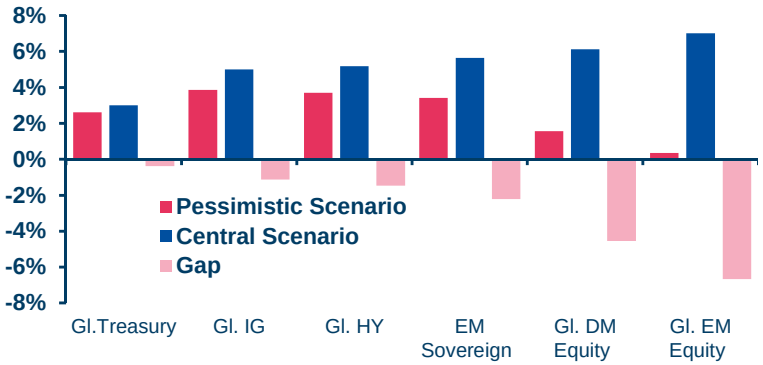
Transition risk: the pessimistic scenario: 'Armageddon'

The pessimistic scenario could trigger higher macro-financial impacts linked to the transition. Under the alternative 'Armageddon' scenario introduced last year, divergent and delayed schemes are predominant. Ultimately, the transition to a net zero world is delayed and the macroeconomic scenario worsens on multiple fronts as the transition / physical risks increase significantly.

Despite the **low likelihood of such a gloomy scenario**, there is **added value in anticipating adversities and measuring their effects**. We prefer to maintain a disciplined and model-driven approach to assessing the implications for financial markets.

By 2050, the impacts of this scenario will be unprecedented, leading to substantial **downgrades in risky assets' expected returns** (low-grade credit and equity) due to weak macro-financial fundamentals, inflationary pressure and default risks.

Pessimistic vs Central Scenario
10-year expected returns



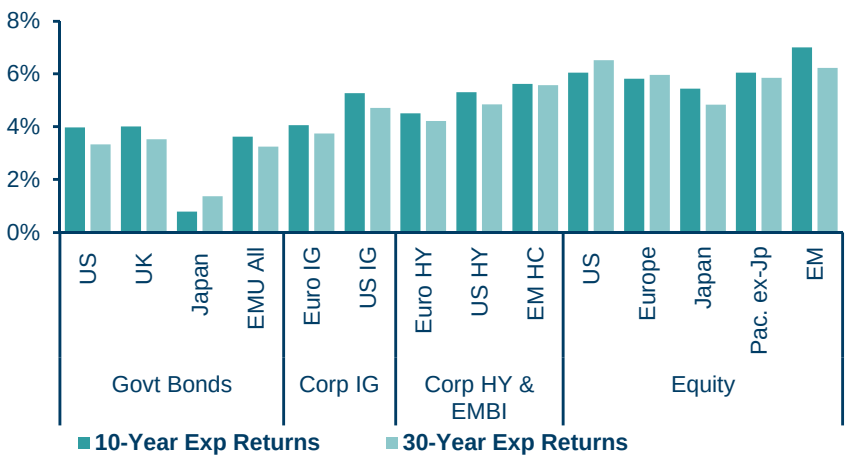
Long-term view

A very long-term view over a 30-year horizon

We investigated long-term trends, aware that the longer the forecasting horizon, the higher the uncertainty around the transition scenario and the model-driven results. Moving beyond 10 years, the picture of asset class projections is characterised by macro and financial variables stabilising on trends and equilibrium levels. In the **fixed income space**, returns will generally be **lower as the repricing effect fades**, leaving space for the carry component, which represents the lion's share of expected returns in the very long term. For **Japanese bonds** the effect is the **opposite**: the starting curve is lower than the one at equilibrium, therefore returns are expected to grow over the time horizon.

In **equities**, countries such as the **US and Europe** will **benefit from the transition** finally taking place, fundamentals reaching equilibrium, and their annualised expected returns beyond the 10-year mark increasing. On the other hand, expectations for **Pacific ex-Japan and EM equity** could move **lower** mainly due to **weaker EPS growth in the long term**, amid a declining trend in economic growth. Expected returns in **Japan** will be marginally **lower**, as the support from **valuations will dilute** over the long term.

30-year vs 10-year expected returns



Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Government bonds

Govies: return forecasts are higher than in the last two decades across most developed markets

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KEY TAKEAWAYS

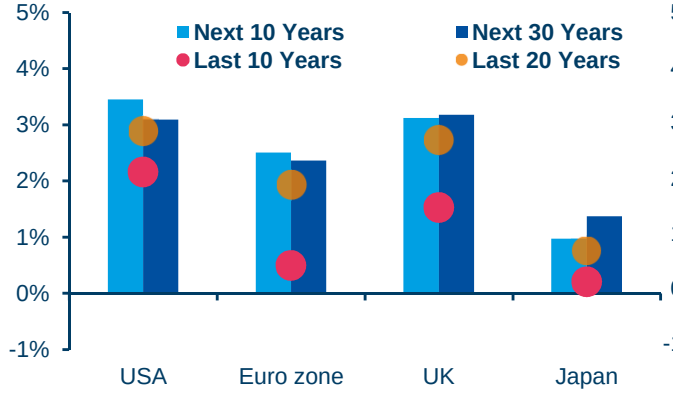
- **US**: Starting curves are higher than 10-year levels, especially at the short end. Therefore, we expect returns to benefit from valuation changes. Higher interest rates, partly due to rising and more volatile prices, should provide US bonds with decent nominal returns of around 4% over the next 10 years.
- **Eurozone** (core and peripherals): The outlook for bond returns is made challenging by the 'higher-for-longer' monetary policy stance to tackle sticky inflation. The higher average carry over the next 10 years is reflected in our forecast for euro core bond returns, slightly below 3% compared to last year's negative figure.
- **UK**: medium-term expected returns rank the highest due to depressed valuations and the assumption that the BoE will switch to an accommodative stance to compensate for the upcoming economic contraction. However, 10-year expectations are in line with US bonds, albeit with significantly higher associated risk.
- **Japan**: bond returns remain compressed compared to other DM countries as the equilibrium curve is expected to remain low, although we expect the end of the YCC and the NIRP.

Towards a positively-sloped normalisation of term structures, albeit flatter than in the past

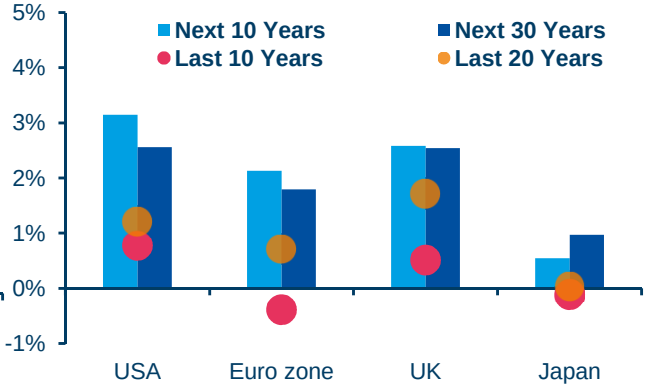
In our central economic scenario, the transition towards the net zero 2050 goal takes place in a 'disorderly' fashion, characterised by significant transition risks and contained physical risks, compared to scenarios where transition efforts are insufficient to halt global warming. Asynchronous policy coordination between countries and sectors results in higher costs for consumers, although substantial investment in technologies guarantees a sufficient degree of adaptation to climate risks. For some countries, we expect interest rates in 10 years to be higher than the levels forecast last year, due to the prevailing macro regime of higher and more volatile inflation dynamics, while for others we confirmed our expectations.

In the US, the Federal Reserve's battle against inflation seems to be going in the right direction although an imminent economic contraction is priced in the current yield curve, which is inverted across several tenors. We expect the abrupt green transition to be inflationary, especially in the US. Therefore, the next decade may be bumpy for the most relevant central banks, as monetary policy will have to balance managing inflation risks and guaranteeing the 'green' quantitative tightening necessary to pursue the transition. The equilibrium term structure of yields will be above last year's forecasts as a result of an upgrade in long-term inflation targets.

Average short-term Rates



Average 10-Year Rates



Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document.

Europe is still behind the US in the fight against inflation, as shown by the resilience of core inflation measures and real wages that are set to rise in the coming months. The short-term interest rate has yet to climb before reaching the expected terminal level of around 3.5%. In the medium to longer term, Continental Europe looks to be better positioned for the upcoming transition, hence the rise in prices and interest rates is less significant. We expect equilibrium interest rates will be slightly higher in some peripheral countries that have come under stress from the transition, reflecting the greater risk of their debt.

In **Japan**, the current economic picture has changed markedly from last year: inflation is at 4% – a level not seen in decades – and the BoJ should soon scrap its Yield Curve Control (YCC) policy, as its cost is becoming unsustainable. Consequently, we expect the short-term rate to rise and the curve to flatten over the medium term. Additionally, we assume the equilibrium yield curve to be higher than previously forecast, given higher long-term inflation expectations than in the past.

The **United Kingdom** is the country facing by far the strongest headwinds, amid political skirmishes, the effects of Brexit and inflation hitting the highest double-digit figure of all main developed countries. We expect the BoE will move to an accommodative stance over the next decade as the inflation threat fades. The yield curve should reach a higher equilibrium than previously forecast, reflecting the intrinsic risk of an isolated British economy.

Cash Returns

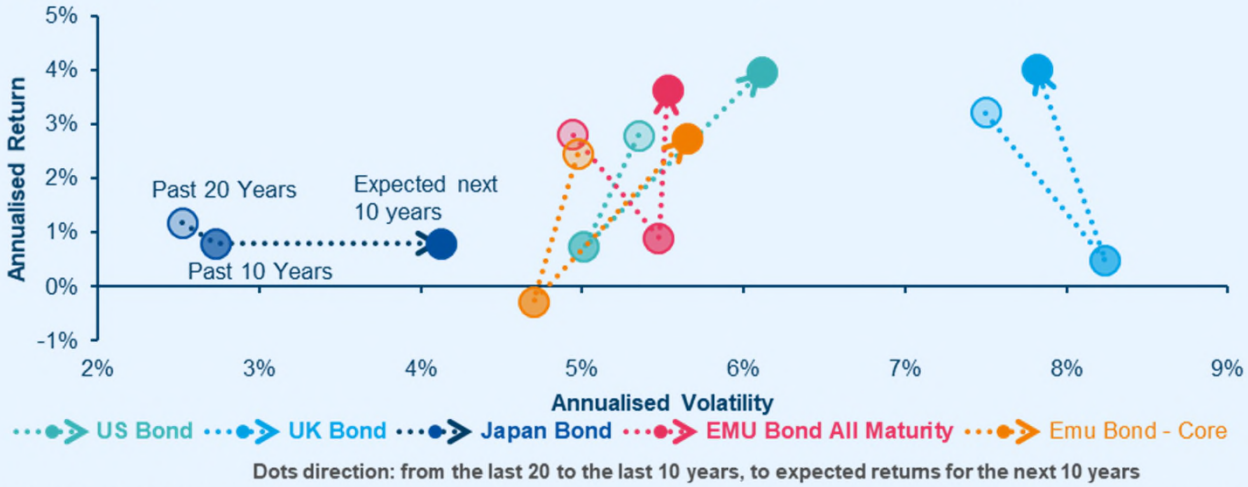
Our central scenario expectation for total returns on cash instruments underlines our assumptions of a normalisation in real rates. Forecasts are very appealing relative to history, which was biased by a regime of unorthodox monetary policies such as Negative and Zero Interest Rates (i.e. NIRP / ZIRP). Given the different starting valuations, our updated figures are much higher than previous estimates.

	Historical		10-year expected returns	
Average Returns	Last 20 Years	Last 10 Years	At December 2021	At December 2022
Euro Cash	1.2%	-0.1%	-0.4%	2.1%
US Cash	1.7%	1.1%	1.3%	3.2%
UK Cash	1.7%	0.5%	1.4%	2.6%
Japan Cash	0.0%	-0.1%	0.2%	0.5%

Bonds' expected returns

The combined effect of higher carry and attractive starting valuations is visible in the expected returns for government bonds. Our forecasts are close to 4% for the US and UK, while the expected returns for Eurozone bonds are only slightly lower thanks to the contribution of peripheral countries: overall forecasts are higher than the average of the last two decades. The initial valuations have not moved for Japanese bonds, so expectations remain modest in a country marked by the YCC. Moreover, we expect uncertainty deriving from the transition and the weaker macro scenario to persist over the next decade, so simulated volatility is higher for most DM bonds.

Higher carry and attractive valuations drive a recovery in DM bonds' expected returns



Dots direction: from the last 20 to the last 10 years, to expected returns for the next 10 years

Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Credit: expected higher defaults call for a tilt towards higher quality

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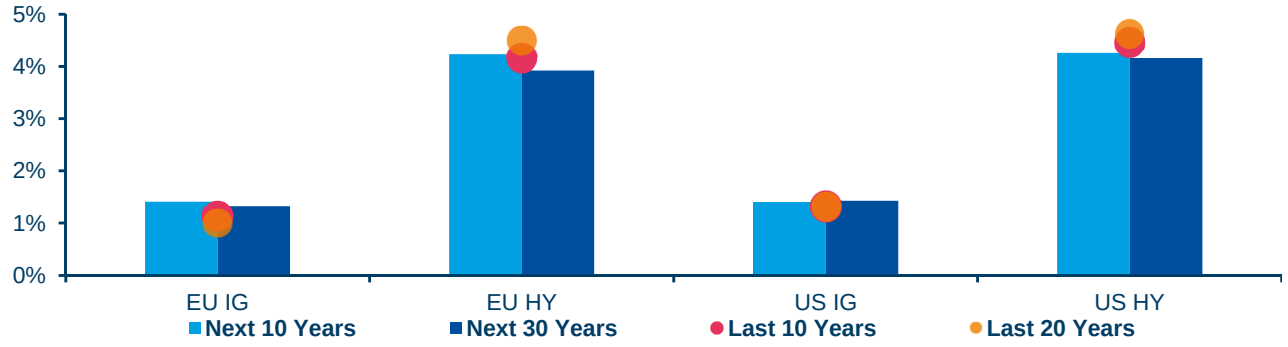
Viviana GISIMUNDO
Head of Quant Solutions, OCIO Solutions, Amundi

KEY TAKEAWAYS

- Our assumptions for credit spreads are linked to the trends in nominal yields, corporate profitability and default risk. Lower corporate profitability implies widening spreads and higher financing costs, which translates into a rising probability of defaults. As default risks are also correlated to credit quality, we factor in a more pronounced potential loss for high yields. This leads to halving the return component linked to credit spreads, after adjusting for the potential default loss.

Looking at the long-term forecasts for credit spreads, these are almost in line with the history of both IG and HY, which has been filtered to exclude outlier events. Compared to last year's expectations, **we highlight a significant improvement in credit's expected returns mainly due to the evolution of government yield expectations**. In addition, the valuation backdrop has improved versus last year, as current spreads are now around target. Credit's expected returns are forecast to be mainly driven by the carry component, with the government yield component being predominant now.

Average spreads



Looking at the quality profile, the potential benefit from investing in low-quality assets (HY) is harmed by the expected impact of default losses: expectations for HY are only marginally higher than IG. **Risk-adjusted returns for the future decade favour IG segments.** Expectations in this space are also more appealing than historical performance, whereas HY's expected returns are below the average of the last 20 years. This represents the combined effect of higher default risk linked to the transition and to the index's construction methodology. In fact, bonds are excluded from the index as soon as a default event is announced, thus polluting the realised performance of the portfolio of securities which eventually does not crystallise the full loss.

Expected vs historical returns

	Historical		Expected	
Average Returns	Last 20 Years	Last 10 Years	as of Dec 21	As of Dec 22
Euro Corporate IG	2.8%	0.8%	0.7%	4.1%
Euro Corporate HY	6.9%	3.2%	1.4%	4.5%
US Corporate IG	4.1%	2.0%	2.6%	5.3%
US Corporate HY	7.1%	3.9%	2.7%	5.3%

Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document.

Emerging market bonds

EM bonds retain a positive outlook, notwithstanding the challenges that could lead to higher defaults

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Claire HUANG
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KEY TAKEAWAYS

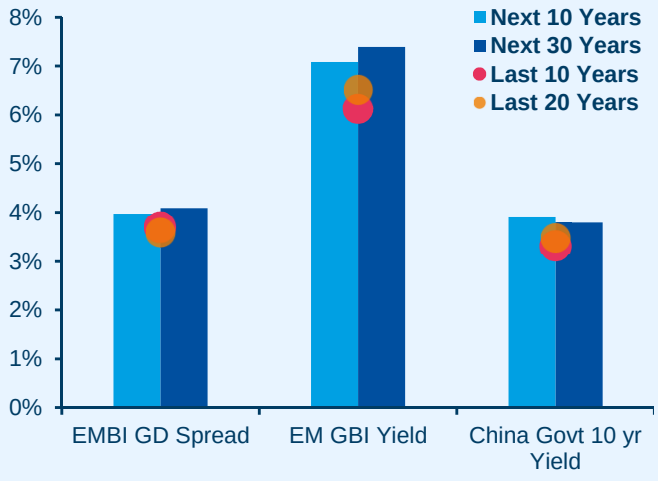
- EMBI: we confirm a positive stance on EM hard currency debt, notwithstanding a gloomier scenario on default risk.
- EM GBI: light and shade for EM sovereign local yields, decent expectations but not enough to balance the risk taken.
- Chinese government: The macro environment combined with less attractive valuations should penalise Chinese bonds versus those from DM countries and above all versus EM local yields and debt.

Forward-looking expectations for the **EMBI Global Diversified Index** combine assumptions on spreads, US curve dynamics and default risk. The assumptions on EMBI spread patterns are based on the evolution of nominal EM GDP, the EM–DM growth differential, 2- and 10-year US Treasuries, implied volatility, government debt and oil prices under our central scenario. This results in a **higher spread than history, but is in line with last year's forecasts**. We assume that the current higher default environment will last for a time, capturing the asset class's vulnerability to both internal and external factors. On the positive side, **the contribution coming from US Treasury exposure is supported by higher carry and improved valuations**. All in all the **expectations for EMBI are quite favourable**, confirming the asset class's resilience in tricky scenarios.

Local yields are currently lower than the long-run level associated with the macro transition scenario which, as highlighted, can be particularly problematic both for EM single countries and the macro aggregate. Final expectations consider **a positive and increasing contribution from carry, tilted down by valuations**. The **contribution coming from currency exposure versus USD is slightly positive, but it is nulled by the associated risk**.

China is entering a phase of lower growth mainly caused by secular forces, notably its ageing population and reduced capital returns. We expect GDP growth to be substantially lower than in the past, but long-run inflation should increase to US levels on the green transition. As a result, **yields on Chinese govies are historically high and the valuation adjustment will depress total returns in local currency**. Assuming a US dollar-denominated investor, we are adding around 1% annualised support coming from FX.

Average spreads and yields

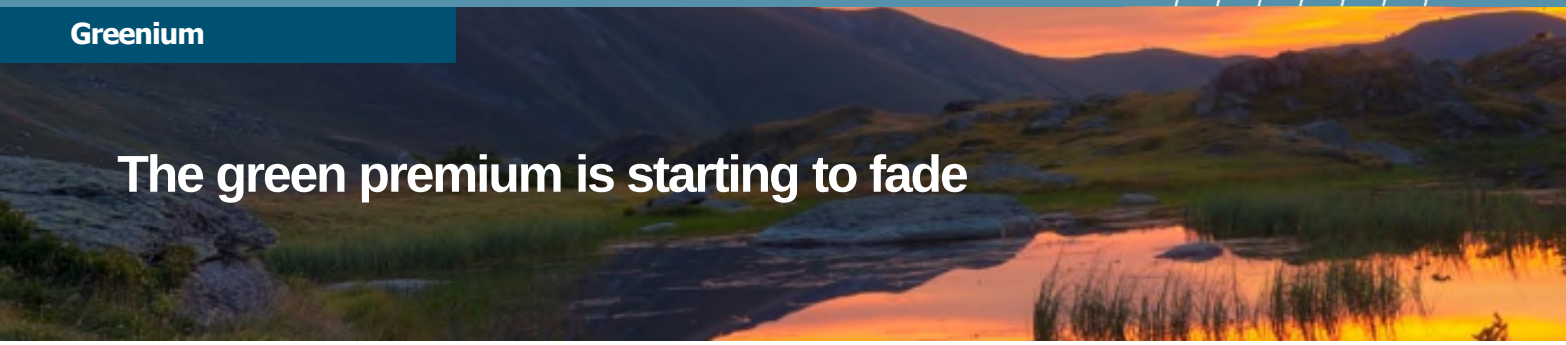


Expected vs historical returns

	Historical		Expected	
Average Returns	Last 20 Years	Last 10 Years	as of Dec 21	As of Dec 22
EM Hard Currency Debt	6.2%	1.6%	4.0%	5.6%
EM-GBI USD Unhedged	4.9%	-2.0%	na	5.5%
GBI-EM China LOC	na	na	3.1%	3.7%

Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document.

Greenium



The green premium is starting to fade

Mohamed BEN SLIMANE
Quantitative Research,
Amundi Institute

KEY TAKEAWAYS

– A small negative green premium ('greenium') remains in place, although we noticed different dynamics in USD vs EUR: the EUR premium has moved close to zero in 2022, while the USD premium was far more volatile and started to move lower only in late 2022. Looking ahead, we would expect the greenium to close further.

Green bonds are debt instruments that aim to channel capital towards green projects. Unlike their conventional counterparts, green bond proceeds are earmarked exclusively for new or existing projects that have an environmental purpose. In setting expectations for green assets, it's important to assess if the 'green' feature of a bond entails a yield premium, a greenium, with respect to conventional bonds.

The greenium refers to green bonds being priced above or below conventional bonds with similar characteristics and is mainly justified by higher demand-supply imbalances for green bonds.

Looking at recent green premium dynamics we confirm last year's **findings of a slightly negative green bond premium overall, which we believe should close further in the future.**

This is larger and more volatile for the USD than for the EUR. In EUR, the premium started to close in 2022, while in the USD it widened initially and started to decrease significantly after the summer of 2022.

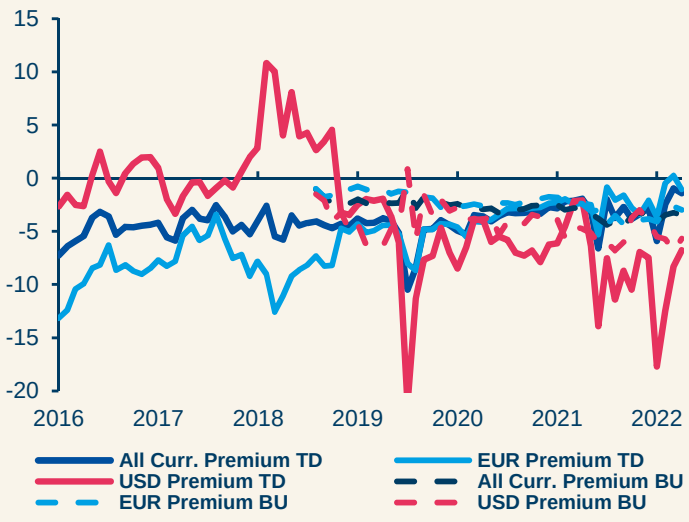
We also noticed different dynamics at the sectoral level. While the greenium remained low and pretty stable for Supranational, Sovereign and Agencies, Covered Bonds and Financial Corporates, it more than doubled for Non-Financial Corporates in 2022 compared to the previous year's results.

Global Universe, Average Premium(bp)

	2022	Up to 2021
Covered Bonds	-0.3	-0.4
Financials Corporates	-2.9	-2.4
Non-Financial Corporates	-8.1	-3.8
Supranational, Sovereign & Agencies	-2.3	-2.2

Source: Quantitative Research, Amundi Institute. 30 December 2022.

Green premium estimates 2021-2022 Update (in bps)



Source: Quantitative Research, Amundi Institute. 30 December 2022.

To estimate the greenium on the secondary market, we use two approaches:

1. A top-down (TD) approach where a Green Index (the Bloomberg Barclays MSCI Global Green Bond Index) is compared to a conventional bond index (the Bloomberg Barclays Global Aggregate Bond Index). To compare the performance of both portfolios, the benchmark is weight-adjusted to mimic the currency, sector, credit quality and maturity features of the Green Index. Data since Sept 2016.
2. A bottom-up (BU) approach that takes the definition of an intra-curve green bond premium, comparing a green bond to a hypothetical conventional bond of the same issuer, currency and seniority. Data since April 2019.

Equity: Expect modest returns compared to history, with EM in focus

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KEY TAKEAWAYS

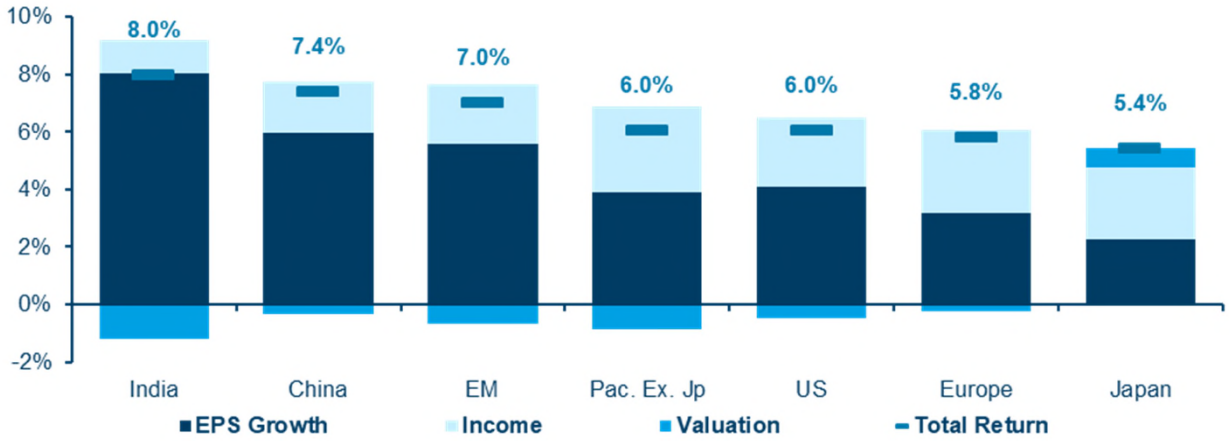
- In an era of a more urgent but less coordinated transition, with some rebalancing between profit and labour, we expect equity returns over the next decade to be more modest compared to the past 20 years. Subdued EPS growth and lower structural valuations should drive return dynamics. Income will become a relevant driver of returns, particularly in Developed Markets, where it will account for around 40% - 50% of expected returns.
- A less coordinated, but also more urgent transition leads to a more challenging macro and financial scenario. However, compared to the 2022 Capital Market Assumptions, more favourable initial valuations – driven by the 2022 market repricing – will lead to more appealing return forecasts across equity markets.
- Regionally, Emerging Markets are expected to top the equity returns ranking, this is particularly evident for China and India; however, the EM growth path is challenged by the rocky transition and their relative advance is mitigated by looking at risk-adjusted returns. In Developed Markets, the US and Pacific-ex-Japan are expected to deliver the highest returns, followed by Europe. In these regions, returns will be driven by robust but below-average EPS and dividend yields close to their long-term average. Japan will likely be the laggard due to its expected lower EPS growth.

Lower EPS growth compared to the past, but a better valuation backdrop vs last year

Our long-term macroeconomic assumptions encapsulate a shift towards a new regime characterised by higher inflation and volatility, which justifies rising interest rates and points to flatter yield curves over the long run. In fact, **the green transition will push prices higher as it inherently produces inefficiencies that will affect economic actors until new and more productive technologies are in place**. In addition, we believe the transition will be accompanied by **a stronger focus on the social dimension through a redistribution of profits towards wages**, in order to rebalance the income share of labour and capital: this will also weigh on the **earnings trajectory**.

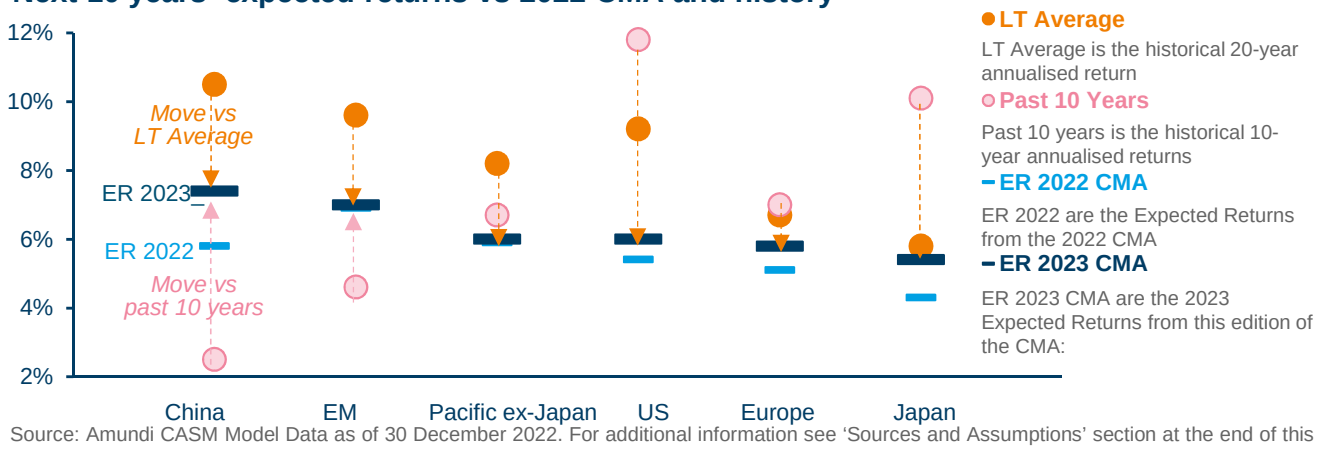
As inflation moves upwards and GDP growth comes down, lower productivity, higher unit labour costs and PPI deriving from more costly brown energy will cause corporate bottom lines to become more unstable and generating EPS will be more difficult.

Annualised 10-year expected returns by contribution



Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. **The forecast returns are not necessarily indicative of future performance, which could differ substantially.**

Next 10 years' expected returns vs 2022 CMA and history



Source: Amundi CASM Model Data as of 30 December 2022. For additional information see 'Sources and Assumptions' section at the end of this document. **The forecast returns are not necessarily indicative of future performance, which could differ substantially.**

Main change versus last year's Capital Market Assumptions (CMA): we assume structurally lower valuations in the future as inflationary pressure and higher yields will push equity prices down. However, compared to last year, the valuation assessment is more favourable after the market repricing in 2022. This translates into higher expected returns across the board compared to last year, particularly in China, Japan and Europe.

2023 CMA range compared to long-term (LT) history. Despite the more supportive valuation backdrop, the worsening macro scenario stemming from the difficult short-term outlook and the rockier transition path leads to lower expected returns compared to long-term averages (20-year horizon). Specific macro and equity market dynamics help to explain the relative gaps between regions. Total return expectations for the next decade are in the range of 5.4% - 7.4% (versus a 5.8% - 10.5% long-term range), under the assumption of continued support from the **income component, which is gaining prominence in explaining final expectations.**

Regional dynamics: Our 2023 expected returns ranking sees India, China and Emerging Markets as leaders, while Europe and Japan are the laggards. While overall expected returns are lower compared to the long-term average, returns in China are expected to rebound compared to the past 10 years as the asset class has been underperforming relative to other equity markets. With regards to the US, we expect future 10-year returns to be approximately half of the exceptional returns witnessed in the previous decade.

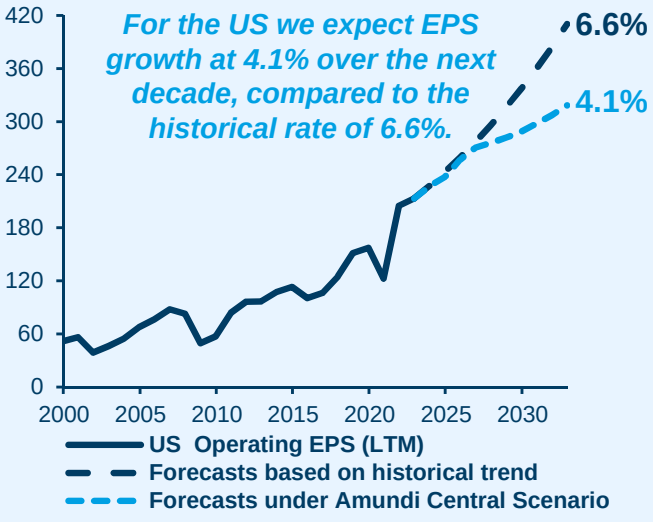
Finally, Europe's expected returns should improve compared to last year's assumptions because of more favourable valuations even if muted by the worsened macro scenario, but are still somewhat lower than historical performances. Nevertheless, compared to other regions, Europe displays the lowest dispersion of returns across the different horizons (followed by Pacific-ex-Japan), thanks to the relevant and stable contribution of income to returns (around 50%).

Amundi methodology for EPS forecasts

In 2022, when we introduced climate considerations into our Capital Market Assumptions, we highlighted the importance of factoring in significant changes in the top-line and bottom-line dynamics driving EPS growth. This means moving beyond GDP figures when modelling production functions, productivity and EPS. In fact, the reconversion of the production function to a greener one significantly changes the cost component. **From this year we are also factoring in a rebalancing of the profit-labour allocation towards labour (which will impact both the top line and bottom line*).** The impact will vary depending on specific countries' sensitivity to energy and their different starting points in the green transition and labour-profit allocation. We also acknowledge that forecasting returns in an era of the energy transition is a challenging task, as assumptions are based on future game-changing technologies not visible in the present that could alter the final outcome and regional dynamics

* See the related section on income distribution views.

A rocky energy transition with more balanced labour-profit allocation will drive EPS lower



Source: Amundi. Data as of 30 December 2022.

Equity sectors: Value investing to be favoured amid revenge for Financials in the next decade

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Joao TONIATO
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John COADOU
Global equity strategist , Amundi Institute

KEY TAKEAWAYS

- Looking at sectors' expected returns, Value investing appears to be supported over the next decade, with Financials favoured vs Real Estate in a rising rates environment. However, Defensive sectors are losing attractiveness and we expect flows to be supportive for IT in the long run.
- Looking at the themes most affected by the transition, we expect that of the two sectors at the heart of the transition efforts Energy will perform better than Materials (except in Pacific-ex-Japan) and we anticipate an increased focus on Australian mining. Capex will also be a theme, with Industrials (Capex producers) expected to benefit versus Communication Services and Utilities (Capex buyers)

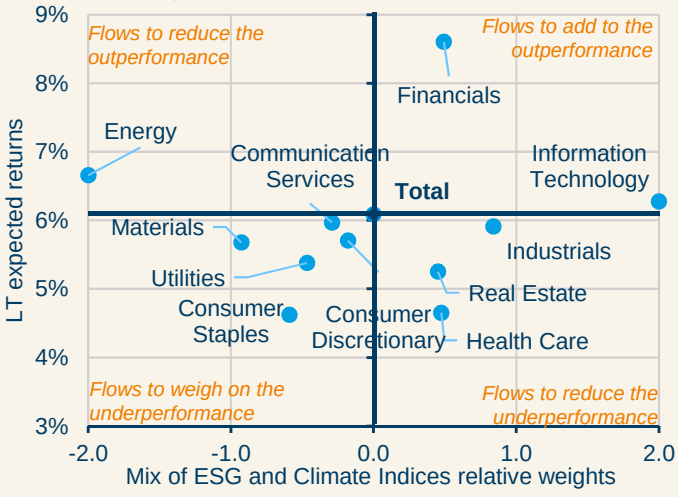
Sectors' expected returns implicitly support the case for Value investing. For the first time, the sectors that come out on top in our global ranking are sectors considered as Value, namely Financials (in all regions) and Energy. IT only comes third. In contrast, the three least attractive sectors according to our analysis are Consumer Staples, Healthcare and Utilities, which are considered Defensive sectors. The rerating of Financials and Energy from a very low valuation and above-average yield more than compensates for below-average expected earnings growth. The outperformance of Value sectors is consistent with a higher level of future inflation and higher interest rates, beyond cyclical movements.

The positive impact of flows will be on IT and more neutrally on Financials. The potential impact of flows to ESG and climate change funds is shown in the graph, on the horizontal axis. It weighs most heavily on Energy globally (especially in the US, Europe and EM), reducing the expected outperformance. In contrast, taking into account the majority of potential flows going to IT (especially in the US, Europe and Japan) will move the sector from slightly underperforming to outperforming globally. The impact of flows on Financials, at the top of the expected returns rank, is neutral to positive overall, and negative only in Japan, although this does not prevent financials from staying among the top positions in the Japanese market.

Amundi methodology to account for ESG and climate flows

Expected returns for sectoral indices are broken down into three components: long-run earnings growth, expected changes in valuation and income. To assess the impact of ESG and climate change demand we have analysed the sector allocation of the relevant ESG (MSCI ESG Leaders – best in class, the MSCI ESG Universal – broad and diversified and the MSCI ESG Focus – optimisation process) and Climate indices (MSCI Low Carbon – best in class, the MSCI Climate Change – broad and diversified – Article 8) and the MSCI Climate Paris Aligned. The over- or under-representations highlight the sectors that should potentially benefit / suffer from the flows related to these themes. These relative weights have been capped at + or -2% and incorporated in the valuation change component within a range of + or -0.75%.

MSCI ACWI - LT Expected Returns vs ESG index weights



Source: Amundi. Data as of 30 January 2023. For information on sources and assumptions see "Sources and Assumptions' section at the end of this document. **The forecast returns are not necessarily indicative of future performance, which could differ significantly.**

Equity sectors

10-year expected returns	USA	Europe	Japan	Pacific-ex-Japan	Emerging	World AC
Consumer Discretionary	6.7%	5.3%	6.7%	2.0%	8.1%	5.7%
Consumer Staples	5.7%	4.1%	2.9%	2.9%	4.0%	4.6%
Energy	6.5%	6.0%	8.9%	3.4%	7.3%	6.7%
Financials	7.5%	9.6%	9.4%	8.1%	9.8%	8.6%
Real Estate	4.8%	3.6%	6.5%	5.1%	9.1%	5.3%
Health Care	5.8%	5.6%	2.6%	1.8%	4.6%	4.7%
Industrials	7.0%	6.9%	5.9%	6.4%	5.2%	5.9%
Information Technology	7.0%	5.1%	4.3%	5.9%	5.2%	6.3%
Materials	6.4%	4.0%	3.8%	6.6%	5.4%	5.7%
Communication Services	6.3%	5.0%	9.8%	4.3%	7.1%	6.0%
Utilities	5.7%	6.3%	7.2%	4.3%	7.4%	5.4%
Total	**6.1%**	**5.8%**	**5.4%**	**6.1%**	**7.0%**	**6.1%**

Source: Amundi. Data as of 30 December 2022. Green colour highlights the best performing sectors in each region. For information on sources and assumptions see 'Sources and Assumptions' section at the end of this document. **The forecast returns are not necessarily indicative of future performance, which could differ substantially.**

Energy should do better than Materials, except in Pacific-ex-Japan. In **Energy**, oil demand should continue to slow down with the rise of renewable energy, electric vehicle usage, etc. However, the lack of investment in supply over the past years and issues around energy independence should sustain a tight oil market ahead. Energy companies have also become more efficient and with the structural decline of the oil market, they have started returning more of the extra cash to shareholders. **Materials** is dominated by mining companies in EM and by chemical companies in the US, with Europe somewhere in between. While an environment of higher rates should be a headwind for the more defensive components of the sector (consumer chemicals, industrial gases, etc.), the more cyclical component, mining, should fare better as demand for commodities should remain robust.

Financials better than Real Estate in a rising rates environment. **Financials** were the laggard of the previous cycle, as ultra-low rates and inflation created an environment where banks' business models did not work. For the next decade, we expect the sector to outperform benefitting from a reversal / normalisation of the trends that challenged it in the past. Conversely, Real Estate will be challenged by the rise in mortgage rates that will likely reduce property prices and dampen housing activity over the coming years, especially in DM. This is less the case for EM, amid fewer mortgages and a less problematic rates environment.

IT, Consumer Discretionary and Communication Services are mostly neutral on average with a strong regional bias. **IT** is the undisputed leader of the past cycle, but it is likely to see much more adjustment ahead. While initially it could benefit from a bounce back from the bear market, the environment is likely to be more challenging in the future, especially for US Big Tech. Returns should reflect that. In **Discretionary** some areas such as autos are still close to all-time high margins and will likely go through further margin compression in the future. Other areas, however, (hotels, leisure, etc) should benefit from a return of spending on services. **Communication Services** have different regional tilts, with telecom operators dominating the sector in Europe and tech companies being the most relevant in the US. The challenging environment for IT should be a headwind for the tech names within the index. Telecom operators, especially in Europe, are likely to continue to be forced into large capex expenditure (5G and whatever comes next over the next 10y) without the means to translate that expenditure into higher returns.

Industrials (capex producers) and Utilities (capex buyers): regional specifics. **Industrials** is a diverse sector that overall should benefit in the next decade from various supporting themes: energy independence, electrification, localisation of supply chains, greater defence expenditure, automation, capex, etc. However, the need to be selective is key, with areas such as aerospace and defence, electrical equipment, industrial conglomerates, machinery, etc. expected to benefit from those trends. Other areas will face headwinds. This is the case of areas exposed to the real estate market (building products) or that have received a sharp earnings boost during Covid lockdowns and are now set to normalise (transport, trading companies). Utilities is split between renewable energy companies and "traditional" producers. While renewable energy components should see increased demand over the coming years, they also suffer from being very long-duration projects where the economics of investments are much harder to justify in an environment of higher rates.

Defensiveness is losing attractiveness. **Staples** was a winner in the past cycle of lower yields, low inflation and globalisation, but it should be challenged in the future as those trends reverse. Health Care is a defensive sector which tended to see tailwinds from lower yields and the strong dollar, while Biotech names also benefited from Growth's past outperformance. This suggests a tougher time ahead. However, valuations are not as stretched as Staples which leads to lower risk of market disappointment for the sector.

Currencies: the green transition and emerging USD headwinds

Federico CESARINI
Head of FX Strategy,
Amundi Institute

KEY TAKEAWAYS

- Inflation has been the main driver of currency valuations in 2021 and 2022, and will also continue to play a key role during the transition given its inflationary nature, particularly regarding the currencies of importer countries.
- Taking a medium to long-term perspective, USD valuations are stretched and better fundamentals outside of the US should cause the greenback to come under pressure. Nevertheless, bouts of heightened geopolitical risk may continue to support demand for the USD during the transition.
- Transition costs will likely weigh more on commodity importers and their currencies. Our valuation metrics suggest the JPY and GBP in particular are highly undervalued and may become interesting.

Over the course of 2021 and 2022, inflation was the main propeller driving currency valuations. **Higher prices caused a division particularly between commodity importers and exporters,** with the former suffering heavily from the surge in production costs and the drop in trade balances. Better fundamentals in the US sustained the dollar, whereas the Eurozone, UK and Japan experienced a drop in long-term valuations. More recently, anxiety surrounding the Fed's response to the rapid price hikes has driven broad-based moves on currency markets.

Taking a longer-term perspective, **stretched valuations are also showing in the USD's trend** performance. However, whereas the rhetoric in 2021 was dominated by the performance of USD-denominated assets, and in 2022 by diversification and issues regarding energy independence, the start of this year has shown signs of a more balanced environment.

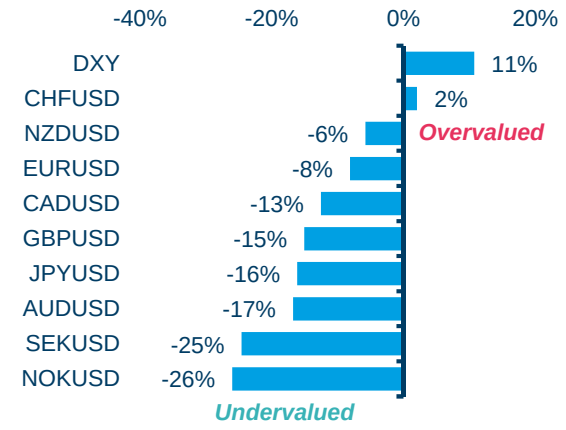
Our long-term central scenario assumptions envisage lower growth and higher inflation rates as a common feature across most DM economies. But while commodity importers will be affected by the elevated transition costs and the accompanying risk of capital reallocation to countries with lower production costs, the outlook for global capital markets is not so clear cut.

The assumption of higher long-term interest rates in the Eurozone, for instance, calls for a shift in the nature of the area's financial position and implies **positive euro inflows during the transition phase**.

In the US, the transition and heightened geopolitical risk may support demand for the greenback. On the other hand, comparatively better fundamentals and more attractive asset characteristics outside of the US may translate into long-term headwinds for the USD.

Overall, **local factors will matter more in the near future: the case for JPY and GBP are of particular interest**. Our valuation metrics view both currencies as being highly undervalued, with potential double-digit upside returns in the long run. However, changes (if any) in the BoJ's monetary policy stance and the UK establishment's ability to foster confidence can either amplify or delay the effects of currency movements.

G10 FX over / under valuation vs long-term fair values



Source: Amundi Institute. Data as of 30 December 2022. For further information see the "Sources and Assumptions" section.

Real and alternative assets: compelling tools to fill gaps in the risk-return spectrum

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OCIO Solutions, Amundi

Bertrand VUILLEMOT
Junior Quantitative Analyst,
OCIO Solutions, Amundi

KEY TAKEAWAYS

- This year we have expanded our universe to include hedge funds' expected returns in our CMAs. We have also added some additional insights by estimating the illiquidity yield measured through private debt and simulating the physical risk impacts for the infrastructure and real estate asset classes.
- Real and alternative assets offer a complementary risk-return profile to traditional asset classes, particularly in the medium and high volatility range. Private equity (particularly in the US) tops the expected returns ranking while, on a risk-adjusted basis, global private debt is favoured. Real estate and infrastructure returns are harmed by the impact of physical risks, but their appeal from a diversification standpoint remains high. Hedge funds also offer an appealing risk / return profile, offering the lowest risk profile across the spectrum of real and alternative assets (similar to that of the credit space) and appealing returns.

Key insights from the next 10 years' expected returns on real and alternative assets

Real Estate is **impacted both by the tug of war between climate change** (physical risk losses) **and the actions taken to combat it** (higher inflation boosting valuations as well as rental yields). This induces contrasting effects on expected returns. Physical risks partially offset the positive impact deriving from higher inflation on real estate expectations. This leads to tamed forecasts vs last year and possibly short-term challenges as valuations are further hit by increased rates.

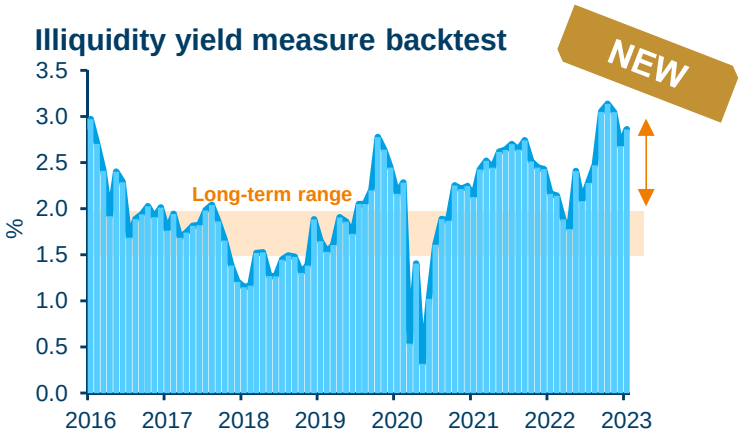
Infrastructure is also concerned with physical risks. The impact is even higher compared with real estate, as this asset class sits at the heart of transition efforts (renewable energy, smart grids). Hence, the positive stance from last year is partially muted because of its exposure to physical risks (e.g. US airports' vulnerability to floods*). Infrastructure's **diversification benefits make it attractive within asset allocation.**

Private Equity expectations move hand-in-hand with improved views on public equity. We confirm an **interesting liquidity premium** as sustained inflows, a long-standing record of being flexible and adapting to new opportunities (e.g. EV, eVTOL) should favour the still resilient private equity realm. Over **the short term**, we acknowledge the **high risk of write-downs** in 2023/24 that could drag down returns.

Private Debt's assessment has been enhanced by the integration of an illiquidity yield measure. **2022 has been marked by worsening liquidity** and private markets were not immune. Nevertheless, we expect a progressive normalisation in the long run.

Hedge Funds are the newcomer in our coverage. We have modelled this space using the HFRI hedge funds FoF Index – a diversified benchmark for hedge fund strategies – which reduces the survivorship and investability biases. Its risk / return profile is attractive, with an expected return of around **USD cash+300bps** mostly due to its positive sensitivity to equity and credit factors, while **its volatility is expected to be in line with that of the credit space**.

Illiquidity yield measure backtest



Source: Illiquidity Yield: The illiquidity yield is measured as Illiquidity Yield = Mezzanine Yield – (US Government Yield + Credit Spread). Credit Spread measured as Weighted Average OAS Spread of a basket of Public-Listed Companies. US Government Yield measured by USGG5YR Index and Mezzanine Yield measured through JP Morgan CLO high Quality Mezzanine Index Yield (JPEI9BYD Index). Methodology inspired by Measuring Liquidity Premiums for Illiquid Assets, Mark Anson, 2017, The journal of Alternative Investments, https://jai.pm-research.com/content/20/2/39

*Physical Risks & the Cost of Capital of Infrastructure Investments, EDHEC Infra, December 2022

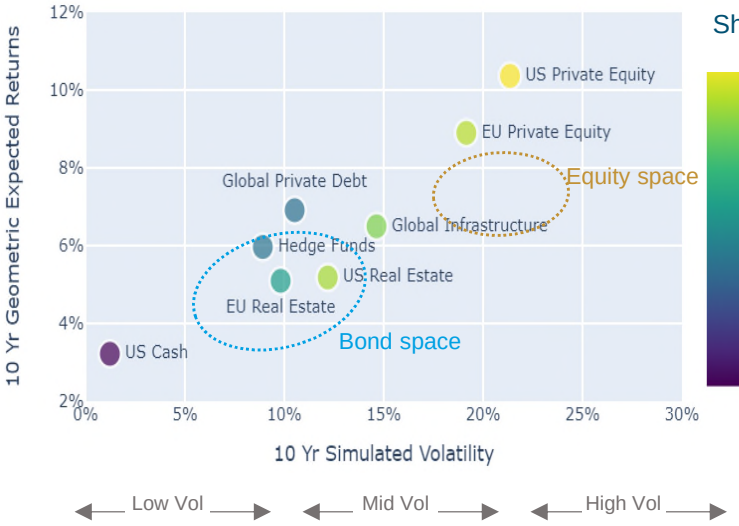
Extending the spectrum of expected returns to the upside, but with higher risk

In the medium volatility range, **global private debt** and **hedge funds** look more attractive compared to real estate and infrastructure, as they offer higher expected returns while maintaining a contained shortfall risk**.

Real estate and **infrastructure are penalised by the inclusion of physical risk** considerations that drive their return profile lower, while their left tail risk is (slightly) inflated (see the box below about integrating physical risks in our assessment of expected returns). Bearing that in mind, we should not downplay the **diversifying effect of real assets, notably during periods of high inflation**.

On the **high-risk / high-reward** end of the spectrum, **private equity** offers the highest potential return, with US private equity being the only asset class expected to cross the double-digit threshold over the next decade.

Risk / return trade-off for real and alternative assets vs traditional bonds and equity



NEW

Annualised	10-Year Expected Returns	Volatility
EU Real Estate	5.1%	9.8%
EU Private Equity	8.9%	19.2%
US Real Estate	5.2%	12.2%
US Private Equity	10.4%	21.4%
GI.Infrastructure	6.5%	14.6%
Global Private Debt	6.8%	10.5%
Hedge Funds	6.0%	8.9%

Source: Amundi CASM Model. Data as of 30 December 2022. For further information see the "Sources and Assumptions" section. **Shortfall Risk measured as 10 Yr Simulated CVaR99 (expected return in the worst 1% of cases). **T**he forecast returns are not necessarily indicative of future performance, which could differ substantially.

Amundi methodology includes physical risks in real asset return forecasts

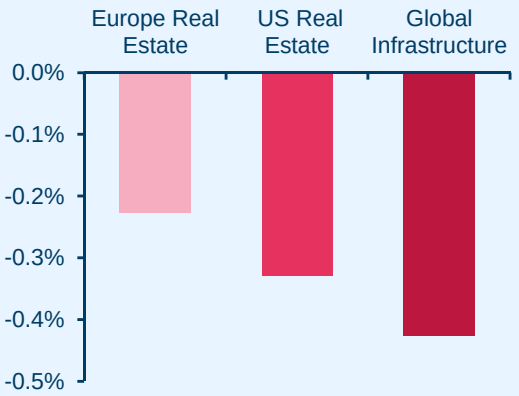
NEW

Even if the macro (indirect) effect of physical risks is embedded in the transition risks, direct **physical risks** resulting from extreme **climate events** (floods, hurricanes, cyclones, wildfires) or longer-term shifts (**chronic**) in climate patterns **require a standalone analysis**. Most of these physical risks are complex to predict and costly to mitigate. Therefore, these direct effects need to be disentangled to provide a holistic approach.

The physical deterioration of these assets and second-order effects, such as increased costs of insurance and undetermined liquidity / demand **will eventually feed into subdued valuations leading to lower performance.**

Thus, for the first time we ran a stress test (using Monte Carlo simulations with an amplified liquidity shock) to estimate the negative impacts of physical risks on real estate (Europe and the US) and global infrastructure.

Physical risks effects on the 10-year expected returns



Source: Amundi CASM Model. Data as of 30 December 2022. For further information see the "Sources and Assumptions" section. Physical Risks: The liquidity factor is modelled as a Poisson law negatively correlated to US GDP, meaning that the deeper the latter collapses, the higher the probability of liquidity shock. Increasing the size of the shock to price-in a worsening liquidity of the real asset classes ultimately feed into lower returns in downside scenarios and lower average return of the distribution. In addition, the distributions of returns for the concerned asset classes display bigger left tail risk and co-dependence.

Expected Returns Table

Assets in local currency	Reference Index	Average Annualised GEOMETRIC		Average Annualised ARITHMETIC	10-year SIMULATED Volatility	2002-2022 Historical Returns (annualised)	2002-2022 Historical Volatility (annualised)
		5-year Expected Returns	10-year Expected Returns	10-year Expected Returns			
Cash							
Euro Cash	JPCAEU3M Index	**2.4%**	**2.1%**	**2.1%**	**1.2%**	1.2%	0.9%
US Cash	JPCAUS3M Index	**3.9%**	**3.2%**	**3.2%**	**1.2%**	1.7%	0.8%
Government Bonds							
US Bond	JPMTUS Index	**3.6%**	**4.0%**	**4.1%**	**6.1%**	2.8%	5.4%
UK Bond	JPMTUK Index	**5.2%**	**4.0%**	**4.2%**	**7.8%**	3.2%	7.5%
Japan Bond	JPMTJPN Index	**0.8%**	**0.8%**	**0.9%**	**4.1%**	1.2%	2.5%
Emu Bond - Core	JPMTWG index	**2.4%**	**2.8%**	**2.9%**	**5.6%**	2.5%	5.0%
Emu Bond - Semi Core (France)	JPMTFR Index	**3.0%**	**3.5%**	**3.6%**	**5.9%**	2.7%	5.2%
Italy Bond	JPMTIT index	**4.2%**	**4.4%**	**4.6%**	**7.6%**	3.5%	6.5%
Spain Bond	JPMTSP Index	**3.6%**	**4.0%**	**4.2%**	**7.5%**	3.3%	5.6%
EMU Bond All Maturity	JPMGEMUI Index	**3.3%**	**3.6%**	**3.7%**	**5.5%**	2.8%	4.9%
Barclays Global Treasury	BTSYTRUH Index	**2.8%**	**3.0%**	**3.0%**	**4.0%**	3.0%	3.7%
Credit Investment Grade							
Euro Corporate IG	ER00 index	**4.0%**	**4.1%**	**4.1%**	**4.3%**	2.8%	4.6%
US Corporate IG	C0A0 index	**5.1%**	**5.3%**	**5.4%**	**6.4%**	4.1%	6.4%
Barclays Euro Aggregate	LBEATREU Index	**3.5%**	**3.7%**	**3.8%**	**5.0%**	2.7%	4.4%
Barclays US Aggregate	LBUSTRUU Index	**4.2%**	**4.5%**	**4.5%**	**5.2%**	3.1%	4.0%
Barclays Global Aggregate	LEGATRUH Index	**3.7%**	**3.8%**	**3.9%**	**4.2%**	3.2%	3.5%
Credit High Yield							
Euro Corporate HY	HE00 index	**4.7%**	**4.5%**	**5.1%**	**11.7%**	6.9%	12.9%
US Corporate HY	H0A0 index	**5.6%**	**5.3%**	**5.7%**	**10.5%**	7.1%	10.6%
Emerging Market Debt							
EM Hard Currency Debt*	JPEIDIVR Index	**6.0%**	**5.6%**	**6.0%**	**10.2%**	6.2%	9.4%
EM-Global Diversified**	JGENVUUG Index	**5.9%**	**5.5%**	**6.3%**	**12.7%**	4.9%	11.7%
GBI-EM China LOC	JGENCNTL Index	**2.2%**	**3.7%**	**3.7%**	**3.6%**	na	na
Convertible Bond							
Europe Index (Eur Hedged)	UCBIFX20 Index	**5.3%**	**4.7%**	**5.4%**	**12.3%**	3.8%	10.1%
Equities							
US Equity	NDDLUS Index	**7.4%**	**6.0%**	**7.4%**	**17.0%**	9.2%	16.3%
Europe Equity	NDDLE15 index	**7.8%**	**5.8%**	**7.2%**	**18.1%**	6.7%	15.6%
Euro zone Equity	NDDLEMU Index	**7.4%**	**5.4%**	**7.2%**	**20.1%**	5.8%	18.5%
UK Equity	NDDLUK Index	**8.3%**	**6.3%**	**7.3%**	**16.1%**	7.1%	13.9%
Japan Equity	NDDLJN Index	**7.3%**	**5.4%**	**7.3%**	**20.6%**	5.8%	19.5%
Pacific ex-Japan Equity	NDDLPXJ Index	**8.1%**	**6.0%**	**7.2%**	**15.5%**	8.2%	15.2%
Emerging Markets Equity	NDLEEGF index	**7.9%**	**7.0%**	**8.7%**	**18.5%**	9.6%	17.9%
China Equity	NDELCHF Index	**8.7%**	**7.4%**	**10.9%**	**27.7%**	10.5%	26.4%
World Equity	NDDLWI index	**7.6%**	**6.1%**	**7.4%**	**16.9%**	8.0%	15.5%
AC World Equity	NDLEACWF Index	**7.7%**	**6.3%**	**7.6%**	**17.3%**	8.0%	15.4%

* Hard Currency USD, China Bond starting date is beginning of 2019. * USD Unhedged, including the USD currency expectation towards EM currencies. Amundi CASM Model. Data as of 30 December 2022. For further information see the “Sources and Assumptions” section**.** The forecast returns are not necessarily indicative of future performance, which could differ substantially.

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Sources and assumptions

Sources of CMA: Amundi Asset Management CASM Model, Amundi Asset Management Quant Solutions and Amundi Institute Teams, Bloomberg. Data as of 30 January 2023. Macro figures as of last release. Starting date as of 30 December 2022. Equity returns based on MSCI indices. Reference duration are average figures. If not otherwise specified, expected returns are geometric annualized average total returns at the specific horizon. They are expressed in local currency. Those returns are gross of fees. Returns on credit assets are comprehensive of default losses.

The arithmetic average returns are derived using the price generated by our simulation engine. By definition, the arithmetic mean is always greater than or equal to the geometric mean. In particular, higher volatility of returns and higher frequency of returns and / or a longer time horizon will increase the difference between the two measures.

Simulated volatilities are calculated on simulated prices over a 10-year horizon.

Regarding real assets, we model core/core-plus (moderate risk) real estate and direct lending on the private debt side. The expected returns do not consider the potential alpha, generated by portfolio management that can be significant above all for real and alternative assets.

Expected returns are calculated on Amundi central scenario assumptions, which include climate transition. Forecast and fair values up to a 3-year horizon provided by Amundi Institute Research team (macro, yields, spread and equity).

Forecasts for annualised returns are based upon estimates and reflect subjective judgments and assumptions. These results were achieved by means of a mathematical formula and do not reflect the effect of unforeseen economic and market factors on decision-making. The forecast returns are not necessarily indicative of future performance, which could differ substantially.

Sources of sectoral expected returns: The expected returns of sectoral indices consider: 1. long-run earnings growth, 2. expected change in valuation and 3. the income component. Long-run earnings growth: for sectoral indices we consider two distinct periods. The first period (2022-2024) is based on the IBES consensus estimates, which allows us to incorporate bottom-up considerations. The second period (2025-2033) is derived from the long-term trend in earnings growth for a given region in our central scenario with the addition of the buyback component. It is also tilted by a coefficient depending on the growth or value characteristics of the sector. As a final step, the outcome is aggregated to match the long-term earnings per share trend of each region. Expected change in valuation: to assess this repricing component, we look first at the PE ex growth of a given region and adjust it from the repricing of the region, making sure it is consistent with the outcome of the regional equity section, which integrates the climate risk by definition at a regional level. Then from this adjusted regional Target PE, we derive a Target PE for each sector, depending on its long-run earnings growth (as defined previously). Finally, we compare this sectoral Target PE with its average historical PE to get the sector valuation change and we adjust for ESG flows as explained on page 31 of this paper. For income, we use the average of 2021-2023 consensus dividend yield of each sector, here again adjusted to be consistent with the regional outcome.

G10 FX Fair Valuation models: The literature is full of theoretical foundations at the basis of currency fair valuation. Our battery of models leverages two main concepts: 1) Purchasing Power Parity equilibria (which in turn expresses FX equilibria as a function of relative price dynamics across countries) and 2) Behavioural Exchange rate equilibria (where we focus on short to long-term fundamental drivers. Purchasing Power Parity models: Standard PPPs rely on CPI differential, we enrich our framework to take into account two additional variations: 1) PPP based on PPI differential (to take into account the differential in costs of production) and 2) a standard PPP but adjusted for productivity (we proxy with CPI-PPI differentials, following the Balassa-Samuelson framework). Both CPI and PPI induce a negative contribution to the FX (i.e. higher inflation means a depreciation in the long run), whilst higher productivity (i.e. higher CPI-PPI differential) empirically translates into stronger FX Behavioural Exchange rate models: We leverage here on the theoretical findings of Clark and McDonald and estimate FX equilibrium based on short to medium- and long-term fundamental drivers. On top of inflation (our longest-term driver, given the empirical convergence rate from spot), we do consider 1) interest rates differentials, 2) terms of trade, 3) fiscal spending, 4) productivity (GDP per capita) and 5) the degree of openness of each G10 economy.

CASM model

We believe capital markets are not always efficient and they deviate from long-term fair values. We follow a disciplined approach to asset allocation that blends quantitative input and qualitative assessment to identify superior asset allocations. Our multivariate approach to modelling assets and liabilities focuses on complex relationships between risk factors over multiple investment horizons. Simulating asset prices that are consistent with our risk factor models allows us to capture complex market dynamics. Macro and financial risk factors explain asset returns and the correlations between assets.

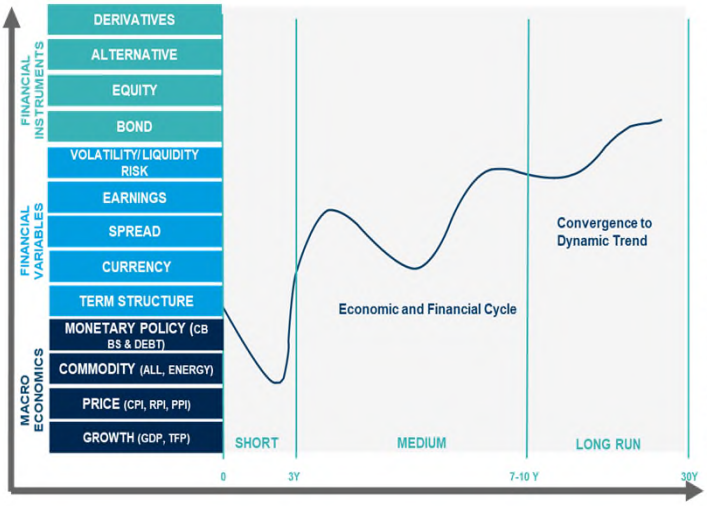
Cascade Asset Simulation Model (CASM) is a platform developed by Amundi in collaboration with Cambridge University*. CASM combines our short-term financial and economic outlooks. It incorporates medium-term dynamics into long-term dynamic trends, to simulate forward-looking returns for different asset classes over multiple horizons. CASM generates asset price scenarios and underlying economic and financial factors that determine Amundi's expected returns. It is a valuable tool for strategic asset allocation and asset-liability management analysis. The flexibility of CASM allows us to provide highly customised solutions to our clients.

We estimate model parameters quarterly to incorporate new market data and our short-term outlook. The process for calibrating models that reflect our view of economic and financial market trends is a close collaborative process between many teams at Amundi. We reach a consensus for the short-to-medium-term outlooks for macro and financial variables for each region under consideration (US, Eurozone (core, semi-core and periphery), UK, Japan, China, EM area). The models are calibrated to be consistent with these outlooks and long-run estimates. At each step in the process, results are analysed against stylised facts and checked for consistency. The estimation process for each region progresses from calibrating macro and financial variables to simulating asset prices, where asset prices are driven by the underlying macro and financial variables.

Price returns are generated using a **Monte Carlo simulation**. Stochastic generation of risk factors and price scenarios allows us to analyse a **wide range of possible outcomes and control the uncertainty surrounding these**. We can change starting assumptions and see the effect on possible future asset prices. The platform allows us to simulate consistent scenarios across any instrument in a multi-asset portfolio, a feature that is particularly relevant for institutional investors with long time horizons.

The CASM platform covers macro and financial variables for major regions, in particular the US, UK, Eurozone, Japan, China and Emerging Markets as an aggregate. Models are constructed to capture the main drivers of economic variables that affect asset prices. The definition of the building blocks within the cascade structure **has been enhanced to incorporate the climate policy actions and their implications**.

Cascade Asset Simulation Model (CASM) is a platform developed by Amundi used to simulate forward-looking returns and derive expected returns (see a more detailed description at the end). We distinguish between macro-economic, financial and pricing models as described in the following chart:



The architecture of CASM can be described in two dimensions. The **first dimension** is a "cascade" of models. Asset and liability price models are made up of market risk factor models. Market risk factor models are made up of macroeconomic models. Initially proposed by Wilkie (1984) and further developed by Dempster et al. (2009), this cascade structure is at the root of the platform's capability to model linear and non-linear relationships between risk factors, asset prices and financial instruments. The **second dimension** is a representation of the future evolution of the aforementioned "cascade" effect. The unique formulation allows us to simulate asset price scenarios that are coherent with the underlying risk factor models. In the short term, CASM blends econometric models and quantitative short-term outlooks from in-house practitioners. In the long term, we assume the market variables are subject to a mean reverting process, defined formally through structural break analysis and general equilibrium models. The short term evolves into a long-run state through the medium-term dynamic driven by business cycle variables.
Source: Amundi Asset Management – CASM model.

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***Dempster, M., Germano, M., Medova, F., Murphy, J., Ryan, D., & Sandrini, F. (2009),** *Risk Profiling Defined Benefit Pension Schemes. Journal of Portfolio Management, Summer (2009)*

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Thematic paper: A year of war in Ukraine

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In an increasing complex and changing world, investors need to better understand their environment and the evolution of investment practices in order to define their asset allocation and help construct their portfolios.

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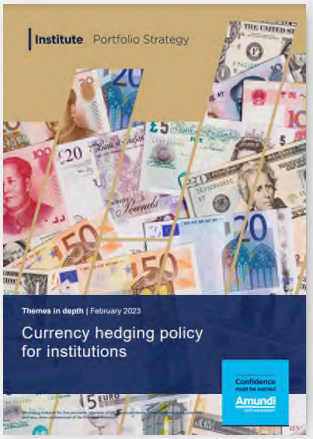

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