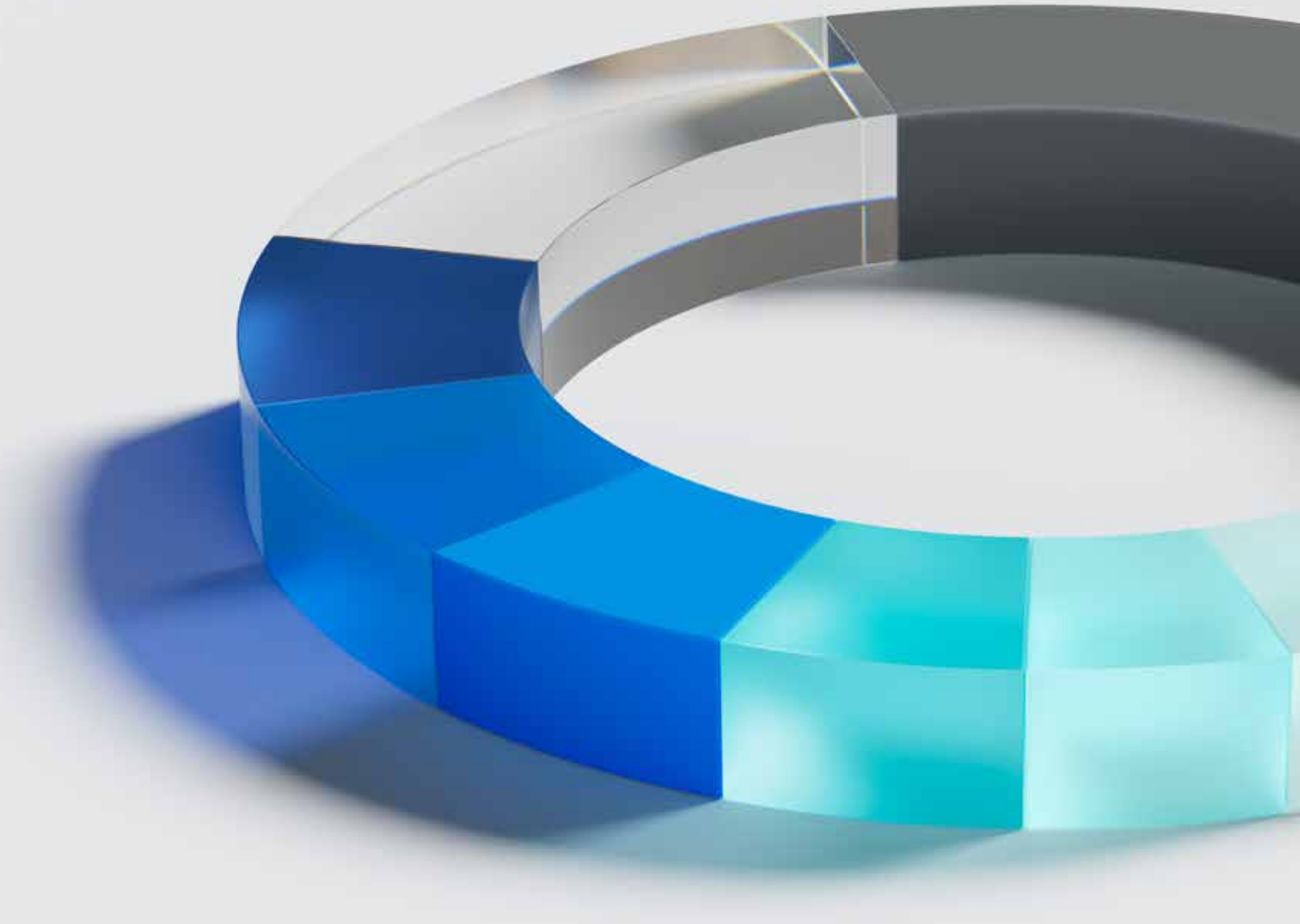
Portfolio Insights

27th annual edition

2023 Long-Term Capital Market Assumptions

Time-tested projections to build stronger portfolios



J.P.Morgan
ASSET MANAGEMENT

Foreword

By nearly any measure, the early 2020s have been a period of extraordinary challenge. The worst pandemic in over a century triggered a short but severe recession and enduring supply disruptions. A generous fiscal response, facilitated by unusually easy monetary policy, fueled the highest levels of inflation since the early 1980s. Russia's brutal invasion of Ukraine created a devastating humanitarian crisis and further supply disruptions and inflation. Central banks, led by the Federal Reserve, then aggressively tightened policy in response to inflation. And in 2022, financial markets around the world and across all major asset classes incurred sharp losses. Amid these cascading crises, many of the past year's losses have created significant opportunities.

Against this backdrop, we're pleased to launch the 2023 edition of J.P. Morgan Asset Management's Long-Term Capital Market Assumptions (LTCMAs).[1] In our 27th year of producing capital market estimates, we incorporate more than 200 asset and strategy classes; our return assumptions are available in 17 base currencies. Over the years, many investors and advisors have come to depend on our assumptions to inform their strategic asset allocation, build more resilient portfolios and establish reasonable expectations for risks and returns over a 10- to 15-year time frame. Additionally, with each passing year, we aim to recalibrate our long-run approximations, incorporating new information presented by markets, policymakers and economic data.

We formulate our LTCMAs as part of a proprietary process. It draws on quantitative and qualitative inputs as well as insights from experts across J.P. Morgan Asset Management. Our own multi-asset investment approach relies heavily on our LTCMAs: The assumptions form a critical foundation of our framework for designing, building and analyzing solutions aligned with our clients' specific investment needs.

This edition of our assumptions is very different from last year's. Our return forecasts move significantly higher across many asset classes. Lower valuations, higher yields and the accompanying unwind of many policy dislocations mean that markets today offer the best long-term return potential in more than a decade. The insights presented here aim to help clients navigate changing market dynamics and identify promising investment opportunities.

We hope our analysis helps guide your long-term strategic perspective and active asset allocation. On behalf of J.P. Morgan Asset Management, we look forward to working with you to make the best use of our assumptions in setting, and achieving, your own investment goals. Thank you for your continued trust and confidence. As always, we welcome your feedback.

George Gatch
Chief Executive Officer
Asset Management

[1] Key asset classes in USD, GBP and EUR are presented at the back of this book; all others are available via our website or from your J.P. Morgan representative.

Contents

Thematic articles

Assumption articles

Assumption matrices

Appendix

Executive summary

Back to basics

Author

John Bilton, CFA
Head of Global Multi-Asset Strategy
Multi-Asset Solutions

Michael Akinyele
Global Strategist
Multi-Asset Solutions

Monica Issar
Global Head of Wealth Management
Multi-Asset and Portfolio Solutions

In brief

- Our 2023 return outlook stands in stark contrast to last year's. Across markets, the unwind of dislocations, notably negative policy rates and large central bank balance sheets, has been abrupt. Few asset classes emerged unscathed. But our LTCMAs deliver a brighter message: Lower valuations and higher yields mean that markets today offer the best potential long-term returns since 2010.
- A recession or at least several quarters of subtrend growth lie immediately ahead. Still, our forecast of global trend growth over our 10- to 15-year investment horizon is unchanged at 2.20%. Despite global inflation today running at 7.30%, we raise our long-term global inflation forecast just 20 basis points, to 2.60%, and expect today's elevated inflation to subside over the next two years.
- After policy rates normalized swiftly, bonds no longer look like serial losers. Real return forecasts for most sovereign bonds move back into positive territory, leaving bonds once again a plausible source of income as well as diversification. Higher riskless rates also translate to improved credit return forecasts.
- Projected equity returns rise sharply. Margins will likely recede from today's levels but not reverse completely to their long-term average, and valuations present an attractive entry point. Alternatives, meanwhile, still offer appealing diversification benefits. With the U.S. dollar more overvalued than at any time since the 1980s, the FX translation will be a significant component of forecast returns.
- Many secular themes affecting our outlook (demographics, globalization patterns, etc.) will demand higher capex – paradoxically coming just as the abundance of cheap capital of the last decade is reversing. As financial markets are called upon to efficiently allocate scarce capital, the result may be more idiosyncratic returns and lower correlations within indices.
- The turmoil of 2022 has brought asset return forecasts close to long-term equilibrium; the 60/40 can once again form the bedrock for portfolios, with alternatives offering alpha, inflation protection and diversification. Once today's market turbulence clears, investors will have more scope to achieve long-term portfolio return objectives.

Lower valuations and higher yields mean that asset markets today offer the best long-term returns in more than a decade. It took a painful slump in stock and bond markets to get here, the worst of which may not yet be over. Still, the turmoil of 2022 might be considered a cathartic moment, revitalizing the portfolio toolkit and creating attractive investment opportunities in the years ahead.

In the near term, investors face a challenging time, as a recession or at least several quarters of subtrend growth lie immediately ahead. Nevertheless, our assessment of long-term trend growth is only marginally below last year's. We expect today's inflationary surge to eventually subside to a rate only slightly above our previous estimates.

Our forecast annual return for a USD 60/40 stock-bond portfolio over the next 10–15 years leaps from 4.30% last year to 7.20%. Over the last 25 years, the rolling 10-year return for this portfolio has averaged 6.10%. But that statistic bears some scrutiny. The secular decline in bond yields over this period[1] provided a tailwind of about 50 basis points (bps) per year (**Exhibit 1A**). Without that tailwind – which we do not expect to recur in the coming decade – the fair historical comparison for a rolling 10-year USD 60/40 portfolio return is closer to 5.60%.

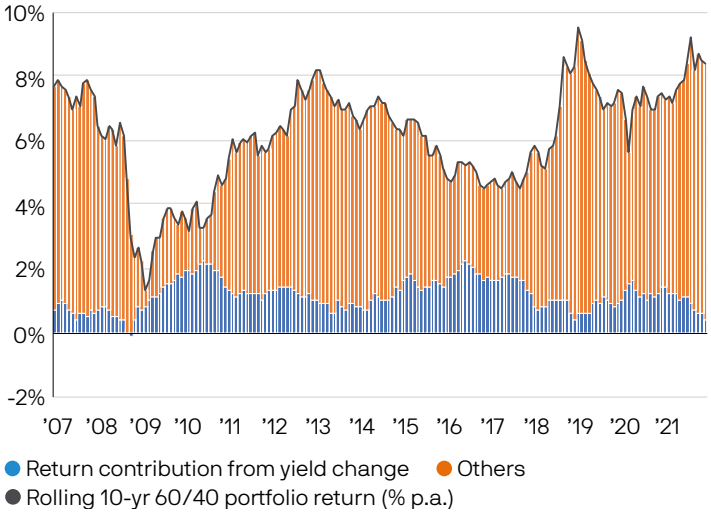
2022 saw drawdowns across asset classes, with international investors also hit hard by a soaring dollar (**Exhibit 1B**). Today, however, opportunities for long-term investors with capital to deploy are the best we've seen since 2010.[2] Meanwhile, we would remind those shouldering losses from the last year that investors able to avoid selling during drops tend to be rewarded in the longer run,[2] and that the sharpest gains are often banked early in the cycle as markets first turn.

Our title this year – Back to Basics – captures our belief that after a year of turmoil, the core principles of investing still hold firm. Once again, the 60/40 can form the bedrock of portfolios, while alternatives can offer alpha, inflation protection and diversification. Meanwhile, the end of free money, greater two-way risk in inflation and policy, and increased return dispersion across assets also give active managers more to swing for.

The past year has been undoubtedly challenging, but the amortization of the sharp moves in valuations and yields has effectively removed many of the cyclical headwinds that faced a wide range of asset classes last year. Given that our forecasts this year are in many cases close to our estimate of long-run equilibrium returns, investors could view the volatility of 2022 as bringing market pricing "back to par," enabling investors to focus on achieving long-term portfolio return objectives with renewed confidence.

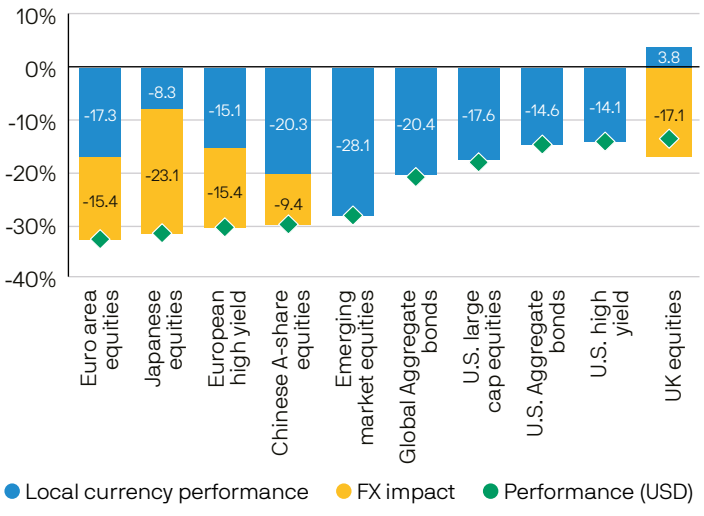
Over the last 25 years, declining bond yields provided a consistent tailwind to 60/40 returns

Exhibit 1A: Contribution of secular decline in bond yields to USD 60/40 returns



The recent sell-off in both fixed income and equity markets has depressed a balanced portfolio

Exhibit 1B: Selected asset returns from September 30, 2021, to September 30, 2022, including FX impact for USD investor



Source: Bloomberg, Haver Analytics, J.P. Morgan Asset Management; data as of September 30, 2022.

[1] U.S. 10-year yields followed a path of secular decline from 15.84% in 1981 to a low of 0.53% in 2020. Source: Bloomberg.
[2] Allowing for a 16% drawdown in a 60/40 portfolio this year, and assuming a linear 7.2% 60/40 return, a balanced portfolio recovers in approximately three years.

A bumpy road – now a better return outlook

Even as long-term return projections improve, many investors will prefer to see at least some of the near-term issues recede – notably, elevated inflation – before committing capital to asset markets. We expect inflation to cool over the next couple of years, and project only modestly higher equilibrium inflation rates over the next decade. Still, the factors that drove the surge in inflation influence our long-term outlook.

Scarcity of key goods, fragility in local supply chains, tight labor markets and a tense geopolitical backdrop (laid bare by Russia's invasion of Ukraine) all led to upside pressure on prices. Addressing these vulnerabilities – as well as achieving net-zero[3] carbon emissions and planning for ongoing global population growth – will demand investment. Paradoxically, this demand for capital investment comes just as central banks are fighting inflation vigorously and in so doing ending a decade of ultra-easy policy. Put another way, capital will become scarcer just as structural demand for investment is increasing.

To be clear, by any reasonable measure the cost of capital will remain subdued. But the world of easy policy and abundant capital, which drove broad-based asset appreciation in the 2010s, has been replaced by a world where capital is rationed via the financial markets. Investors will probably find that this creates an environment where fundamentals matter more and the dispersion of returns within an index widens. It may also lead to meaningful changes to secular winners and losers in equity markets: With capital becoming scarce, those firms that simply grew their balance sheets on cheap cash and the promise of future growth or profits will fall from favor, while those able to consistently generate cash will be rewarded.

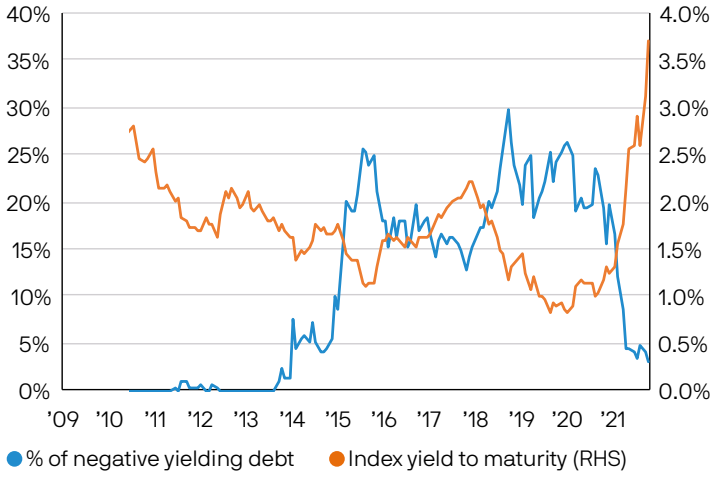
Both the memory and the initial impact of the pandemic have faded, but the effects on supply chains linger. The war in Ukraine and ongoing COVID-19-related restrictions in parts of Asia serve to highlight persistent supply-side vulnerability. The combination of fiscal stimulus in response to the pandemic, and the wave of optimism that came as societies reopened, caused a surge in demand. Fragile supply chains were unable to cope, and the result has been a widespread surge in inflation.

As a result, the drawn-out pain we expected bondholders to suffer over several years was compressed into several months (**Exhibit 2**). For equity holders, central banks' sharp policy pivot, from supporting nominal growth at all costs to depressing inflation at all costs, damaged otherwise resilient corporate revenues and earnings: At the time of writing, we are on the cusp of an earnings downgrade cycle likely to play out over the next 12 months. Policy tightening should finally kill off inflation, but the cost might well be a swift end to the current business cycle.

Across markets, the unwind of dislocations, most notably negative policy rates and large central bank balance sheets, has been abrupt. Few asset classes, with the exception of some real assets, have emerged unscathed.

We have seen a sharp repricing of global bond yields higher to levels not seen in over a decade

Exhibit 2: Global bond yield and stock of negative yielding debt, 2009-2022



Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022.

Today, bonds no longer look like serial losers. Equities remain cyclically sensitive, but while margins still look high, valuations are not, and stocks are already at an attractive long-term entry point. Real assets and private markets continue to appear broadly supported and well geared to many important secular investment themes.

The most important shift from last year is that real return forecasts for assets right across the risk spectrum are positive once again. For the first time in years, investors have a complete toolkit at their disposal.

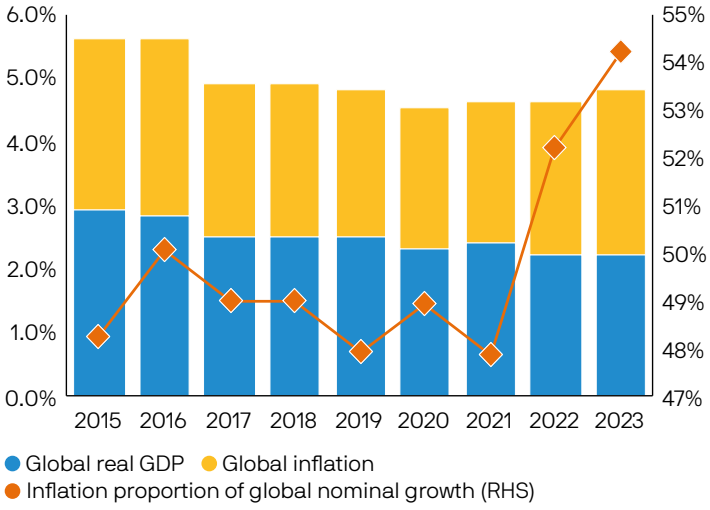
[3] To keep global warming to no more than 1.5°C – as called for in the Paris Agreement – emissions need to be reduced by 45% by 2030 and reach net zero by 2050. Source: United Nations.

Macroeconomic outlook – secular trends little affected by cyclical pressures

We expect a period of subtrend global growth to extend through 2023, with some regions falling into recession. But despite the near-term cyclical challenges, our forecasts for long-run trend global growth over the next decade or so are unchanged at 2.20%, largely as a result of differential growth rates of emerging and developed regions gradually shifting the mix of global growth.[4] Our U.S. and eurozone forecasts dip by 10bps, to 1.60% and 1.10%, respectively, and we make cuts of 20bps, to 4.00%, for China and 30bps, to 5.70%, for India (**Exhibit 3**).

The mix of real growth and inflation slightly worsens at a global level, but today's burst of inflation is set to cool over the longer run

Exhibit 3: Evolution of global trend growth and inflation projections



Source: J.P. Morgan Asset Management; data as of October 2022.

Productivity growth once again disappointed over 2022 – it continues to be an elusive topside risk to our growth projections. If we are right that pursuing net-zero carbon emissions and addressing supply chain fragility spark a pickup in capex, then there may be scope for productivity to improve. After all, capital deepening tends to lead to a rise in total factor productivity. Still, it remains unclear how much of any lift in capex will boost productive assets or labor skills. For this reason, we remain circumspect on building further productivity gains into our Long-Term Capital Market Assumptions (LTCMAs).

Some readers may be surprised to see our inflation forecasts move only modestly higher: up 30bps, to 2.10%, across developed economies and up 10bps, to 3.40%, across emerging markets, pushing projected global inflation up 20bps, to 2.60%. With prevailing global inflation[5] of 7.30% as of September 30, 2022, our faith that inflation will cool to levels close to central bank targets, on average, may seem optimistic. Nonetheless, we see few signs that consumers expect long-term inflation will rise uncontrollably and little evidence signaling tolerance of inflation by central banks.

To be sure, risks to inflation are considerably more two-sided today, possibly pointing to more volatility in inflation in the years ahead. As we discuss in our macroeconomics section, the longer-term disinflationary forces of technology adoption and globalization may have slowed, but they have not disappeared. Meanwhile, central banks have clearly rediscovered their inflation-fighting zeal, with renewed commitment to achieving inflation targets over the next two to three years.

[4] EM economies grow at a faster rate than DM economies, so over a longer period higher growth EM regions gradually contribute a greater share of global growth.
[5] As of September 2022. Source: Bloomberg, Datastream, Haver Analytics, J.P. Morgan Asset Management.

Globalization – evolving, not unraveling

Inflation hawks often argue that "deglobalization" is pushing inflation higher over the long term. Certainly, the world today feels a more dangerous place than it has since the end of the Cold War, as geopolitical tension indices such as the Federal Reserve's (Fed's) Geopolitical Risk Index (GPR) underscore (**Exhibit 4A**). While trading blocs may become more regionally focused, we think globalization will evolve but not unravel.

For the time being, we are probably past "peak globalization," at least with regard to goods trade. Still, in the years ahead, we expect trade to run roughly in line with GDP growth (**Exhibit 4B**) but to focus more on services and labor, and less on finished goods. While the emergence of rival trading blocs increases right-tail risks to inflation – particularly as rival blocs compete for scarce commodities – globalization of services and labor may be a mitigating disinflationary force.

A more polarized world, with a renewed emphasis on trade in services and labor, will require meaningful capex. But not all capex results in better productivity. If capex is deployed simply to create contingency to an already optimal supply chain, it is unlikely to lead to higher productivity. By contrast, where capex strengthens resilience, improves efficiency for regional industry and deepens labor skills, the impact on long-term potential growth trends may be meaningful.

Fixed income and FX – bonds normalize, dollar still overvalued

As our inflation forecasts move slightly higher, our forecast of cycle-neutral cash rates rises by 20bps–30bps across developed markets. To be clear, our forecast rates represent the average cash rate we expect over the next 10–15 years, not the terminal rate from the current cycle or the economic equilibrium rate (R*).[6] This year, our USD and EUR cash return forecasts increase significantly, to 2.40% and 1.30%, respectively.

For the first time since the global financial crisis (GFC), prevailing interest rates in most currencies sit at or above the cycle-neutral rate. This implies that the normalization of rates is no longer a drag on average returns and may even be a positive contributor. The impact is minimal in cash but meaningful for longer-duration bonds. For U.S. 10-year bonds, the combination of a slightly higher cash assumption with a slightly flatter curve pushes the cycle-neutral yield up 20bps, to 3.20%. Much higher starting yields push our return forecast up by 160bps, to 4.00%.

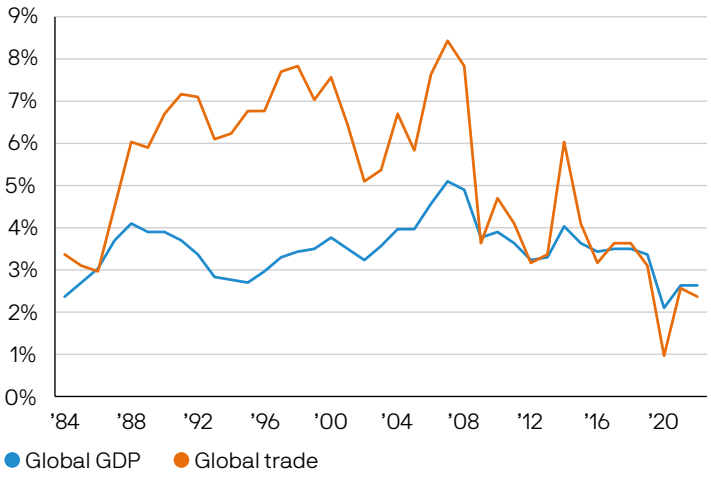
In short, over the last year rates normalized swiftly and painfully. Excepting Japan, real return forecasts across G4 sovereign bonds shift back into positive territory (**Exhibit 5**), leaving bonds once again a plausible source of income as well as diversification.

Global geopolitical risk is exhibiting more volatility after a brief lull at the turn of the decade

Exhibit 4A: The Fed's Geopolitical Risk Index (GPR) shows elevated tension

Growth in global trade is likely to continue tracking GDP growth

Exhibit 4B: Patterns of global activity and global trade growth over the last 40 years



Source: Federal Reserve, IFR, Measuring Geopolitical Risk – Dairo Caldara and Matteo Iacoviello, J.P. Morgan Asset Management; data as of June 2022.

[6] R* (R-star) is the real short-term interest rate expected to prevail when an economy is at full strength and inflation is stable. Source: New York Fed.

Normalization of rates is no longer a drag on average returns in most markets

Exhibit 5: Building-block fixed income return projections for G4 countries

	USD		GBP		EUR		JPY	
	Cycle-neutral average yields	Return	Cycle-neutral average yields	Return	Cycle-neutral average yields	Return	Cycle-neutral average yields	Return
Inflation	2.6%		2.4%		1.8%		0.9%	
Cash	2.3%	2.4%	2.2%	2.2%	1.4%	1.3%	0.5%	0.4%
10-year bond	3.2%	4.0%	2.6%	3.8%	2.2%	3.0%	1.0%	0.6%
Long maturity	3.5%	4.2%	2.7%	4.4%	2.5%	3.6%	1.0%	0.7%
Investment grade credit	4.7%	5.5%	4.3%	5.7%	3.2%	3.6%	1.3%	1.1%
High yield	7.7%	6.8%			5.9%	5.7%		
Emerging market debt*	6.9%	7.1%						

Source: J.P. Morgan Asset Management; estimates as of September 30, 2022.
Long-maturity government bond index: Citi EMU GBI 15+ yr EUR; Citi Japan GBI JPY; FTSE UK Gilts Under 15+ yr GBP and Bloomberg U.S. Treasury 20+ yr USD. High yield: Bloomberg US High Yield 2% Issuer Cap USD and Bloomberg Pan-European High Yield EUR. Emerging market debt: J.P. Morgan EMBI Global Diversified Composite. Cycle-neutral: the average yield we expect after normalization.
* Emerging market local currency debt.

While dislocations have reset quickly across large parts of the sovereign bond market, the same cannot be said for the currency market. Inevitably, rapid policy action in one asset market (interest rates) has pushed others (currencies) further from equilibrium. Today, the U.S. dollar is more overvalued in nominal terms than at any time since the 1980s, and in real terms since 2002. Any investor making a strategic allocation decision across global asset markets today must carefully scrutinize the FX translation, as it will be a meaningful component of forecast returns.

An impending period of subtrend growth may continue to support the greenback, but over our full forecast horizon we expect dollar valuations to recede – particularly as large but slow-moving blocs of international capital (including insurers and pension funds) can now find the yield in their domestic markets to match their liabilities. Over time, this could start to reduce capital flows toward U.S. assets, in turn removing some support for the dollar.

For some years, return forecasts for credit suggested it was a bright spot, not only in fixed income but across asset markets. While the drawdown in credit this year has been brutal, losses were mostly driven by the jump in riskless rates. True, spreads widened across the board, but a combination of light supply, solid corporate balance sheets and a limited need for refinancing meant credit spreads outperformed equities.

Prevailing spreads in both U.S. investment grade (IG) and high yield (HY) are near our equilibrium spread forecasts of 160bps and 480bps, respectively, leading to return forecasts up 270bps, to 5.50%, for U.S. IG and up 290bps, to 6.80%, for U.S. HY.

A feature of the last decade that we do not expect to reverse is the drift in credit index ratings: down in quality in IG and up in quality in HY. Triple Bs account for around half of the IG index today, and double Bs are more than half of the HY index (**Exhibit 6A**). The drift in rating quality might imply a secular spread compression between IG and HY. However, high demand for IG paper, portfolio de-risking and liability hedging likely keep equilibrium spreads near historical averages despite the concentration of BBBs. Meanwhile, in HY we expect default losses to be stable – with a slightly higher level of defaults than lately but with better recovery rates – which serves to keep our long-term HY spread forecast unchanged from last year.

Emerging market debt (EMD) spreads have also widened meaningfully this year, but once again, after adjusting for rating drift, we keep our equilibrium spread assumption unchanged, at 400bps for emerging market (EM) corporate debt and 380bps for EM sovereign debt. This translates to return forecasts up 200bps, to 7.00%, for EMD corporates and up 190bps, to 7.10%, for EMD sovereigns.

EMD remains on top in return terms, across extended credit – especially if adjusted for quality. But the trade-off is in liquidity, which can skew risk-adjusted returns lower in weak markets (**Exhibit 6B**).

Over the last decade, quality ratings across credit indices have changed markedly

Exhibit 6A: Trend in BBBs in IG credit and BBs in HY credit in the last 25 years

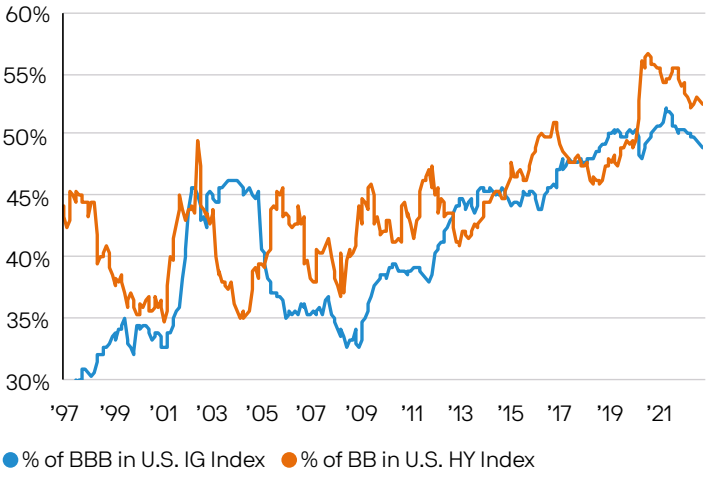
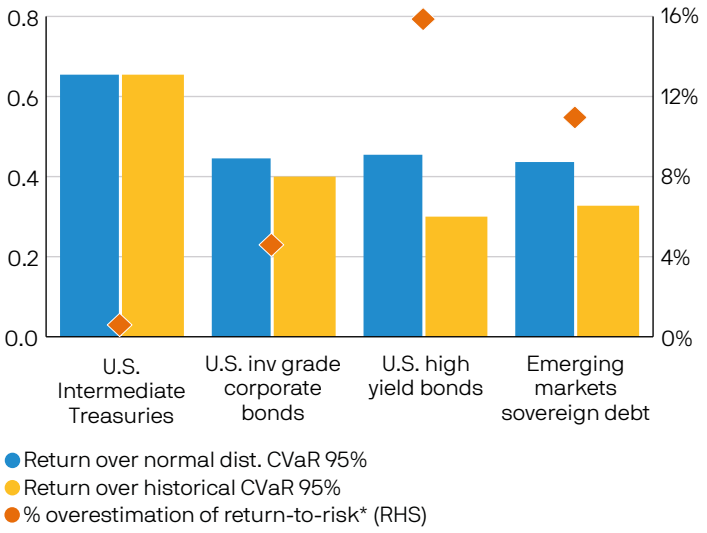


Exhibit 6B: Return-to-risk ratios focused on left-tail risk



Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022.

* Percentage difference between return-to-CVaR based on normal assumption and return-to-CVaR based on historical experience. Both CVaR measures are computed at 95% confidence level. See Volatility assumptions section for details.

Toward a 10 billion person planet

Emerging market nations, and specifically many frontier market nations, are potential beneficiaries of the significant growth in global population projected over the next 25–30 years. While developed nations face the challenge of aging workforces, some of the emerging world – parts of the Middle East and South Asia, alongside much of Africa – have young, fast-growing workforces. The challenge is that much of the world's capital and productive assets are in places where the workforce is shrinking (**Exhibit 7**).

Regions with a growing labor supply do not possess the most productive capital assets

Exhibit 7: Top 10 most populous nations

	2020	2050	2100
1	China	India	India
2	India	China	China
3	United States	Nigeria	*Nigeria**
4	Indonesia	United States	*DR Congo**
5	Pakistan	Pakistan	Pakistan*
6	Brazil	Indonesia	*Ethiopia**
7	Nigeria	DR Congo	Indonesia*
8	Bangladesh	Brazil	*Tanzania**
9	Russia	Ethiopia	Brazil*
10	Mexico	Bangladesh	*Egypt**
	Share of world GDP in PPP (2020, %)		
	53	**48**	**33**

Source: Haver Analytics, IMF, U.S. Census Bureau, J.P. Morgan Asset Management; data as of September 30, 2022.

* New countries in top-10 most populous by end of 21st century

Given the higher cost of capital, it will be key for these younger nations to have the right macro and micro policies in place to attract the capital needed to convert their favorable demographics and increasing labor force into sustained economic growth. Today, the economic effect of reinforcing supply chains in developed regions through local sourcing may dominate longer-term demographic developments. But as globalization shifts from goods toward services and labor, we see potential for unlocking this potential workforce – and, in time, a new, fast-growing consumer bloc.

However, given the strain further population growth will place on global resources (energy, food and ecosystems), together with momentum toward net-zero,[7] thoughtful and substantial investment will be needed. While private capital, infrastructure and new asset classes like timberland are the most obvious beneficiaries of this trend, public market sectors such as communications, technology, renewable energy and consumer goods also stand to benefit.

Capex needs rising just as capital gets scarcer

Population growth and the need to shore up supply chain frailties point to a capex boom ahead. Financial markets, for a decade supported by abundant capital that lifted all assets' valuations, will once more have to fulfill their primary social and economic function of allocating scarce capital to where the return outlook is most promising. This will be a significant shift, its effects felt across businesses, economies and markets. In the world of investing, we think this shift will, at the margin, prove helpful for active investing styles.

The low inflation and easy policy of the 2010s have given way to a backdrop of two-sided inflation risks and greater policy uncertainty. Ahead, we anticipate an environment where asset markets are driven less by central bank support (a headwind for active alpha) and more by allocating scarce capital to long-run economic trends (a tailwind for active alpha). While the challenge of selecting the right manager persists, we believe that the potential for active alpha is improving at the margin.

Equity – valuation now a tailwind, margins still a headwind

The asset market most commonly associated with active investing decisions is equities. Last year, global equities were undeniably expensive and trading at what appeared to be unsustainable margin levels. The bear market of 2022 has swung valuations from being a headwind to a tailwind in most regions. But despite rising input and labor costs, corporate margins remain extended, as companies in some sectors (autos, semiconductors, etc.) have raised prices for the first time in several years.

[7] To keep global warming to no more than 1.5°C – as called for in the Paris Agreement – emissions need to be reduced by 45% by 2030 and reach net zero by 2050. Source: United Nations.

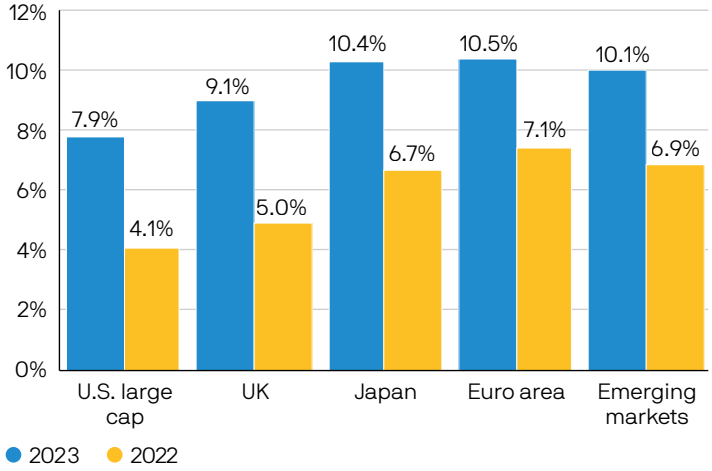
As margins likely recede, they create a headwind to equity returns. Still, we do not expect margins to reverse completely to their long-term average. It is difficult to pinpoint equilibrium margins over long periods of time due to changes in sector mix, corporate finance rules and company capital structures. Taking those changes into account, we think equilibrium margins over the LTCMA horizon will be somewhere around the pre-COVID-19 peak of 9.5% rather than the 7.5% level that would be the unadjusted 25-year average.

The prevalence of capital-light balance sheets, the pricing power of branded corporates and a management focus on profitability all suggest the potential for higher equilibrium margins. When we project that margins will revert to their pre-pandemic levels, we tacitly acknowledge that the capital share of the economy is unlikely to expand further. Equally, in choosing not to anchor our forecast on the 25-year average, we recognize that labor is unlikely to enjoy a resurgence in pricing power.

Despite the margin headwind, our equity forecasts shift meaningfully higher this year: developed market (DM) forecasts up 360bps, to 8.40% (in USD), and emerging market (EM) forecasts up 320bps, to 10.10% (in USD).[8] The slight narrowing of the wedge between DM and EM returns reflects greater margin resilience in markets such as the U.S. and Europe, where our local currency forecasts are up 380bps, to 7.90%, for U.S. stocks and up 260bps, to 8.40%, for eurozone stocks. While UK and Japan also see improvement, it is a little less pronounced given the unfavorable sector mix of the UK index, and the relative outperformance of both UK and Japanese equities in 2022 (**Exhibit 8**).

Our LTCMA equity forecasts move significantly higher this year

Exhibit 8: LTCMA forecasts, 2023 vs. 2022, USD terms



Source: J.P. Morgan Asset Management; data as of September 30, 2022. Please note that we changed our forecasting methodology for MSCI China this year, now treating the market as an asset whose local currency is CNY. The change in our emerging market equity returns reflects this change.

Alternatives – solid returns, renewed appeal

Even as return forecasts for public markets roared back this year, alternatives still offer benefits that cannot be easily found elsewhere. Over the last few years, alternative assets provided relative safety – for those willing to forgo liquidity, a welcome source of income and strong return uplift. Those attractive qualities endure.

Real assets showed their worth this year, with valuations broadly holding up even as stock markets slumped. Income from real estate and infrastructure remained roughly stable while bond yields caught up to their level. Private equity, meanwhile, continues to have a significant cushion of dry powder. This may mitigate the risk of asset markdowns, which some investors fear may dent private equity returns in the short run. Nevertheless, we have included an explicit adjustment for the impact of potential markdowns over the next year or two in our return forecast for private equity.

Higher public market return forecasts have pushed up our expectations for financial alts. Cap-weighted private equity returns increase 180bps, to 9.90%; hedge fund returns are up between 110bps and 220bps, depending on strategy; and direct lending jumps 90bps, to 7.80%. In all financial alternatives categories, we continue to see improving alpha trends that are likely to benefit further as dry powder meets the capex demand that we anticipate picking up in the 2020s.

[8] Due to a change in assumptions adopted this year, we now treat MSCI China as an asset whose local currency is CNY. As a result, MSCI China and MSCI Emerging Markets data from 2022 may not be directly comparable to 2023.

While our numbers include an adjustment for potential writedowns that may be crystalized in the next year, generally the private equity industry seems well insulated with sufficient capital to manage such issues. Given that sharp moves in public markets may act on private asset markets only with a lag, in our view a small adjustment for markdown risk in the short run is prudent.

Real estate valuations and cash flows hold steady despite the turmoil in public markets in 2022. However, the higher interest rate environment pushes our forecasts down at the margin: Core U.S. real estate declines 10bps, to 5.70%. Global core infrastructure rises 20bps, to 6.30% and global core transportation increases 10bps, to 7.50%. Those gains reflect the ongoing attractiveness of global real assets as a theme.

Our commodity return forecasts are up 50bps, to 3.10%. The commodity supercycle is not yet over, despite some weakness in metals prices this year, even as energy prices surged. Finally, we add timber to our coverage universe this year; we expect demand for these assets to grow sharply as investors value their positive ESG[9] bias, as well as the attractive forecast returns of 6.70% for global timber.

Across all alternative sectors and strategies, future performance may exhibit wider dispersion of returns

Exhibit 9: Selected alternative strategies – return assumptions (levered,[1] net of fees, %) in local currency

Financial alternatives	2023	2022
Private equity (USD)**		
Cap-weighted composite	9.90	8.10
Private equity - small cap	9.50	7.40
Private equity - mid cap	9.40	7.60
Private equity - large/mega cap	10.20	8.40
Private debt (USD)		
Direct lending	7.80	6.90
Venture capital (USD)		
Venture capital	8.50	n/a
Hedge funds (USD)		
Equity long bias	5.00	3.30
Event-driven	5.40	3.20
Relative value	4.90	3.80
Macro	4.10	2.70
Diversified†	5.00	3.60
Conservative††	3.70	3.30

Real assets	2023	2022
Real estate - direct (local currency)		
U.S. core	5.70	5.80
U.S. value-added	7.70	7.70
European core	4.70	4.80
European value-added	6.70	6.80
Asia-Pacific core	6.10	6.50
REITs (local currency)		
U.S. REITs	6.80	5.70
European REITs	6.10	5.10
Asia-Pacific REITs	5.10	5.00
Global REITs‡	6.40	5.40
Global infrastructure (USD)		
Core	6.30	6.10
Global transport (USD)		
Core	7.50	7.40
Global timber (USD)		
Global timber	6.70	n/a
Commodities (USD)		
Commodities	3.10	2.60
Gold	3.50	3.00

Source: J.P. Morgan Asset Management; estimates as of September 30, 2021, and September 30, 2022.

* All return assumptions incorporate leverage, except for commodities, where it does not apply.

** The private equity composite is AUM-weighted: 65% large cap and mega cap, 25% mid cap and 10% small cap. Capitalization size categories refer to the size of the asset pool, which has a direct correlation to the size of companies acquired, except in the case of mega cap.

† The Diversified assumption represents the projected return for multi-strategy hedge funds.

†† The Conservative assumption represents the projected return for multi-strategy hedge funds that seek to achieve consistent returns and low overall portfolio volatility by primarily investing in lower volatility strategies such as equity market neutral and fixed income arbitrage. The 2023 Conservative assumption uses a 0.70 beta to Diversified.

‡ The global composite is built assuming the following weights: roughly 65% U.S., 15% Europe and 20% Asia-Pacific.

[9] ESG: environmental, social and governance.

Portfolio design – more choice, more opportunity

Overall, the return outlook in this year's LTCMAs stands in stark contrast to last year's. It has taken a meaningful reset in asset markets to bring us to this place, and considerable pain for bondholders over a much shorter horizon than we had expected. Still, the underlying patterns of economic growth look stable, and the assumptions that underpin asset returns – cycle-neutral real cash rates, curve shape, default and recovery rates, and margin expectations – are also little altered. But the market drawdown in 2022 is now creating an increasingly attractive entry point for long-term investors.

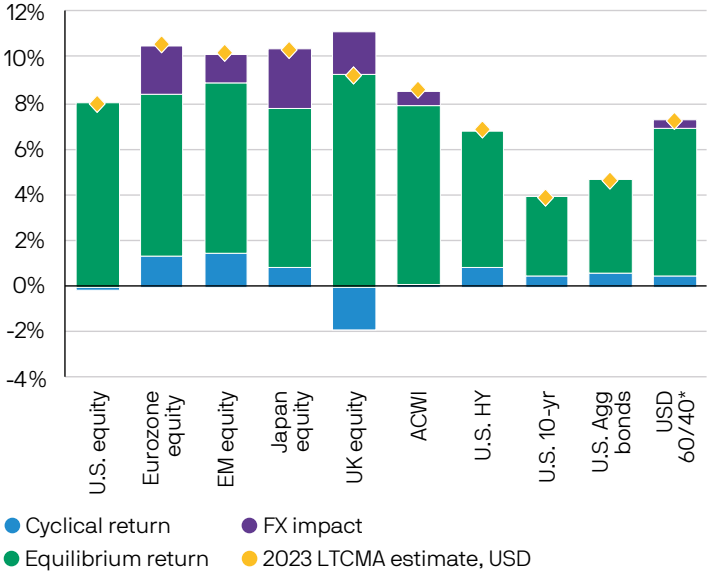
For many years, cyclical headwinds led to a large gap between secular returns[10] and our return forecasts. But these headwinds have mostly cleared (**Exhibit 10**). Many of our asset return forecasts are now at, or even a little above, fair equilibrium levels. This should in turn reassure long-term investors that the current market turmoil will be time limited.

Some of the distortions that were apparent both in return uplift (premia) across asset classes and when comparing returns and Sharpe ratios have either disappeared or greatly diminished (**Exhibits 11A** and **11B**). That is clearly a positive development.

While there are both topside and downside risks to our outlook, we acknowledge two specific caveats to any optimism. First, entry points do matter, even for long-term investors. And second, correlation patterns have been unhelpful to balanced investors in 2022.

This year, our return forecasts are now at, or even a little above, our estimates of secular returns

Exhibit 10: Secular and cyclical return drivers for key assets in USD



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Over the past year, distortions in return uplift (premia) have diminished and Sharpe ratios have improved for many assets

Exhibit 11A: Return uplift (premia)

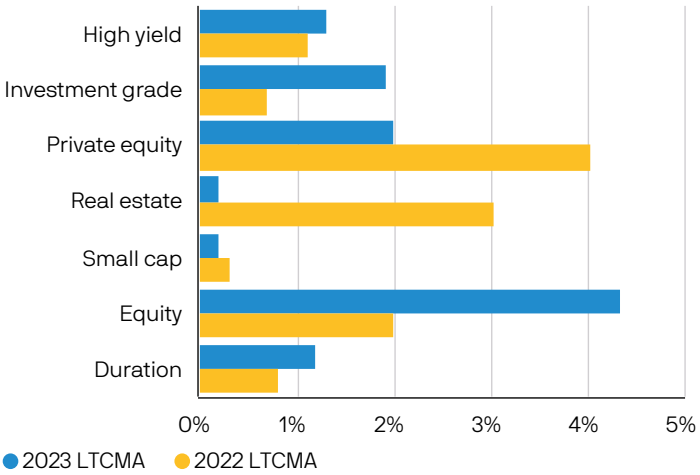
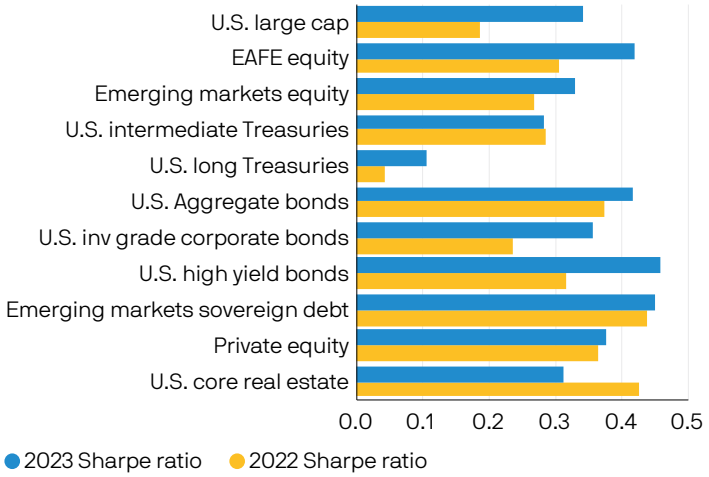


Exhibit 11B: Sharpe ratios



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

[10] Valuations, margins and prevailing yields are the more cyclical elements of our return calculations; other components (trend growth, productivity, dividend yields, equilibrium credit spreads, etc.) are more secular in nature and tend to evolve only slowly.

While entry points are much more attractive than they were a year ago, they could get even more attractive if the cyclical weakness of 2022 extends into 2023, as seems plausible. Investors thus need to consider the timing and approach of their entry point, with an eye to how much drawdown they can tolerate in the short term. With policy rates likely to rise further over the next year, investors will also be penalized less for opportunistically holding some cash in the short term in order to take advantage of any further dislocations in asset markets.

Whatever the precise timing and approach of investor entry points, it seems evident that clearing the return hurdles common in the investing industry, such as the 7% return hurdle for U.S. public plans that we discussed in our paper "How investors can reach their 7% return target," is now eminently achievable.[11]

We explore the second caveat, related to correlation patterns, in our Portfolio Implications chapter. This year, stocks and bonds moved together as inflation fears dominated, reducing the diversification benefit of bonds. Based on our assumption that the inflation genie will (eventually) return to its bottle, we believe a negative stock-bond correlation will reassert itself. Still, this year has showed that alternative assets are powerful diversifiers at times when the traditional economic model is under strain, and with it the usual relationship between stock and bond returns.

Few portfolios these days are simply stocks and bonds, and as our opportunity set grows – often to incorporate assets with "fat tails," or non-normal return distribution – our traditional allocation frameworks must also evolve. Simply put, 2022 reminds us that asset correlations can move around and diversification can't be taken for granted.

Ultimately, the main message from this year's LTCMAs is that long-term asset return forecasts for portfolios of all kinds are better today than they have been in a decade (**Exhibits 12A** and **12B**). But this has taken a rapid and forced reversal of long-standing dislocations in policy, and an accompanying bond market rout.

While the high inflation that finally stirred policymakers into action is likely to moderate, the underlying drivers of higher prices – scarcity of important goods and commodities, tightness in labor markets and heightened geopolitical tension – will remain risks for investors for the rest of the decade. Addressing these issues is likely to require substantial investment, meaning we may be about to see a capex boom just as central banks are raising rates and capital is becoming scarcer (**Exhibit 13**).

For investors, this all translates to a better environment to derive returns both from market beta and from active alpha. For investors with capital to deploy, a wide range of assets offer appealing potential returns. For those still cautious, bonds can once again provide both income and a safe haven. Meanwhile, those rotating existing portfolios are no longer confined to less liquid assets to boost returns, and balanced portfolios can compound returns at a much better pace.

Stock-bond frontiers are significantly higher than last year, with much improved returns for both bonds and equities. Alternative assets continue to offer the potential for alpha, inflation protection, and diversification

Exhibit 12A: USD stock-bond frontiers and 60/40 portfolios based on 2023 vs. 2022 LTCMAs for risk and return (%)

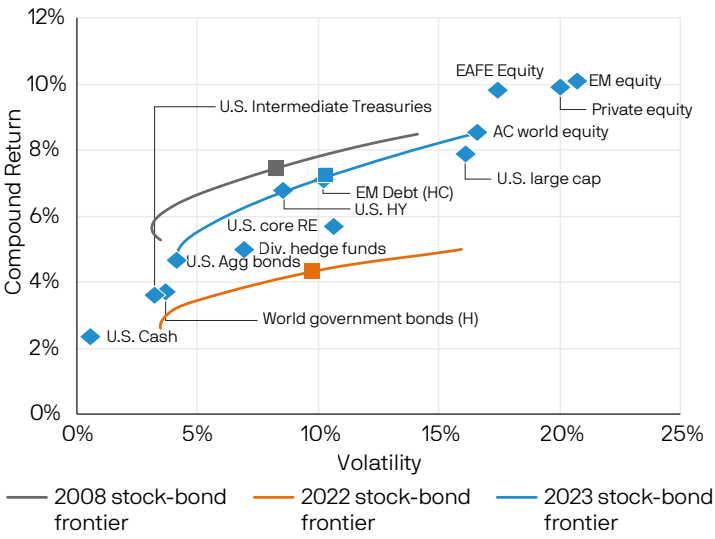
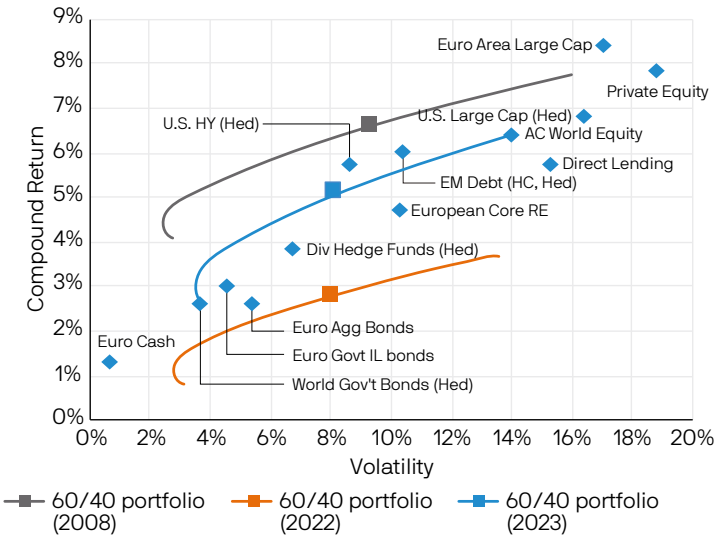


Exhibit 12B: EUR stock-bond frontiers and 60/40 portfolios based on 2023 vs. 2022 LTCMAs for risk and return (%)



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

[11] John Bilton, Jared Gross et al., "How investors can reach their 7% return target," J.P. Morgan Asset Management, July 2021.

Over our 10- to 15-year horizon, we look through some of the cyclical risks and instead home in on risks that might alter trend growth or inflation, or leave a lasting imprint on long-term asset returns

Exhibit 13: Our core case sees positive returns and stable equilibrium growth but more two-sided risks to inflation

Risk	Upside or downside?	Description	Macro or asset class implications
Worsening climate or environmental situation	Downside	More frequent or more extreme weather events leading to destruction of productive assets and disruptions to food and basic materials supply	Near-term economic downside from disruptions to supply side; forced migration may lead to international tensions in extreme cases. Positive for bonds, commodities (ex-energy), real assets, negative for stocks, credit
Russia-Ukraine war spills over into other conflicts	Downside	The current war spills over into neighboring countries, pulling in NATO, or ignites tension in other regions; may also include meaningful uplift in cyberconflict that threatens infrastructure	Elevated geopolitical tension a feature in our near-term analysis; may well have lasting trade implications; positive for USD and supportive for commodities; adds to volatility in many asset classes
Further weaponization of fuel and food	Downside	Gas supply disruption and interruption to trade in grain from Ukraine have created impetus for governments to invest heavily to reinforce supply chains; this investment may not lead to growth in productive assets	Initially inflationary and adds to volatility of inflation over longer term, as future conflicts or disputes may also cause bursts of headline inflation; may create a short-term windfall for recipients of capex dollars
Accelerated adoption of technology	Upside	Communication and automation technologies proven over the pandemic become more ubiquitous, generating an uplift in productivity	Positive for real GDP and limits inflation; supportive for stocks, credit and other risk assets; mitigates some right-tail inflation risks from bond markets
Stronger than expected investment and capex cycle	Upside	Surge in fiscal spending and upswing in capex that followed pandemic lead to building of productive capacity and upskilling in labor	Positive for real GDP and limits inflation; supportive for stocks, credit and other risk assets; mitigates some right-tail inflation risks from bond markets; may favor developed over emerging markets
Rapid abandonment of USD as key reserve currency	Downside	Challenger to USD (from either crypto or from an alternative fiat currency) emerges and pulls reserve assets away from USD; diminishes demand for U.S. assets and refocuses attention on U.S. deficit	Negative for growth, USD, bonds, credit and stocks; positive for real assets and commodities
Secondary pandemics or emergence of vaccine-resistant strains	Downside	Vaccine-resistant strain of recent pandemic or entirely new pathogen emerges, necessitating rolling lockdowns and creating disruption to supply chains globally	Negative for growth but may lead to further stimulus, leading to cyclical volatility and risking further expansion of deficits; positive for bonds in short run but risks of financial repression in longer term; increases volatility in equities and credit; generally positive at margin for real assets and commodities relative to financial assets
Inflation expectations become embedded, forcing persistently tight policy	Downside	Central banks overshoot reasonable levels of financial conditions due to embedded consumer inflation expectations; growth is stifled and investment discouraged due to high interest rates and uncertainty over prices	Bond investors suffer from jump in yields, while equity multiples contract further; growth equities under pressure and margins hit across the board. Better-performers likely to be real assets and infrastructure; consumer wealth degraded due to inflation, potentially leading to more extreme political decisions
Liquidity crisis within nonbank financial system	Downside	Contagion risks grow in some parts of the financial system without direct last resort, meaning that despite open market or liquidity stabilization, price action becomes disorderly	Fire sale of assets to meet margin calls may precipitate sharp fall in credit supply, not initially noted due to limited refinancing wall; however, over longer run, levered companies and sectors come under significant pressure
Fiscal dominance diminishes impact of monetary policy	Upside and downside	Economic stress for households or key industries prompts excessive or pro-cyclical fiscal support measures	Confidence and, in turn, growth supported in near term but may extend inflationary risks. If done prudently, may be supportive for risk assets in shorter term, but may mean tighter monetary policy for longer to counteract any lingering inflation impact – with knock on negative impact for longer term asset returns. Done recklessly or without proper funding risks increasing market volatility

Source: J.P. Morgan Asset Management; data as of October 2022.

Macroeconomic assumptions

Inching forward: Lingering inflation, moderate growth

Authors

Michael Hood
Global Strategist
Multi-Asset Solutions

Dr. David Kelly, CFA
Chief Global Strategist
Head of Global Market Insights

In brief

- The pandemic and its aftershocks have not changed our long-term growth outlook by as much as seemed possible during the past two years.
- Demographics continue to constrain growth prospects, especially in developed markets and many emerging Asian economies.
- Our growth projections have not changed significantly from last year, although we have trimmed forecasts in several economies to take account of elevated starting positions.
- We remain optimistic about long-term prospects for productivity growth, although our assumptions in this area have not changed from last year.
- The major question hanging over the outlook is whether the world has moved into a high inflation regime.
- While many economies are overheating today and inflation expectations have moved up, we think many secular forces that have depressed inflation in recent decades remain in place.
- Additionally, we think most central banks will pursue their price stability goals assiduously over the medium term.
- As a result, our inflation forecasts have moved up modestly but not dramatically.

Growth outlook

What will be the long-term macroeconomic consequences of the pandemic and its aftermath?

At this point, we can say very little for sure. Already, though, many early predictions, such as large-scale migration away from cities, seem not to be panning out. In last year's publication, we posited that expansionary fiscal policies could become a persistent feature of the macro environment. While that might prove correct in some cases, the U.S. fiscal stance has turned notably tight during 2022. The prospect of deglobalization has also loomed, but without yet finding much support in the data.

All told, we do not think the long-term outlook for real growth has changed significantly in the past couple of years (**Exhibit 1**). In our view, the main moving parts that determine long-term growth – demographics and technological change – will not feel much impact from the pandemic era. Our forecasts expect a smaller contribution to growth from the labor force (including the improvement, over time, in human capital) than occurred in the past, but a slightly greater push from technology. Total factor productivity (TFP) – the part of our growth-accounting framework that we think captures technological change – disappointed in the period following the global financial crisis, but we expect somewhat better performance from here. Indeed, the pandemic appears to have catalyzed technology adoption in many parts of the economy. Perhaps this will be one of its genuine and lasting legacies.

We see much greater uncertainty about the inflation environment. Nearly every country in our sample is currently experiencing its highest inflation rate in decades. Have we moved back into a 1970s-style high inflation atmosphere? In answering that question, we find it helpful to ask two more.

First, has the global economy become more inherently inflationary? We acknowledge that inflation expectations have moved sharply higher, a development likely to reverberate for some years. But we are skeptical about broader structural changes and attribute much of today's high inflation to economic overheating. We think many of the secular forces that pushed inflation down during the prior three decades remain in place. Still, we see competing forces that create two-way risks to inflation, and as a result we have increased our estimate of inflation volatility this year.

Second, what preferences will societies and governments display? Over the long run, inflation is partly a policy choice. Our reading of current conditions suggests that citizens and governments prefer low inflation, and we expect central banks to work toward restoring broad price stability over the next few years.

GDP growth: Mostly stable, with current overheating pressure

We are modestly trimming our GDP growth projections for several developed market (DM) economies this year, partly reflecting elevated starting points. Our views about the underlying drivers of growth – labor forces, capital stocks and TFP – have not changed significantly. Weak demographics – slower-growing and aging populations – continue, in our view, to represent the main constraint on long-term growth prospects in most DM and many emerging market (EM) economies.

Last year, we raised our expectation for total factor productivity growth, a concept that over the long run we think owes heavily to technological change. Incoming information over the past year has broadly corroborated that upgrade but does not, in our view, justify any further increment. The most striking development since last year has been the overheating pressure evident in many DM economies, with high inflation stemming in part from tight labor markets. We think unemployment rates in the U.S. and the UK, and possibly the euro area, stand below levels likely to be achieved, on average, during the next 15 years. As a result, our long-run forecasts for these economies now include a small cyclical penalty.

The early stages of the coronavirus pandemic left enormous footprints in job markets and led to widespread speculation about ongoing structural change in work relationships. There was much talk of the so-called Great Resignation in the U.S. Two years into the pandemic era, though, we see only limited signs of permanent change. Labor force participation rates have recovered across most age and gender cohorts, if not fully, and with still-notable shortfalls among the age 55–65 group, where early retirements were common in 2020. Migration has restarted in many countries. And a spell of early retirements has given way to labor force reentry.

In forecasting growth, we therefore put more stress on the long-run growth rates of the prime-age and senior populations, generally assuming broadly stable participation from the former and a gradual uptrend in employment rates among older people. We see rising senior participation as a well-established secular trend, one fueled primarily by better health outcomes.

In the U.S., we expect employment to average 0.2% growth over the coming 10–15 years, held back partly by less immigration than in recent decades. Labor forces will likely shrink in Japan and the euro area, given their slower population growth and older age distribution. Sweden, Canada and particularly Australia, with their younger populations, should enjoy more growth support from demographics.

The slightly more favorable demographic outlook in emerging market countries in aggregate conceals significant differences. Excepting India, the major EM Asian countries are experiencing slow overall population growth and outright declines among prime-age people. In the past, we applied a bonus to the China labor force projection to take account of urbanization, which shifts people from subsistence farming and similar activities into the modern economy. That process continues but now looks fairly well advanced. As a result, our labor force forecast for China edges lower this year. It remains positive, though, at 0.5%, in contrast with Korea (0.0%) and Taiwan (-0.4%). Population and labor force growth in Latin America, emerging Europe and Africa, along with India, is expected to run significantly faster.

Our 2023 assumptions anticipate mostly stable real GDP growth and higher – but not dramatically higher – inflation

Exhibit 1: 2023 Long-Term Capital Market Macroeconomic Assumptions (%, annual average)

	Real GDP			Inflation		
	2023	2022	Change	2023	2022	Change
Developed markets	**1.4**	**1.5**	**-0.1**	**2.1**	**1.8**	**0.3**
United States	1.6	1.7	-0.1	2.6	2.3	0.3
Euro area	1.1	1.2	-0.1	1.8	1.5	0.3
Japan	0.7	0.7	0.0	0.9	0.7	0.2
United Kingdom	1.3	1.4	-0.1	2.4	2.2	0.2
Australia	2.1	2.2	-0.1	2.4	2.2	0.2
Canada	1.6	1.6	0.0	2.3	1.9	0.4
Sweden	1.8	1.8	0.0	2.1	1.9	0.2
Switzerland	1.4	1.4	0.0	1.0	0.6	0.4
Emerging markets	**3.5**	**3.7**	**-0.2**	**3.4**	**3.3**	**0.1**
China	4.0	4.2	-0.2	2.2	2.5	-0.3
India	5.7	6.0	-0.3	4.5	4.5	0.0
Russia	0.4	0.8	-0.4	8.0	5.0	3.0
Brazil	2.0	2.0	0.0	4.6	4.3	0.3
Korea	2.0	2.0	0.0	2.0	2.0	0.0
Taiwan	1.7	1.7	0.0	1.3	1.1	0.2
Mexico	2.0	2.2	-0.2	3.9	3.7	0.2
South Africa	2.1	2.2	-0.1	5.5	5.3	0.2
Turkey	3.1	3.1	0.0	16.0	12.0	4.0
Global	**2.2**	**2.2**	**0.0**	**2.6**	**2.4**	**0.2**

Source: J.P. Morgan Asset Management; estimates as of September 30, 2022. Previous year's real GDP forecasts shown include cyclical bonuses. Given depressed post-shock starting points, in last year's edition we added cyclical bonuses to our 2021 trend growth projections. This year, our 2023 forecasting returns to trend rates alone. In comparing 2022 with 2023 trend rates here, we do not use last year's rate-plus-cyclical-bonus figure but only the trend rate.

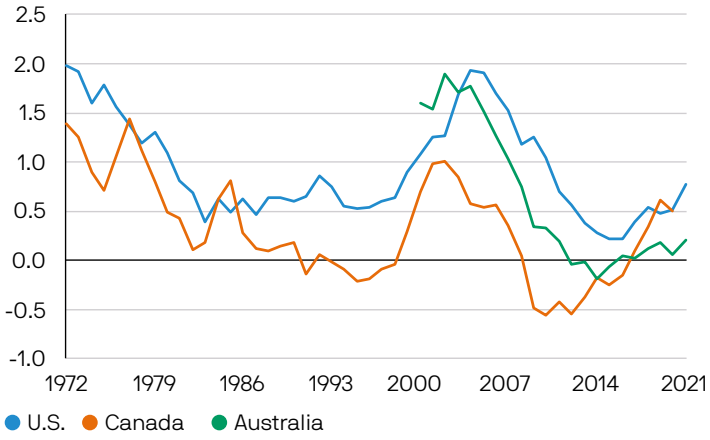
Further progress in total factor productivity

Over the long haul, annual TFP growth has averaged 0.5%–0.6% across DM economies. Like we did last year, we take a slightly more optimistic forward-looking view, forecasting 0.8% for the U.S. and 0.7% for the DM aggregate. TFP growth showed signs of shifting higher late in the previous expansion. In addition, the pandemic appears to have catalyzed widespread technology adoption and changes in business work practices that take advantage of the past few decades' innovations (**Exhibit 2**). Capex spending has moved toward generating intellectual property, historically linked with faster TFP growth. At the same time, the rapid overheating of major economies at the early stage of an expansion suggests that a 1990s-style TFP boom is not yet materializing, making additional upgrades unnecessary at this stage.

The pandemic looks to have catalyzed widespread technology adoption

Exhibit 2: Total factor productivity trends

% y/y, 10-year average



Source: Haver Analytics, J.P. Morgan Asset Management; data as of 2021.

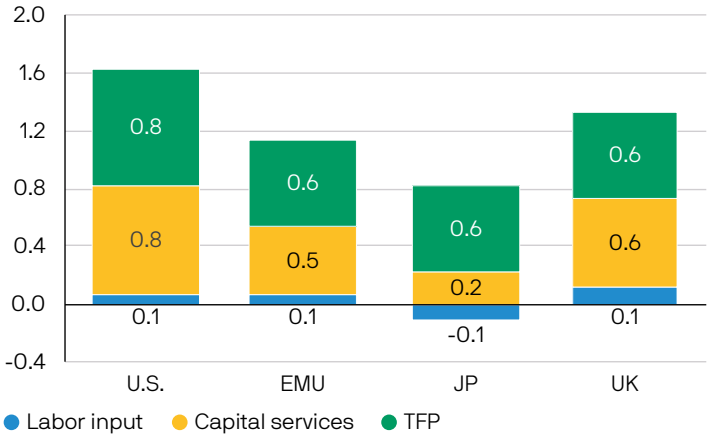
As with demographics, TFP assumptions vary widely among EM economies. India – the lowest income country in our sample – leads the way, in part reflecting the large distance between itself and the global technology frontier, and the resulting room for catch-up. We project Korea and Taiwan to run TFP growth rates similar to DM economies'. In many other EM economies, though, we forecast more sluggish TFP growth. Inbound technology transfer seems likely to prove a challenge for China in coming years, and Latin American economies have struggled with technology adoption.

Our U.S. growth forecast edges down 0.1 percentage point (ppt), to 1.6% (**Exhibit 3**). While our trend forecast has not changed, we are applying a small cyclical penalty this year to take account of the economy's present state. We cannot say with any certainty where the "neutral rate" of unemployment is, but today's 3.6% joblessness rate is very low by historical standards. We estimate that growth of 0.1% below potential, on average, would be required to bring it back to longer-term norms.

While our trend forecast has not changed, this year we apply a small cyclical penalty

Exhibit 3: Contribution to long-term GDP growth

ppt, annual average



Source: J.P. Morgan Asset Management; data and forecasts as of September 2022.

Similar logic applies to our growth forecasts for the euro area and the UK, where we also trim our projections by 0.1ppt, to 1.1% and 1.3%, respectively. Other DM economies appear to be overheating by less. We leave our other forecasts unchanged, except for Australia, where a modest reduction in the capital stock assumption brings the overall growth figure down by 0.1ppt, to 2.1%. Even with that cut, Australia is still the DM growth standout.

In EM economies, aside from India and China, most of our forecasts have not changed significantly. Our China forecast moves down 0.2ppt, to 4.0%. A revised historical growth decomposition has caused us to lower our sights on TFP growth, which, together with the urbanization story, accounts for the reduction. China has maintained solid growth performance after moving into middle income territory – in contrast to many other formerly emerging economies that rose to middle income status – so the economy's room for further catch-up has continued to narrow.

We also revise our India growth forecast down, for the second straight year. While its growth projection remains the highest among our sample, India's realized performance has deteriorated in recent years. Earlier enthusiasm for the country's prospects has dimmed somewhat as the structural reform process has slowed.

Most of our other EM growth forecasts do not change this year, although we shave 0.2ppt from Mexico's and 0.1ppt from South Africa's projection. Both face challenging policy environments that seem likely to inhibit productivity growth, and South Africa's investment rate has slowed significantly.

Inflation outlook

Higher inflation, but not the 1970s

Our inflation projections start with the recognition that the world's central banks generally regard achieving steady, low inflation as one of their most important goals. Moreover, we assume that, in theory, they should be able to influence aggregate demand enough to achieve this goal in the long run. Thus, any long-term inflation forecast begins with the central banks' inflation targets.

However, a central bank resolving to achieve an inflation target is a little like agreeing with your doctor on a personal weight goal for the year ahead. In theory, achieving this target is within your control. Yet certain forces, including your own determination, may conspire to make you overshoot or undershoot that goal. Moreover, if you begin some distance from that target, it will take time to get there. Meanwhile, your actual average weight will fluctuate and may further deviate from that long-run goal.

In our inflation projections, we first outline the central banks' targets and then consider the long-term forces that could impact the ability of central banks to achieve these targets. Finally, for each country and region, we look at how a transition path, taking inflation from current rates to a presumed long-run trend, would impact actual realized inflation over the next 10–15 years.

Central bank targets: Some DM-EM divergence

Exhibit 4 outlines the long-run inflation goals for the major DM and EM central banks.

The Federal Reserve (Fed) has a symmetrical target of 2% for long-run inflation. We note, however, this is inflation measured by the personal consumption deflator. Based on the gap between inflation as measured by CPI and by the personal consumption deflator over the past 20 years, this implies a target of roughly 2.3% inflation measured by CPI, the index our Long-Term Capital Market Assumptions use.

Among other DM central banks, the European Central Bank (ECB), the UK, Canada and Sweden have symmetrical goals of 2% inflation, while the Swiss National Bank (SNB) aims for inflation close to or below 2%. By contrast, Japan aims for inflation of at least 2% and Australia targets inflation of between 2% and 3%.

Inflation goals in emerging markets are generally higher. In particular, the central banks of India, Brazil and South Africa all currently have inflation targets of over 3%; Mexico has a symmetrical 3% target. China does not publish a long-term inflation target but is estimating 3% for 2022. Taiwan also does not publish a long-term inflation target, while the Bank of Korea (BoK) has a 2% target, more in line with DM central banks.

Any long-term inflation forecast begins with central banks' inflation targets

Exhibit 4: Central bank inflation targets

Central bank (CB)	CB inflation target	Current policy	Source
U.S. (Federal Reserve)	Headline PCE	Average inflation targeting: Will allow for inflation to overshoot 2% for a period of time to make up for periods when inflation undershoots 2%	Federal Reserve, "Statement on Longer-Run Goals and Monetary Policy Strategy," January 2022
Eurozone (European Central Bank)	Harmonised Index of Consumer Prices (HICP)	Targets inflation of 2% over the medium term	European Central Bank, "Our Monetary Policy Statement at a Glance," July 2022
UK (Bank of England)	Headline CPI	Seeks significant progress toward achieving inflation at 2% sustainably	Bank of England, "Monetary Policy Summary," May 2022
Japan (Bank of Japan)	Core CPI (ex-food)	Inflation-overshooting commitment: Continue to expand the monetary base until the year-on-year rate of increase in the observed CPI (all items less fresh food) exceeds 2% and stays above the target in a stable manner	Bank of Japan, "Price Stability Target of 2 Percent and Quantitative and Qualitative Monetary Easing with Yield Curve Control"
Canada (Bank of Canada)	Headline CPI	Aims to keep inflation at the 2% midpoint, as measured by the 12-month rate of change in CPI, of a target range of 1% to 3%	Bank of Canada, "Monetary Policy Framework Renewal," December 2021
Australia (Reserve Bank of Australia)	Headline CPI	Aims to achieve a medium-term average rate of inflation within 2%–3%	Reserve Bank of Australia, "Statement on the Conduct of Monetary Policy," August 14, 1996
Switzerland (Swiss National Bank)	Headline CPI	Aims to achieve positive rates of inflation below 2%	Swiss National Bank, "Monetary Policy Strategy"
Sweden (Riksbank)	CPIF	Aims to achieve 2% inflation, with a tolerance range of 1%–3%	Riksbank monetary policy
China (People's Bank of China)	CPI	Has set its inflation target at around 3% for 2022. The PBoC does not publish a long-term inflation target	2022 Government Work Report of the Chinese State Council
India (Reserve Bank of India)	CPI	Targets inflation of 4% for the next five years, with an upper tolerance limit of 6% and a lower tolerance limit of 2%	Reserve Bank of India monetary policy
Brazil (Central Bank of Brazil)	CPI	Targets inflation of 3.5% over the next year and 3.25% over the next three-year period, with a 1.5% tolerance margin on either side	Central bank inflation report, June 2022
Mexico (Bank of Mexico)	CPI	Targets inflation of 3%, with a 1ppt tolerance range above and below that level	Bank of Mexico quarterly report, 1Q 2022
Korea (Bank of Korea)	CPI	Targets inflation at 2% over the medium term. Prior to 2016, the BoK published inflation target ranges with either implicit or explicit inflation targets	Bank of Korea monetary policy report, June 2022
Taiwan (Central Bank of the Republic of China)	CPI	Does not target inflation	Central Bank of the Republic of China monetary policy
South Africa (South African Reserve Bank)	CPI	Targets inflation of 3%–6% but does not target an average inflation rate. Since 2017, the MPC has emphasized that it would like to see inflation close to the 4.5% midpoint of the target range	South African Reserve Bank, "Statement of the Monetary Policy Committee," March 2022

Source: J.P. Morgan Asset Management; data and forecasts as of September 2022.

Economic forces impacting the Fed's ability to hit its inflation target

The surge in inflation around the world as the pandemic has faded serves as a reminder that central banks face several challenges impacting their ability to achieve inflation targets. **Exhibit 5** summarizes some of the forces that are likely to add to or subtract from inflationary pressures over the next 10–15 years.

Strong forces and counterforces will push inflation up and down over the next decade

Exhibit 5: Long-term inflation influences

Economic forces	Last global expansion (2008–19)	Next 10–15 years
Income distribution	–	+
Globalization process	–	+
ESG	0	+
Inflation expectations	–	+
Targeting unemployment below NAIRU	0	+
Fiscal policy	–	–
Online markets & information availability	––	–
Energy costs	+	0
Union membership	–	–
Technology adoption	–	–

Source: J.P. Morgan Asset Management; data and forecasts as of September 2022.

- **Income distribution** – A more unequal income distribution has tended to suppress inflation in recent decades, as the richest households divert their income toward the purchase of assets and away from goods and services. However, tight labor markets at the start of this forecast period, combined with a rise in political populism, could leave more money in the pockets of poor and middle income households going forward. That would boost both demand and inflation.
- **Globalization process** – As we conclude in "Globalization will evolve – but not unravel," in our 2023 Long-Term Capital Market Assumptions, on balance we expect less build-out of globalization over the next 10–15 years, with some risk of partial deglobalization. In recent decades, globalization has generally been a disinflationary force due to declining tariff levels; lower costs achieved by tapping cheaper labor markets around the world; and the indirect effect of global competition, which has forced domestic firms to be more efficient. Conversely, any retreat from globalization in the years ahead could intensify inflation pressures, especially for goods.
- **ESG** – A growing global focus on sustainability could also add to inflation going forward, at least in the short run. The cheapest methods of producing, distributing and consuming food, energy and other commodities are generally not friendly to the planet. To the extent that governments try to push against these practices, inflationary pressures could be higher. However, in the very long run, sustainability should have disinflationary effects, as it counteracts practices that are contributing to drought, soil erosion, deforestation and global warming.
- **Inflation expectations** – At least in the early years of our 10- to 15-year horizon, elevated inflation expectations could add to actual inflation. As economists frequently note, expectations play a key role in setting prices. The high inflation seen around the world as the impact of the pandemic has eased is encouraging workers to demand higher wages and companies to raise their prices. This effect could fade out entirely in the aftermath of a recession. For now, it is pushing inflation higher.
- **Central banks targeting a too-low nonaccelerating inflation rate of unemployment (NAIRU)** – Most central banks assume a dual responsibility to control inflation and help facilitate full employment. However, both central bankers themselves and politicians may try to achieve or sustain a lower unemployment rate than is theoretically compatible with stable inflation. This risk has grown because of both the sheer uncertainty of economic relationships in the aftermath of the pandemic and questions concerning the ability of central bankers to make decisions independently, particularly when facing populist political leaders.
- **Fiscal drag** – After the extreme fiscal stimulus of the pandemic years, most economies face some fiscal drag going forward. In the U.S., the decline is dramatic, with the deficit falling from USD 2.4 trillion in fiscal 2021 to USD 1.4 trillion in fiscal 2022 – the biggest deficit decline as a percent of GDP since the demobilization following World War II. This is likely to continue for years as governments, saddled with heightened levels of debt and higher interest costs, cut budgets to ensure fiscal stability.

- **Online markets and information availability** – One of the most potent forces depressing inflation in recent decades has been the ability to buy an increasing variety of goods and services online. This lets buyers see different prices for the same product and switch between sellers with very little effort. We see this phenomenon as one aspect of the technology adoption story mentioned earlier, which might both boost real growth and restrain inflation.
- **Energy prices** – At the start of our forecast horizon, global energy prices were at very elevated levels. Oil was running close to USD 90 per barrel for Brent crude; natural gas prices were at very high levels, especially in Europe; and refinery margins were much wider than usual. However, while this was a large part of the inflation story in 2022, we expect these prices to elicit both demand destruction and increased supplies in the years ahead. Consequently, energy prices could, on average, drift sideways over the forecast horizon.
- **Union membership** – Trade union membership has generally declined in recent decades, and we expect this trend to continue, providing some further downward impetus to inflation.

It is nearly impossible to estimate precisely the impacts on inflation of most of these forces over the next 10 to 15 years. On balance, we believe that, for most countries, they will tend to cause inflation to slightly overshoot central bank targets.

One factor that will clearly be different across countries is the impact of changes in exchange rates. Our FX assumptions outline what changes we expect across countries (**Exhibit 6**, which also includes the observed import share of GDP).

As a very rough estimate of the inflation impact of changing exchange rates, we multiply each country's import share of GDP in 2020 by the expected annual change in its currency. By this measure, a rising euro over the forecast period will result in a drag on eurozone inflation while a falling dollar will add something to U.S. inflation.

Our forecast expects a falling dollar – all else equal – will push U.S. inflation higher

Exhibit 6: Exchange rate impacts on inflation

Economic forces	Import share of GDP (2020)	Expected annual change in trade-weighted exchange rate	Crude annual impact on inflation of change in exchange rate
U.S. dollar	13.2	-1.0	0.13
Euro	17.0	1.3	-0.22
British pound	28.0	0.9	-0.25
Japanese yen	15.5	1.7	-0.26
Canadian dollar	31.4	0.5	-0.16
Australian dollar	20.1	0.2	-0.04
Swiss franc	53.5	1.6	-0.86
Swedish krona	40.0	1.4	-0.56
Chinese yuan	16.0	1.6	-0.26
Brazilian real	15.5	-0.7	0.11
Mexican peso	38.0	-1.9	0.72

Source: J.P. Morgan Asset Management; data and forecasts as of September 2022.

Transition effects: In most countries, adding to inflation

Finally, we consider the impact of the starting point for inflation relative to its long-term trend. At publishing time, the monthly running rate for inflation had backed off from its peak earlier in 2022. However, with higher wage growth, higher inflation expectations and the lagged impact of higher home prices, inflation in most countries remains significantly above both central bank targets and our estimates of long-run trend inflation.

Despite public concern about recent inflation, we expect that inflation rates will moderate quite quickly in 2023 and 2024. Indeed, the current much more hawkish attitudes and actions of central banks suggest that inflation could fall sharply to trend rates, undershoot them and then revert to them in the early years of the forecast.

The full details of these dynamics are, of course, well beyond the scope of our Long-Term Capital Market Assumptions. However, it should be noted that, on net, this transition boosts long-term inflation by about 0.1% per year in the U.S., the eurozone and the U.K.

I Thematic articles

The future of globalization

Globalization will evolve – but not unravel

Authors

David Kelly, CFA
Chief Global Strategist
Head of Global Market Insights Strategy

Stephanie Aliaga
Macro Research Analyst
Global Market Insights Strategy

Kerry Craig, CFA
Global Market Strategist
Global Market Insights Strategy

Tilmann Galler, CFA
Global Market Strategist
Global Market Insights Strategy

Tai Hui
Chief Market Strategist, Asia
Global Market Insights Strategy

Joel Ryzowy
Portfolio Manager
Asset Management Solutions

Jacob Tadros, CFA
Portfolio Manager
Multi-Asset Solutions

In brief

- While an era of increasingly close economic integration may be coming to an end, deglobalization is not inevitable. Globalization will evolve but not unravel. The most likely scenario is a multi-polar world in which trading blocs become more politically aligned.
- How globalization evolves will likely depend on the role of innovation and automation, demand growth in new markets, rising (or declining) nationalism and shifts in regulation on climate, taxes and data.
- Winners and losers will emerge across regions and industries:
  - Low wage economies that have derived the greatest benefit of decades of globalization appear at greatest risk.
  - Greater regionalization as supply chains diversify and production moves closer to demand would benefit the broader Asian region and an increasingly wealthy consumer base.
  - While the intensity of goods trade may slow, services trade is likely to accelerate in an increasingly digital world.
  - The rise of "digital sovereignty" as a national security issue likely means increased spending on cybersecurity.
- As governments adopt more stringent decarbonization standards, new barriers to trade could emerge. We expect substantial investment in renewables, along with persistent demand for traditional commodities such as oil and natural gas.

The pandemic, supply chain disarray and heightened geopolitical tensions have all raised questions about whether the long trend toward deepening globalization is being thrown into reverse. But it's not easy to unwind decades of economic and capital market integration. In our view, the nature of globalization will evolve but not unravel.

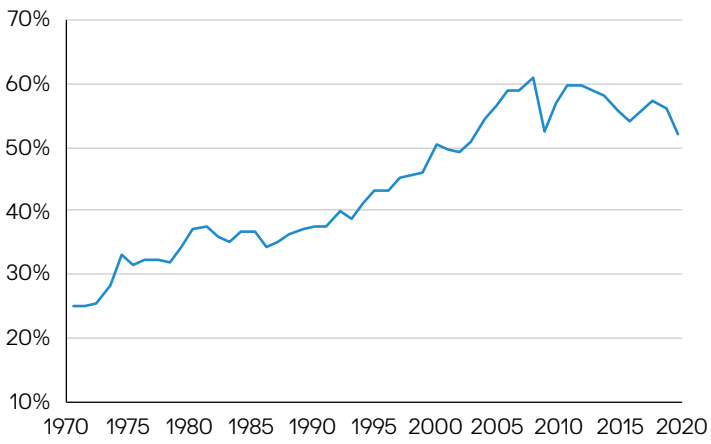
How globalization evolves in the coming decades will likely depend on the role of innovation and automation, demand growth in new markets, rising (or declining) nationalism and shifts in regulation on climate, taxes and data.

There is a wide spectrum of possible outcomes. The most likely scenario is a multi-polar world in which trading blocs become more politically aligned, sometimes driven by nationalistic (if not blinkered) economic policies. Overall, the global economy could become less efficient. Trade intensity in goods likely declines, while services could flourish amid growing digitalization.

Who wins and who loses from such a scenario? And what might it mean for investors?

Global trade as a share of GDP rose steadily for decades – until the financial crisis

Exhibit 1: Trade in goods and services



Source: World Bank, J.P. Morgan Asset Management; data as of July 2022.

The benefits of globalization

First, we'll define our terms. Globalization is the "openness" of markets and economies that allows for greater integration, particularly through the movement of goods, services, capital and labor. A broader definition also captures the exchange of knowledge, culture and politics across borders.

Globalization traces its modern history back to the global institutions and policies established following World War II. These promoted the adoption of free market systems, reduced barriers to commerce and forged international agreements to promote trade and investment. Global trade as a share of GDP rose steadily through the decades, up to the mid 2007–09 global financial crisis (GFC) (**Exhibit 1**). The world had become a much smaller and more digital place.

Globalization has dramatically reduced poverty in developing economies – one of its most important benefits – and created new consumer markets. For example, as the Chinese economy became more open, average daily consumption rose from around USD 1 per person in 1990 to USD 11 in 2020.[1] Workers from many countries increasingly emigrated to find better job prospects. In 2021, the annual value of remittances to low and middle income countries reached USD 589 billion – more than three times the flows from government foreign aid and an important spur to prosperity.[2]

Meanwhile, the geographical shift in goods production that reduced poverty in some countries boosted consumer buying power in others. Prior to the supply chain havoc caused by the COVID-19 pandemic, new vehicle prices in the U.S. increased by only 3% since 1997. During the same period, clothing prices fell 7%, toy prices declined by 76%, furniture prices dropped 14%, and TV prices were down 98%.[3] These declines underscore how trade has raised the standard of living of low income people in developed markets – consumers who devote more of their income to goods than to services.

Globalization also fostered technology transfer across markets as expertise moved from developed to developing countries, increasing the value-add in production and spurring innovation. In 1998, China's largest export products were agricultural. Today, China is a major exporter of highly complex goods in sectors such as electronics and machinery.

Even as stronger global linkages have delivered clear benefits, resistance to globalization has broadened and intensified. Opponents of the trend have marshaled several arguments to make their case.

1 World Bank national accounts data, 2019.
2 World Bank, Migration and Development Brief, November 2021.
3 U.S. Bureau of Labor Statistics, Consumer Price Index, February 2020. This data includes adjustments for quality improvements.

The costs of globalization

First, while income inequality between developed and developing nations has declined at a national level, income inequality within most nations has widened. Global trade is often blamed for creating downward pressure on wages and exposing domestic industries to global competition. However, technological advancement and innovation could take equal blame for reshaping many industries at the expense of livelihoods.

Second, in the dozen years since the GFC, as countries have become more inward-looking and both tariffs and nontariff barriers to trade have become more commonplace, supranational organizations such as the World Trade Organization (WTO) have struggled to promote open markets and free trade.

Larger economies have often found it easier to set up their own regional trade blocs. After the U.S. pulled out of the Trans-Pacific Partnership in 2017, Japan led the signing of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). In 2020, China took the lead in the creation of the 15-nation Regional Comprehensive Economic Partnership (RCEP) in Asia. While these blocs still promote free trade within regions, they don't necessarily promote global free trade, and the alliances are perhaps as much political as they are economic.

Third, key events over the last two decades have underscored some of the drawbacks to greater financial integration and complex global supply chains. Populists on both the left and the right have railed against what they deem to be the dangers of globalization, sometimes blaming other countries and people for domestic problems.

The global financial crisis inflicted financial losses and economic pain on families around the world who felt very removed from the U.S. housing market or American financial institutions. The European sovereign debt crisis of 2011–12 wreaked widespread damage throughout Europe, showing the danger of pursuing a common currency project without a strong central fiscal policy. The 2011 Japanese Tohoku earthquake and tsunami disrupted global supply chains.

More recently, the pandemic revealed the vulnerability of all economies to foreign-sourced supplies of key inputs and commodities. Russia's invasion of Ukraine has underscored the risks to countries that depend on one region or country for vital supplies.

In the coming decade, climate policy could become a particularly thorny issue in the larger debate about globalization. As governments adopt more stringent decarbonization standards, new barriers to trade could emerge. Beyond climate, social and governance issues could spark similar global battles.

The global economy will be shaped for decades to come by the extent to which globalization's costs appear to outweigh its benefits – from the perspective of policymakers, citizens, companies and market participants, among others. We see three possible scenarios for how globalization might evolve. In the following sections, we explore four key issues – related to innovation; the energy transition; growing wealth and regional demand; the USD and capital markets – that investors should consider in thinking about the future of globalization.

Three possible paths forward

The current state of globalization is a single global economy that is fraying at the edges. Resistance to a "one world" framework has steadily increased along political lines as countries seek greater protectionist measures. Going forward, collaboration in trade, economics and finance could take several different paths. For this analysis, we outline three potential outcomes:

Globalization renewed: International organizations again take the lead in global collaboration on trade and regulation, keeping globalization on track (albeit at a slower pace than in the late 20th century). Global issues, such as tackling climate change or addressing global health challenges, prompt global cooperation. Trade barriers continue to fall, and a recognition of economic mutual interests eclipses nationalistic impulses.

A multi-polar world: This is the most likely outcome, in our view. International cooperation continues, but political and cultural alignments lead to the formation of a few large core trading blocs. These new blocs draw in other countries based on what they perceive to be their national interest. One potential structure could have the U.S. and Western Europe in one bloc and China and Russia in another. Meanwhile, other countries and regions, such as emerging economies in Southeast Asia, Latin America and the Middle East, opportunistically trade with both sides. This would dictate the flow of trade, technology and investment, and create a less efficient global economy as multiple technology standards emerge. Countries won't stop trading, but what they trade may shift. We could also see that innovation and cooperation to solve global problems, such as climate change, may bind nations together in a multi-polar world.

Geopolitical alliances are just one dimension of this multi-polar world. It could also be shaped by the concentration of consumer power, with a growing number of emerging economies becoming more dominant. In this scenario, multinational companies would continue to invest directly in these growing markets and rely less on servicing them from offshore locations.

Full fragmentation: Cooperation falters with further fragmentation in production and distribution. Under this scenario, globalization unwinds as nations emphasize domestic production of goods and services and increase the use of tariffs and other barriers to trade, even among countries that are politically aligned. Immigration is generally discouraged. This would imply both higher costs and lower efficiency, and by reducing economic relationships among nations, fragmentation could lead to greater international conflict.

Which scenario unfolds, and how, could depend on the answers to a handful of key questions:

How will the next wave of innovation affect trading patterns?

Innovations in information and communication technology have allowed internet, mobile communications and software-enabled companies to decentralize goods production and supply chains, and exploit their comparative advantages on a global scale. In the future, innovation may lead to less global trade in goods but a stronger network for globalized services. It could benefit companies rich in capital at the expense of those reliant on low cost labor.

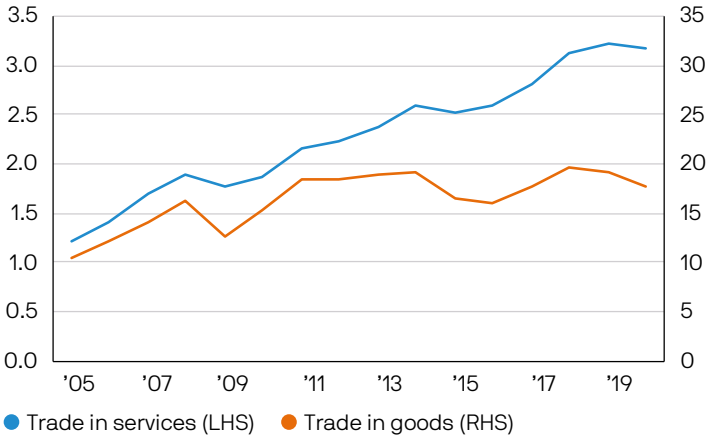
Politics and policies may restrict trade in goods, but because of new technologies, services could flourish in an increasingly digital world. Technological adaptation has already changed the way goods and services are traded. It has also contributed to the decline of goods and the rise of services as a fraction of total trade. Global trade in goods increased by 7.6% per annum between 1990 and 2005. But from 2005 to 2020, that growth rate more than halved (**Exhibit 2**). The digitization of goods and the replacement of local IT infrastructure with cloud services contributed to that decline.

Meanwhile, over the same latter 15-year period, trade in digital services grew almost twice as fast. (To be clear, digital platforms, data processing and improvement in logistics and transport have helped both types of trade by reducing friction in the value chain and easing transaction costs, with a correspondingly positive effect on trade activity overall.)

In recent years, services trade grew almost twice as fast as goods trade

Exhibit 2: International trade

Trillions of USD, annual



Source: UNCTAD, J.P. Morgan Asset Management; data as of June 2022.

While the impact of the next wave of innovation is less clear-cut, it should support the continued growth in services trade over goods. Looking at a slightly different period – 2016 to 2022 – international bandwidths, or the capacity of all internet exchanges globally, increased almost sixfold in total. Those gains illustrate how further progress in mobile communications technology and broadband expansion continue to pave the way for new markets and experiences, such as autonomous driving and the Internet of Things.

The continued growth of services supports our outlook: An evolving rather than unraveling global economy and a multi-polar world are the most likely scenario for the future of globalization.

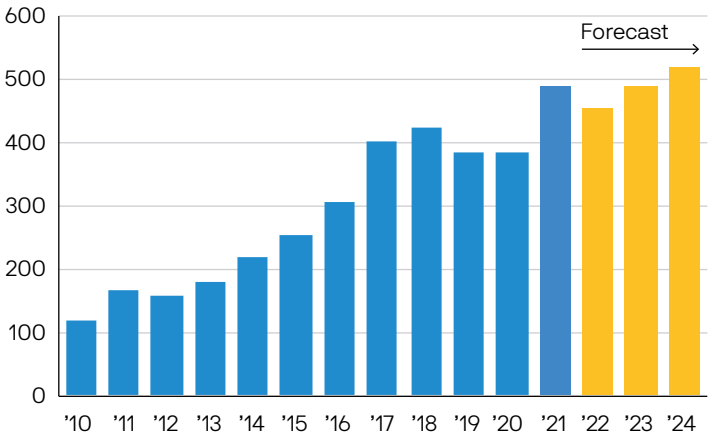
Innovation could have yet another influence on trade in goods when it comes to labor, one that favors a fragmentation scenario: Robotics, 3D printing and virtual reality, for example, give companies more flexibility. As businesses look to diversify their supply chains, it could lead to a shift in production away from areas dependent on cheap labor. However, the economic incentive to seek out the lowest marginal cost of production could be achieved through better technology rather than low wages. Such a shift would favor those companies with more capital and advanced technology.

The economics of industrial robots has improved significantly, lowering the cost of automation vs. the cost of labor (**Exhibits 3** and **4**). As a result, global supply chains could fragment, becoming more regional or even national. McKinsey estimates that robotics alone could reduce global trade between USD 1.5 trillion and USD 3 trillion annually by 2030.[4]

[4] "Globalization in transition: The future of trade and value chains," McKinsey Global Institute, January 2019.

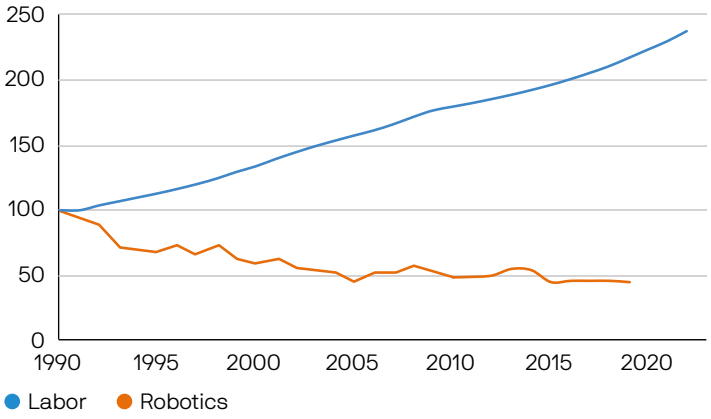
Automation costs have dramatically fallen vs. the cost of labor

Exhibit 3: Global annual installation of industrial robots



Source: IFR, J.P. Morgan Asset Management; data as of June 2022.

Exhibit 4: Cost of automation



Source: CBO, EIU, IFR, McKinsey, J.P. Morgan Asset Management; data as of June 2022.

How will the energy transition unfold?

The transition to clean energy will also have a significant impact on supply chains and trade volumes. That's because the requirements of an ecosystem based on renewable energy differ profoundly from one based on fossil fuels. Solar parks and wind farms require significantly more material and mineral inputs in construction than fossil fuel power generation. For instance, replacing a coal-fired power plant with offshore wind power requires six times the amount of mineral commodities (copper, zinc, nickel, chromium and rare earths); for a gas plant, it's 13 times more. In addition, building new gridlines to connect the world's electricity supply and demand will require significant amounts of copper and aluminum (**Exhibit 5**).

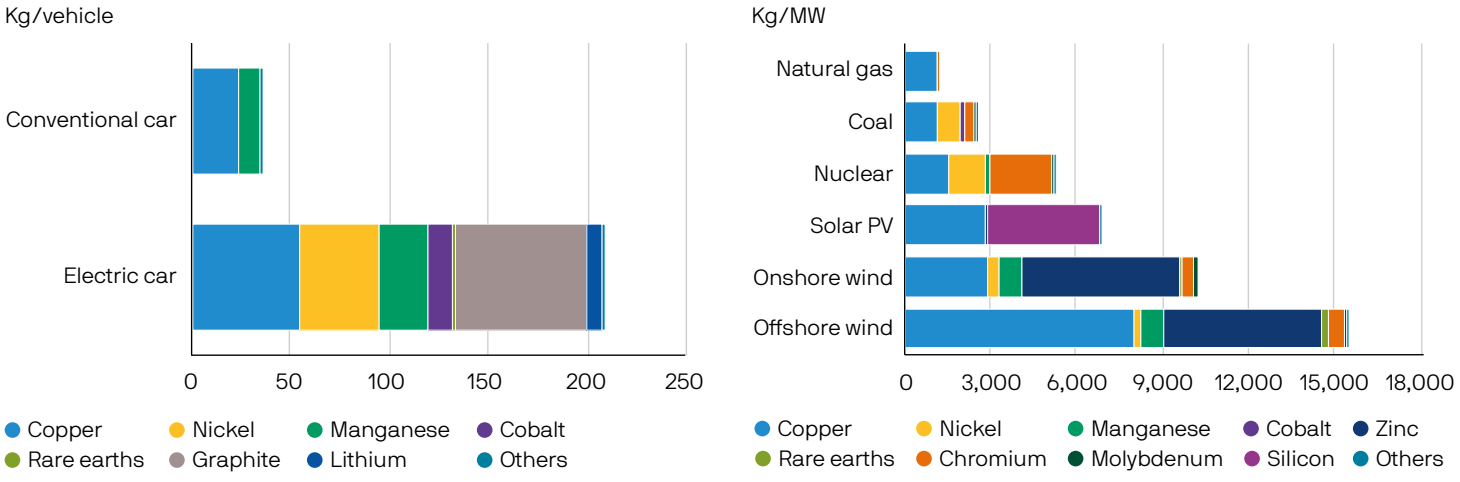
The transition to electric vehicles (EVs) presents similar challenges. While EVs are in some ways simple machines with only a sixth of the moving parts of a traditional combustion engine, their production requires six times as many minerals (lithium, nickel, cobalt, manganese and graphite).

Reducing greenhouse gas emissions, either through power generation or EVs, will make the economy less fuel intensive and more materials intensive. As a result, companies will reconfigure their supply chains and new trade patterns will evolve.

This suggests the potential for a multi-polar but in many ways still globalized economy. For example, some economic integration will be required to supply manufacturers with the necessary minerals and metals for wind power, updated energy grids and EV production.

Building solar parks, wind farms and electric vehicles requires substantial mineral inputs

Exhibit 5: Minerals used in vehicle and electricity construction



Source: IFR, J.P. Morgan Asset Management; data as of June 2022.

The U.S. Inflation Reduction Act represents a meaningful commitment to climate goals but with a clear bias for sourcing or processing minerals needed for EV battery production either locally or from key trading partners. Such a stance binds some nations together and limits access for others, fostering a more multi-polar world.[5]

How will growing wealth in developing economies affect trade patterns?

The convergence in wealth levels and the cultural assimilation that has taken place among developed and emerging economies have created new markets and many new consumers. Consumers in emerging economies represent a growing source of demand for everything from cars to social media to financial services.

If local supply can meet local demand, it could reduce the need for cross-border trade, creating a more fragmented global economy. To the extent that nationalistic political agendas further restrain cross-border trade, that fragmentation could deepen. Such a shift would be gradual, though. Over the near term, multinational companies could still invest and operate in a broad range of countries to capture profits in growing consumer markets.

The relative freedom – or constraints – on cross-border trade have important implications for supply chains. For example, the distribution of motor vehicle production globally has mirrored the distribution of sales over the past 20 years.

The share of motor vehicle sales in both the U.S. and Europe has fallen during this period, matching a decline in these regions' share of production. At the same time, a sharp rise in sales in China and India has been matched by a rise in production (**Exhibit 6**).

This evolution in demand (combined with greater use of automation in production) reinforces the shift in trade activity toward becoming more regional and less global. While companies may choose manufacturing based on proximity to consumers, growth in the services sector will be determined by technological infrastructure and the changing demands of consumers with rising wealth in new markets.

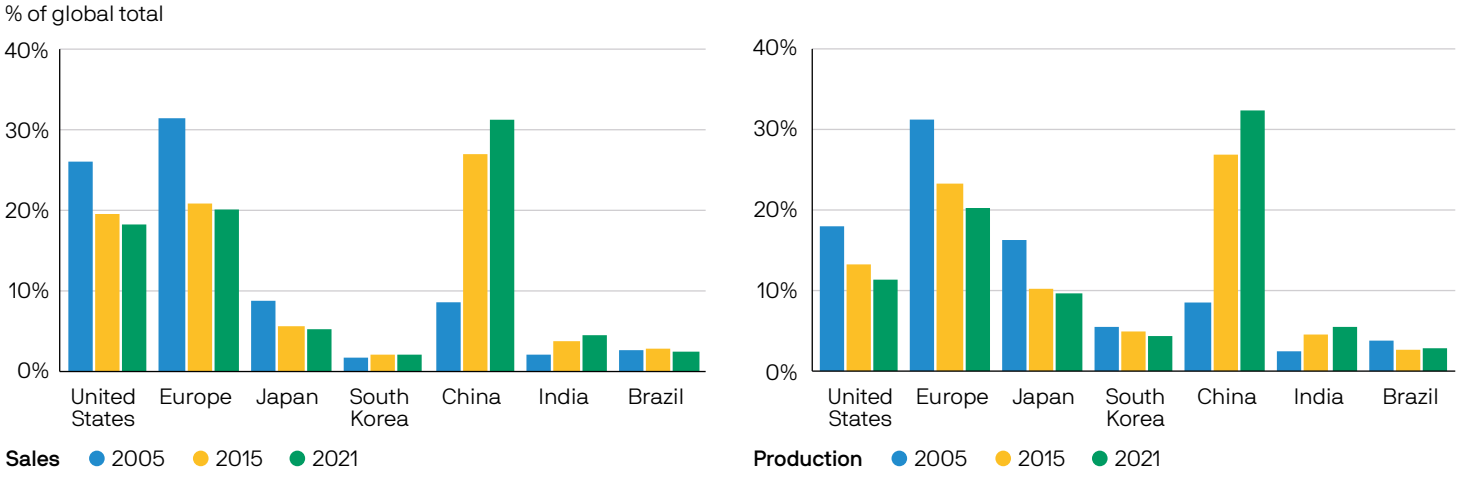
Can the dominant U.S. dollar be overthrown?

Global financial markets have become increasingly integrated as governments compete to attract international capital. This integration will not be easily unwound. The need for capital and the U.S. dollar's pivotal role in the global financial system should limit any potential fragmentation.

Despite financial market integration, we note that global capital flows have yet to recover to pre-GFC levels. Direct investment and portfolio flows were relatively stable up until 2017. However, other capital flows have dropped, perhaps because tighter regulatory policies encouraged greater domestic lending and the development of local debt markets in the emerging world. More recently, investment flows have started to recover, even if they remain some way from pre-GFC levels (**Exhibit 7**).

Motor vehicle sales have generally tracked car production over the past 20 years

Exhibit 6: Motor vehicle sales and production

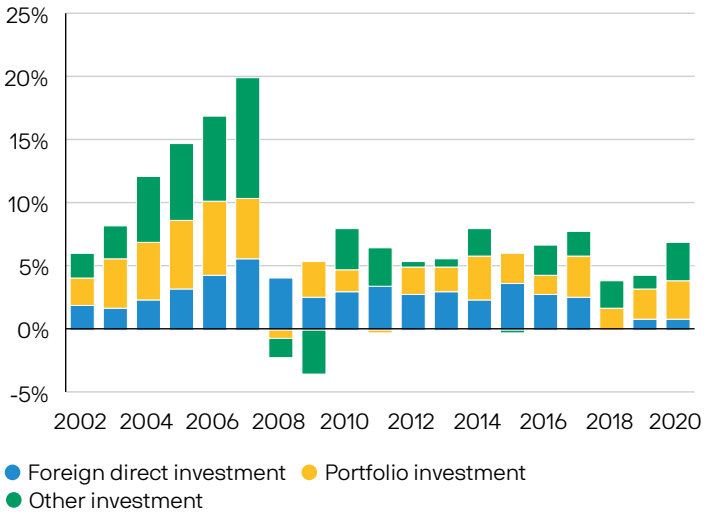


Source: International Organization of Motor Vehicle Manufacturers, J.P. Morgan Asset Management; data as of June 30, 2022.

[5] From 2024 on, EVs will not be eligible for tax credits if the battery components are made by a "foreign entity of concern," including Russia and China.

Global capital flows have yet to recover to pre-financial crisis levels

Exhibit 7: % of global GDP

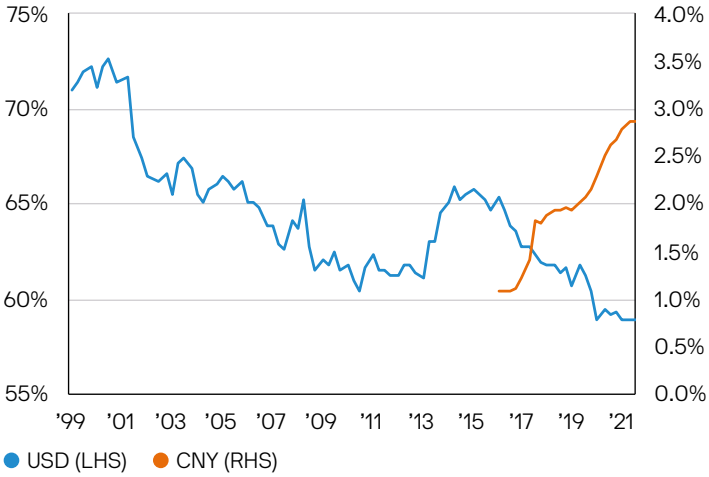


Source: IMF, J.P. Morgan Asset Management; data as of August 30, 2022.

China's share of global FX reserves has risen sharply, but the U.S. dollar faces no close rival as a global reserve currency

Exhibit 8: U.S. dollar and Chinese RMB share of foreign exchange reserves

Allocated global reserves, % of total



Source: IMF COFER, FactSet, J.P. Morgan Asset Management; data as of June 30, 2022.

At the core of financial market integration is the U.S. dollar, which plays a key role as a facilitator of globalization. No currency is more dominant in global trade, global payments or global debt, and we don't foresee this changing. The dollar is by far the leading reserve currency, with no close rivals. This is likely to be the case as long as the stability of the U.S. economy remains unmatched.

However, in the coming decades, while the dollar may not lose its dominant position, it may be eroded as market participants seek to reduce their reliance on a single currency in an increasingly multi-polar world. In an extreme (if unlikely) scenario, there might be no dominant currency and multiple payment systems.

Could the renminbi (RMB) challenge the dollar as the global reserve currency? Not within our forecast horizon. Although China's share of global foreign exchange reserves (2.9%) has increased sharply in the last four years, it remains a fraction of the U.S. dollar's (58.9%) and less than the combined holdings of the Australian and Canadian dollars in foreign exchange reserves (4.4%) (**Exhibit 8**).

For the RMB to become a reserve currency, significant changes would be needed in China's financial infrastructure. At minimum, they would require the liberalization of the current account and the removal of restrictions on cross-border capital flows, enabling market forces to determine the currency's value. Greater investor confidence in China's rule of law and legal system would also be necessary. We think the risk that the RMB overtakes the USD in the next 10 to 15 years is very low.

In an extreme situation, if a single currency such as the RMB did rise to a level that would rival the U.S. dollar, we'd expect further fracturing of the global system – and an increasingly multi-polar world as U.S. dollar hegemony came to an end.

The frequent use of financial sanctions by the U.S. might diminish the dollar's dominance (along with the political influence of the U.S. government) while promoting the use of an alternative currency like the RMB. But a similar outcome could be achieved by using multiple currencies that have a perceived lower economic risk. For example, we could see diversification in reserve holdings to other "safe" currencies, such as the Australian or Canadian dollar.

To reduce reliance on the dollar and diminish U.S. influence, market participants would need to develop alternative payment systems to process cross-border flows. This would enable transactions among countries outside of the U.S. sphere of influence. It would also increase convertibility in currency pairs that are currently less liquid. However, the share of global trade covered by such a parallel system is likely to remain very small over the next decade.

Of our three globalization scenarios, a multi-polar outcome would be more likely to emerge from a world served by diversified reserve currencies and alternative payment systems.

Could a new wave of government regulation rein in further globalization?

Trends in government regulation and taxation will also shape the course of globalization. For example, governments across both developed and emerging economies have committed to reducing carbon emissions and greenhouse gases.

Given that climate change is a profoundly global issue, there is clearly scope for greater global collaboration in tackling the challenge of the energy transition. Yet each country plans to move at its own pace, with varied degrees of implementation and enforcement. A nonstandard approach to addressing climate change could create new barriers to trade as regulatory requirements in one economy are forced upon another.

Emission trading schemes and cross-border carbon taxes, such as those developed by the European Union (EU), are two areas where friction may emerge. Both China and Europe have emission trading schemes, with very different prices for carbon. In Europe, the price of emitted carbon, or its equivalent, is USD 102 per ton, about 10 times higher than the price in China. These are unlikely to converge until global standards are adopted or until all economies' paths to net-zero are synced, allowing emission trading schemes to be calibrated to achieve carbon reduction goals.

Before that occurs, an unstable equilibrium may prevail. In such a scenario, polluters could maintain an economic edge, pushing disadvantaged industries to pressure policymakers and/or regulators for relief. This could lead to further fragmentation in the global economy.

Alternatively, environmental standards and emissions schemes may develop at a regional level, facilitating greater regional trade and bolstering the forces of globalization. Certainly, climate change policies and initiatives would benefit from a global approach. Successfully implemented, they would support a renewed globalization scenario.

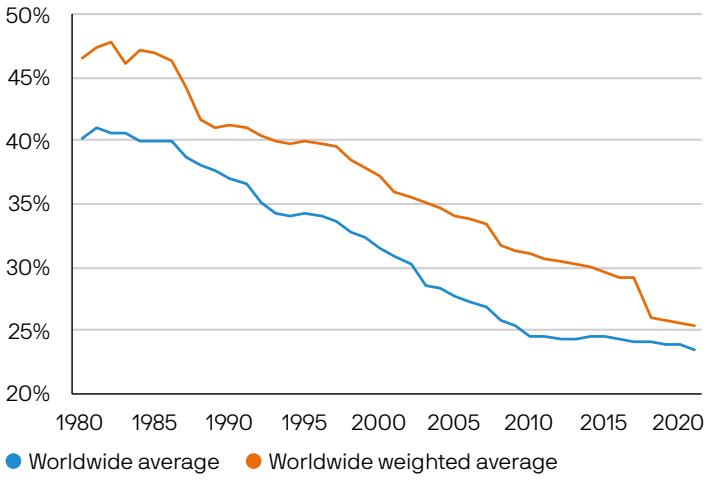
However, in recent years, adverse events impacting global food production (notably the Russia-Ukraine war) have led to growing demands for protectionism to ensure food security. Several countries have banned the export of key food items as global scarcity has increased. This issue of food security will run to a timeline of years rather than months. In the meantime, it could create headwinds to global trade.

In the area of taxation, to attract capital, countries have competed to reduce corporate taxes, especially on mobile factors of production, making up lost revenue by increasing tax rates on immobile factors of production. Globalization has both incentivized and been boosted by global tax competition. Between 1980 and 2020, the statutory corporate tax rate weighted by GDP fell from 46.5% to 25.9% (**Exhibit 9**).[6]

In recent decades, countries have competed to lower corporate taxes

Exhibit 9: Global corporate tax rates

Statutory weighted and unweighted corporate income tax rates



Tax Foundation, J.P. Morgan Asset Management; data as of December 2021. Footnote: The worldwide average represents the average statutory corporate income tax rate measured across 180 jurisdictions for which GDP data are available between 1980 and 2021, per the Tax Foundation data. The worldwide weighted average represents the average statutory corporate income tax rate weighted by GDP. For years prior to 2021, the number of countries included in calculated averages varies by year due to missing corporate tax rates (i.e., the 1980 average includes statutory corporate income tax rates of 73 jurisdictions, compared with 180 jurisdictions in 2021).

As multinational corporations have taken advantage of beneficial tax rates by transferring their taxable revenue to lower tax jurisdictions, some have called for a global minimum corporate tax. In late 2021, leaders of G20 nations agreed in principle to a 15% minimum global corporate tax rate.

Some have argued that such a minimal global corporate tax would stall globalization by limiting foreign direct investment (FDI) and force a reduction in operations and employment in regions with lower tax rates. But taxes aren't the only factor driving investment decisions. They may be outweighed by the quality of infrastructure, access to resources or nonfinancial factors such as language and culture. If the global economy moves from a state of tax competition to tax harmonization, it should not in itself limit globalization.

[6] "Corporate Tax Rates around the World," Tax Foundation, December 2020.

Another issue in an increasingly digitized globalized economy, data privacy and security, has attracted increased regulatory scrutiny of technology companies. In the U.S., antitrust legislation has already been introduced, while regulations to enhance transparency in the EU are in train. The rise of "digital sovereignty" as a national security issue suggests greater regulation may lie ahead. Case in point: Some OECD countries are considering implementation of a tax on digital services. Differing attitudes toward controlling and protecting data could create divisions across nations, in turn affecting the ability of technology companies to operate globally.

Of all the issues covered here, the regulatory backdrop has the greatest potential to create barriers related to national security or to environmental, social and governance (ESG) issues. Regulations could lead to a more fragmented economy and higher costs for consumers and companies. Over the medium term, we do expect further regulatory-driven fragmentation. But over the longer term, political dynamics could shift, spurring global collaboration to address important issues.

Investment implications

Globalization will not unravel or unwind. But as trading blocs become increasingly politically aligned and fragmented, the resulting risk is a global economy that is less efficient, with higher inflation, higher interest rates and lower equity valuations. However, over the long term, we expect a fragmented global economy will reach a new trade equilibrium, one that allows for some restored efficiencies and inflation falling back to central bank targets.

We note that companies in general have benefited from increasing globalization, and their economic incentives are unlikely to have changed. What will change are the political forces acting on those incentives, and they may shape corporate behavior.

Regional winners and losers

From an investment standpoint, it is difficult to identify any pure winners in a more fragmented world where economic growth may be lower and inflation higher. Still, the realignment of trade flows and imposition of various investment and trade restrictions will create regional winners and losers. Low wage economies that have specialized in labor-intensive manufacturing look to be some of the most vulnerable. Meanwhile, the world's poorest economies yet to partake in export-driven growth (especially those without an abundance of natural resources or sufficient infrastructure) could see their development curbed.

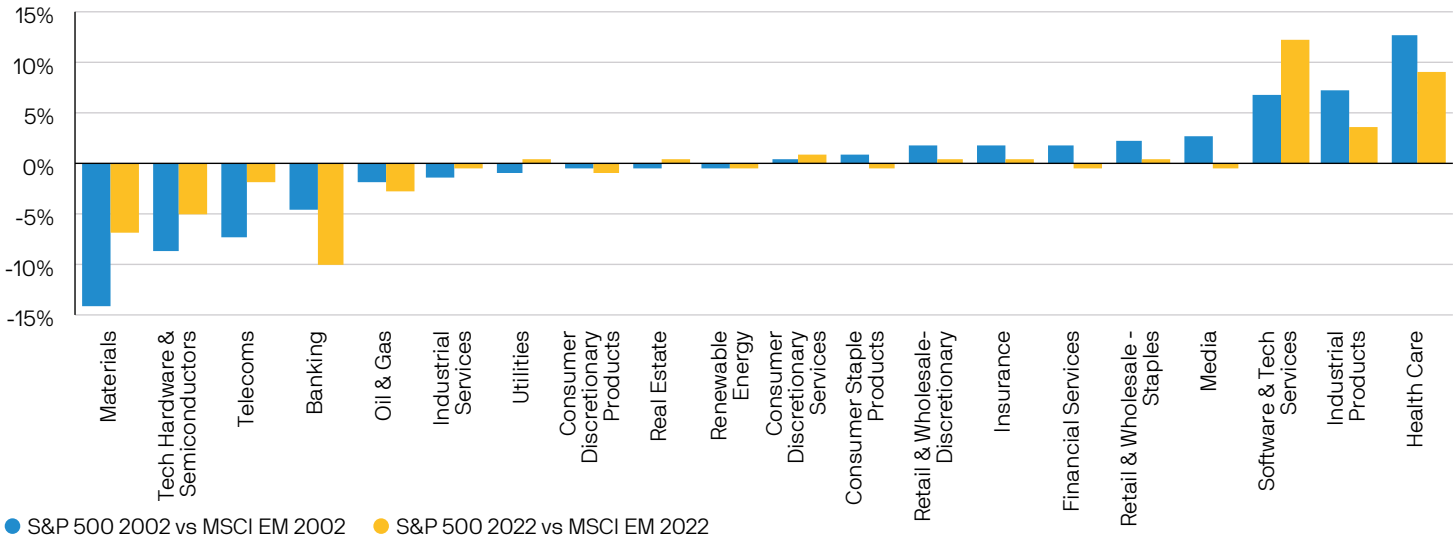
As discussed in more detail in a recent paper by our colleagues in the Strategic Investment Advisory Group, "The lifeboat economy: Implications of a fracturing world order,"[7] the increased use of both tariff and nontariff measures between China and its trading partners, particularly the U.S. and Europe, is aimed at reducing interdependence and could lead to lower levels of trade and investment flows over the longer term. In such a scenario, other economies may see benefits. The end of the low wage arbitrage in China has already benefited the wider Asian region as production has moved to relatively lower cost markets close to the source of final demand. The shift to greater supply chain diversification could accelerate this trend, especially for manufacturers of consumable products such as textiles and technology hardware. It could also support infrastructure investment, such as in ports, to bolster shifting supply chains.

However, many economies, especially viewed through the lens of emerging or developed, will continue to both rely on and compete with one another. For example, the flow of technological hardware and materials will run from emerging to developed economies, while software and health care services will likely flow in the other direction, at least in the medium term. Longer term, the narrowing of the gap between the U.S. and emerging market index weights in sectors such as health care, insurance and financial services could highlight the convergence in specializations (**Exhibit 10**).

[7] "The lifeboat economy: Implications of a fracturing world order," Strategic Investment Advisory Group, J.P. Morgan Asset Management, September 2022.

In various sectors, the gap between U.S. and emerging market index weights has narrowed

Exhibit 10: International trade



Source: Bloomberg, MSCI, S&P Global, J.P. Morgan Asset Management; data as of July 2022, leveraging Bloomberg Industry Classification Standard (BICS).

Services to take the lead

Trade in services should continue to expand in a global economy that is more virtual, despite polarization. Services industries should benefit from investment in skilled labor and labor-saving technologies. Economies such as India and the Philippines, with high rates of English speakers and established infrastructure, may gain in attracting foreign capital. While the rise of digital service taxes remains a risk, growth in services trade looks set to dominate trade growth going forward.

While the technology sector broadly may carry a heavier regulatory burden in the future, certain technology companies will benefit from new demands. Most notably, the ongoing digitization of the global economy has created a growing need for cybersecurity, further amplified by recent geopolitical tensions. Even before the Russian invasion of Ukraine, it was estimated that cybersecurity spending would surpass USD 200 billion by 2024, a 43% increase from 2021 levels.[8] As the threat and costliness of security breaches worsen, companies and governments are highly incentivized to invest in security protection. Similarly, defense sectors will benefit from a more fragmented world.

Meanwhile, robotics and automation will become increasingly important as labor replacements while the related technology becomes cheaper and access to low wage labor becomes more limited. We anticipate this trend will continue as aging demographics in developed countries continues to place a strain on the labor supply and production shifts to serve growth in new markets.

Commodities, the path to net-zero, higher inflation in the near term

The focus on building domestic energy security, though it may add to economic fragmentation, bodes well for traditional commodities and renewables. In most instances, green energy is an important source of local energy. Economies will have to invest heavily if they are to achieve their decarbonization goals and reduce dependency on unreliable energy sources. In the interim, demand for traditional commodities such as oil and natural gas will continue to drive growth in those sectors as economies seek to diversify and reduce reliance on unfriendly exporters.

Market participants now see food security, along with energy security, as major risks, as both politics and climate impact the supply and price of food. Agricultural machinery manufacturing and biotechnology that can raise crop yields may well find growing demand.

As trade relationships are redrawn, the global economy will move away from maximizing economies of scale. Higher commodity and materials prices will prevail, potentially keeping headline inflation measures elevated relative to history. Over time, we believe a multi-polar world will find new equilibriums and push elevated inflation lower as supply chains and technology adapt to this new environment.

[8] Dorsey Wright, "Investing in Cybersecurity," Nasdaq, October 21, 2021.

Conclusion

The global economy has clearly benefited from the rise in globalization in the last 70 years. However, the benefits have not been felt evenly across or within economies, and the marginal gains now (and in the future) are diminished. Protectionist headwinds from nationalism may not fade anytime soon, adding to the challenge of further economic and financial integration. But we see this as a reconfiguration rather than a reversal of the current economic system, and one that creates a multi-polar world. In any disruptive environment, there will be winners and losers – new opportunities and risks – as investors adapt and respond to change.

Demographics and destiny

The challenges and opportunities of a 10 billion person planet

Authors

Gabriela Santos
Global Market Strategist
Global Market Insights Strategy

Sylvia Sheng, Ph.D.
Global Strategist
Multi-Asset Solutions

Sasha Abrahams
Research Analyst
Sustainable Investing

Jason DeSena
Head of Research and Analytics
Alternatives Investment Strategy & Solutions

Vincent Juvyns
Global Market Strategist
Global Market Insights Strategy

Maria Paola Toschi
Global Strategist
Global Market Insights Strategy

Preeti Parashar
Global Strategist
Multi-Asset Solutions

Olivia Schubert
Research Analyst
Global Market Insights Strategy

Nandini Ramakrishnan
Macro Strategist
Emerging Markets and Asia Pacific Equities

Jordan Stewart
Portfolio Manager
Multi-Asset Solutions

Paul Summer
Global Alternatives Marketing and
Communications Strategy

In brief

- Within our Long-Term Capital Market Assumptions time frame, a larger global population will create dramatic challenges – and opportunities. Of primary importance for investors: demographics' impact on economic growth, consumption patterns, infrastructure needs and the harvest and use of finite resources.
- Optimal policies can convert demographic challenges into demographic opportunities. Faster population growth does not guarantee faster GDP growth or better investment opportunities.Harnessing the demographic dividend will take strong national and corporate governance frameworks, good infrastructure and integration into global supply chains.
- Despite the challenge of income inequality, investment opportunities to service a fast-growing population of emerging market (EM) consumers in their home countries are abundant. Younger consumers also boost consumption. EM consumers' rise should accelerate consumption growth for clothing, educational services and transportation.
- More people mean more intensive use of energy, water, food, ecosystems and infrastructure. To alleviate the stress on our planet, adequate and timely investment is needed in sustainable energy and agriculture, reforestation and green infrastructure. Opportunities can also be found in younger economies leapfrogging over those with older infrastructure.
- We create scores based on national policies, corporate governance, migratory policies and energy transition momentum to help inform better investment decisions.
- In a world of higher interest rates, sound policy will be the key to attracting scarcer funding, creating winners and losers. Our scores and investment themes may help investors decide where they can best take advantage of this population growth.

Ten billion people: A potential dividend or a looming liability?

The world's population has tripled since 1950, from 2.6 billion to 7.8 billion people.[1] Within our Long-Term Capital Market Assumptions (LTCMA) time frame, it may reach 8.8 billion and, by 2056, 10 billion.[2] The sheer size of the population will create dramatic challenges – and opportunities. Of primary interest here: the impact of these changes on economic growth, future consumption patterns, infrastructure needs and the harvest and use of finite resources. In each area, we find investment implications.

Demographics will powerfully affect economics and investing. An economy with a rising proportion of young and working-age people (15–64) can deliver higher economic growth and higher GDP per capita – a "demographic dividend" – vs. an economy where more older adults may need social services. A young population can serve as a large labor pool and a long-term generator of tax receipts to fund older cohorts.[3]

Yet population growth poses important risks. An economy that fails to make the proper investments beforehand to incorporate productively a growing working-age population into the labor force, to build out sufficient infrastructure in time and to ensure the sustainable use of its finite natural resources could see disastrous consequences for social, political and economic stability.

These are the twin challenges and opportunities of a planet of 10 billion.

Our own work has focused on combining demographics with relevant policy indicators to generate a set of country scores that make national policies and demographics comparable. While many economies share broad demographic trends, their similarities end there. Different policy regimes can lead to diverse economic outcomes. We believe policy is a large piece of the solution of how to turn challenge into opportunity, the key to unlocking an economy's fate – and what likely separates winners from losers in the investment space.

In our view, four policy areas are most crucial: governance (public and corporate), education, immigrant integration and energy transition preparedness. Our scores aggregate relevant national, corporate, energy and population indicators to help identify the economies best positioned to benefit from their demographic profile. Investors may use this multifaceted approach to identify the places likeliest to reap the demographic dividend.

It will come as no surprise that there are major investment possibilities in fulfilling emerging market (EM) consumers' rising demand for goods and services. We thus examine likely changes ahead in key "young" economies' consumption patterns.

These economies share the need for infrastructure: water access, power generation, waste management, transportation and communications – the essentials of life and economies. These areas offer enormous investment possibilities. We consider how, in the critical areas of infrastructure and resource use, developing sustainable solutions should support a new and growing range of real assets that may offer attractive returns over the next 10 to 15 years. The sustainability theme should shape many other areas of investment as well: sustainable materials and design, food, agriculture, water systems, and better recycling and reusability of materials and resources.

"Younger" and "older" economies' policy and the demographic dividend

Our story of potential economic growth and opportunity begins with expanding populations. Three factors affect population growth. First, fertility rates, which should still leave India and China as the most populous economies in 2050, even as China's population declines. International migration is second: The movement of humans will reshape demographics, as international migrants number about 281 million and account for one-quarter of the net annual change in economies' populations.[4] Life expectancy is third: It is projected to reach 77 years at birth by 2050,[5] when 25% of the people in Europe and North America could be over 65, while the proportion of children is expected to remain stable. Europe could have the largest dependency ratio – the number of adults 65-plus and children (birth to 14) divided by the working-age population.[6]

1 Based on the U.S. Census Bureau's population estimates, as of December 2021.
2 Although population growth is projected to be slower than in previous periods. Forecasts based on U.S. Census Bureau data, which imply a slowdown to 0.8% over the next 15 years vs. an increase of 1.1% over the past 15 years and 1.5% in 1950.
3 Indeed, demographic forecasts are important to our LTCMA economic growth assumptions. Along with capital and total factor productivity, demographics affects our employment and labor input estimates. Michael Hood and David Kelly, "Macroeconomic Assumptions: Inching forward: Lingering inflation, moderate growth," 2023 Long-Term Capital Market Assumptions, J.P. Morgan Asset Management, November 2022.
4 United Nations (U.N.), 2010–20 data, authors' calculations. In high income economies, this proportion is 53%, compared with low income economies, where net migration contributes a 7% decline to the annual population growth rate, on average.
5 Up from the current average life expectancy of 73 years, Our World in Data, 2022.
6 Changes in the dependency ratio can indicate effects on social and economic development, and likely trends in the need for social support. U.N. Statistics Division, retrieved September 2022.

Sub-Saharan Africa, the Middle East and parts of Asia should see their working-age populations grow the most and should have low old-age dependency ratios; we call them "younger." We call economies with high dependency ratios "older." Those with average ratios we call "average age"[7] (**Exhibit 1**).

We bucket economies into cohorts: Older, average and younger

Exhibit 1: Economies by deviation from global average old-age dependency ratio

Older	Average	Younger
Australia	Brazil	Bahrain
Canada	Colombia	Egypt
Chile	India	Indonesia
China	Malaysia	Kenya
France	Mexico	Nigeria
Germany	Morocco	Philippines
Hong Kong	South Korea	Qatar
Italy	Turkey	Saudi Arabia
Japan	Vietnam	South Africa
Spain		UAE
Taiwan		
Thailand		
UK		
U.S.		

Source: World Bank, J.P. Morgan Asset Management; data as of December 2021. Old-age dependency ratio is the number of people aged 65-plus per 100 people of working age (16–64).

Many, but not all, emerging markets have younger populations.[8] History suggests caution, however, in translating population growth alone, or youthful emerging market demographics, into future economic growth and market returns. In 2000, 17 major EM economies were projected to have the fastest population growth over the next 20 years, but just eight ended up having faster annualized GDP growth than the global average, and just one – Saudi Arabia – delivered stronger than average equity market returns.[9] The rest have yet to put their demographic advantage to work.

For emerging markets to harness the demographic dividend, we believe they need strong institutions and governance frameworks in place beforehand. In their absence, a potential boon can turn into a liability. A body of research shows that rule of law, anti-corruption practices, economic openness and quality public education are crucial preconditions for the productive employment of the labor force and the optimal allocation of resources.[10]

These are hard to measure. There is no set, quantifiable definition of "governance," but we combine industry-leading indicators that seek to provide a narrow enough, standardized, comparable definition of key governance dimensions. Our Top-Down score identifies the younger economies that have the greatest likelihood of succeeding over the next 10 to 15 years.

Our models: Combining demographics and policy

Demographics is not the only reason to invest (or not) in a market, but it's particularly relevant to emerging markets, which tend to have younger populations. We aggregate demographics with other policy metrics into a series of scores (**Exhibit 2**). We recommend investors use this type of multifaceted approach when seeking to capitalize on the demographic dividend rather than relying on demographics alone.

[7] The ratios are based on standard deviations from the global average: Old is defined as half a standard deviation or more above the average global dependency ratio. Average is within half a standard deviation of that average, and young is half a standard deviation or less below the global average.

[8] We define as emerging markets those included in the MSCI Emerging Markets Index, the MSCI Frontier Equity Index and/or those with a minimum weight of 3% in the J.P. Morgan Emerging Market Bond Index–Diversified (EMBIG). Some are in the LTCMA universe: India, Mexico, South Africa. Outside LTCMA coverage, regions expected to see the lowest dependency ratios include sub-Saharan Africa, Central and South Asia, and North Africa and West Asia.

[9] The eight economies were China, Vietnam, Indonesia, India, Pakistan, Malaysia, Egypt and the Philippines.

[10] Academic studies have shown a strong correlation among economic development (measured as income per capita), economic growth (output per worker) and the quality of governance frameworks in place. Daniel Kaufmann and Aart Kraay, "Growth Without Governance," Policy Research Working Paper, World Bank Institute and the Development Research Group, November 2002; Robert E. Hall and Charles I. Jones, "Why Do Some Countries Produce So Much More Output per Worker than Others?" NBER Working Paper no. 6564, June 1999.

Our scores offer investors a multifaceted approach to capitalize on the demographic and migration dividends

Exhibit 2: The scores and what they measure

Score	Purpose	What it measures
Top-Down score	To aggregate key national policies and institutions correlated with economic success for a standardized, comparable picture. Higher score indicates stronger sovereign fundamentals that may make sovereign asset classes (government bonds, currencies) more appealing. Can also be useful in determining the cost of capital in modeling an asset's expected returns.	**Rule of law and corruption perception**: Extent to which economic agents and governments respect, trust and abide by national rules and norms (including quality of contract enforcement, property rights, police, courts, likelihood of crime and violence).[11] **Economic freedom**: Regulatory efficiency and openness of an economy (including trade freedom, tax burden, judicial effectiveness). **Education**: Average years of schooling and projected returns on that education.
Bottom-Up score	To capture an aggregate of bottom-up corporate governance for economies. Each is ranked by quintile based on its average score. May make investing in specific companies more appealing because of the quality of corporate governance.	**Levels of corporate governance**, using relevant components from proprietary 40-question ESG checklist that J.P. Morgan Asset Management Global Equities researchers apply to 3,000+ companies. Captures negative governance responses by companies under coverage, represented by an average per economy. Higher quintiles reflect stronger aggregate governance.
Migration-Productivity score	To capture the extent to which economies can economically capitalize on migratory trends. May make investing in an economy more appealing.	**Strength and composition of net migration** (net migration rate, ratio of migrant to domestic working-age populations, human capital of migrants, reasons for migration), quality and trend of migrant integration, brain drain and displacement rankings, and remittance flows, summing up to the strength of an economy's potential migration dividend.
Energy Transition Momentum score	To capture the potential trajectory of green energy in different economies, based on current transition readiness and performance. Higher score indicates momentum in a greener direction from a low starting point. May suggest attractive green infrastructure opportunities.	**Transition readiness**: Energy system structure, capex, regulations/political commitment, infrastructure and innovative business environment, and institutions. Boost given to countries considered "leapfrog" and "emerging," defined as having high transition readiness but relatively low current level (in energy access, environmental sustainability and economic development).

Source: J.P. Morgan Asset Management; scores as of September 30, 2022. Top-Down score: World Bank Worldwide Governance Indicator of the Rule of Law (40%); Transparency International Corruption Perception Indicator (20%); Heritage Foundation Index of Economic Freedom (20%); Penn World Table Human Capital Index (20%). Bottom-Up score: J.P. Morgan Asset Management Global Equity Research; includes some coverage bias since the Global Equities team has more engagement and interaction in markets with larger numbers of investible companies. Migration-Productivity score: Average expected net migration rate (2022–50) from U.S. Census; U.N. Department of Economic and Social Affairs Population Division ratio of working-age migrants to domestic population; Penn World Table Human Capital Index; data points are overlaid with the Migrant Integration Policy Index, and brain drain and displacement rankings taken from the Fragile States Index. Energy Momentum Transition score: World Economic Forum Energy Transition readiness index (a measure of capital and investment, energy system structure, human capital and consumer participation, infrastructure, institutions and governance) boost given to countries classified as "leapfrog" and "emerging" based on current performance.

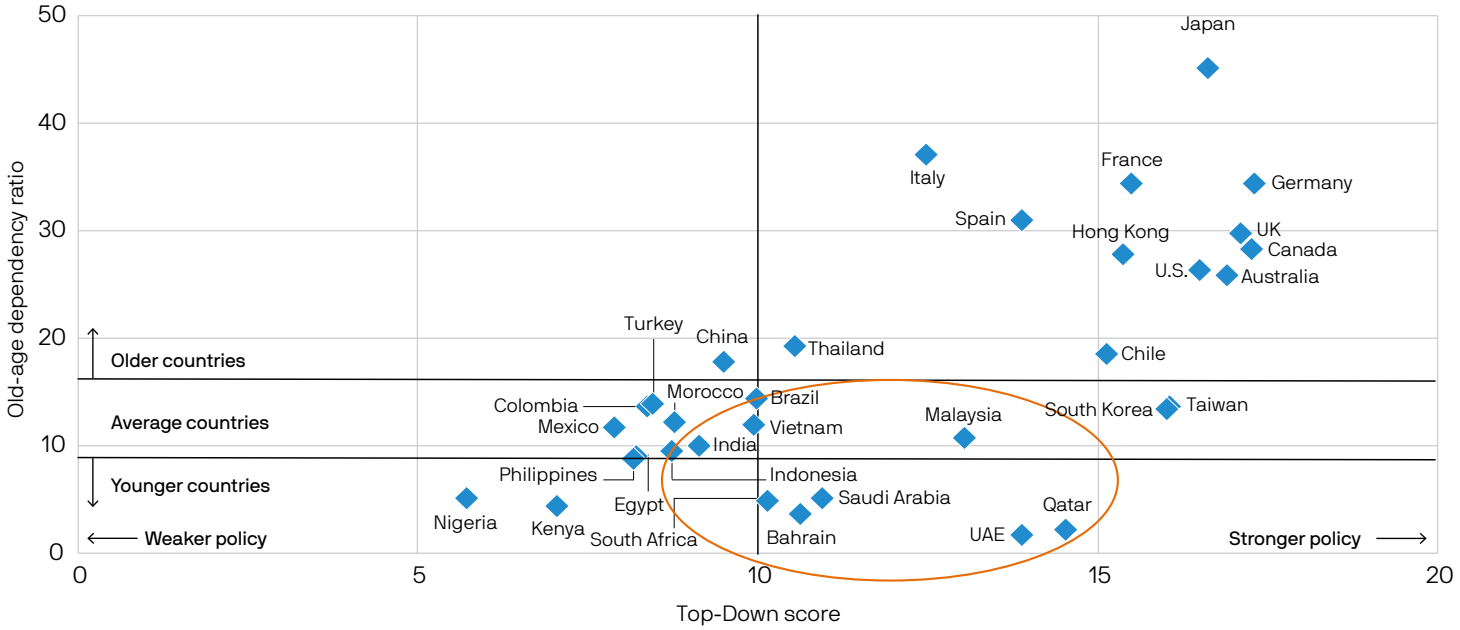
Combining demographics with Top-Down scores

Where in emerging economies might investors find both demographic promise and the policy supports to realize the promise of growth and opportunity? Here, we identify EM economies with favorable demographics (low old-age dependency ratios) and solid Top-Down scores, suggesting which economies are on a path to becoming standouts in the EM universe (**Exhibit 3**).

[11] Daniel Kauffmann, Aart Kraay and Massimo Mastruzzi, "The Worldwide Governance Indicators: Methodology and Analytical Issues," World Bank Policy Research Working Paper no. 5430, September 2010.

Economies combining younger populations with good macro governance and education look most set to harness the demographic dividend

Exhibit 3: Top-Down score vs. demographics (old-age dependency ratio, % of population)



Source: Heritage Foundation, Penn World Table (PWT), Transparency International, World Bank Governance Indicators (WGI), J.P. Morgan Asset Management. Old-age dependency ratio is the number of people aged 65+ per 100 people of working age (ages 20–64). Top-Down score is based on J.P. Morgan Asset Management country-level analysis. It is a blended governance and education score based on 40% WGI Rule of Law (measures the extent to which agents have confidence in and abide by the rules of society), 20% Index of Economic Freedom (measures jurisdictions against each other in terms of parameters such as trade freedom, tax burden, judicial effectiveness, etc.), 20% Corruption Perception Index (measures how corrupt each country's public sector is perceived to be), 20% PWT Human Capital Index (measures average years of schooling and an assumed rate of return to education). Score components as of Heritage (2021), PWT (2021), WGI (2021).

We note:

- **India, Vietnam, Malaysia, South Africa, Saudi Arabia** and the **United Arab Emirates (UAE)** show demographic promise as well as institutional strength. They are likely to gain further importance in EM benchmarks and analysis.
- **India** and **Vietnam** have better governance and education frameworks and, critically, close integration into regional and global supply chains. Their relatively large working-age populations mean that labor-intensive industries may benefit from economies of scale and find solid domestic demand. In contrast, many sub-Saharan economies have historically struggled to accumulate physical capital (tools, machines, infrastructure), skills and education on par with brisk population growth. Much of the region is still reliant on commodity exports and would need to diversify economically and better integrate into a continent-wide market to harness a demographic dividend.
- **Nigeria** and **Kenya** have demographic promise but would need to improve on the policy front to realize their economic growth potential.
- **China** was an exception – able to generate above-average growth rates for 30 years with a large, young working-age population, yet with previously low scores on traditional measures of macro governance. Despite its policy uncertainty, China's uniquely large market has drawn foreign capital from investors who saw the rewards as worth the risk. Now, China's demographic dividend is fading, but its economic growth could potentially be improved through structural reforms.

Interplay between macroeconomic policies and corporate governance

Complementing Top-Down scores with Bottom-Up scores helps paint a more complete picture for investors, given the interplay between national and corporate governance (**Exhibit 4**). A high Bottom-Up score may give an investor greater conviction about an equity or credit investment in an economy vs. basing a decision on a high Top-Down score alone. To the contrary, a high Bottom-Up score may be why an equity or credit investor would tolerate weaker macroeconomics in exchange for a strong opportunity in a specific company in a country.

Several insights jump out when comparing an economy's two scores; Malaysia scores well on both, supporting a decision to invest in the country. Saudi Arabia has a relatively good Top-Down score but does not do as well on its Bottom-Up score, highlighting that corporate governance will be key for investors selecting equity investments there. South Korea and the UAE screen extremely well on the Top-Down score but have bottom two quintile Bottom-Up scores. There, we see support for sectors linked to economic growth (in the form of a lower cost of capital, currency stability and healthy sovereign solvency), but a more discerning approach would be required to choose individual companies in which to invest.

The migration dividend: A crucial boost for older economies, a potential drag on younger ones

As noted, another important layer in forecasting an economy's potential to capitalize on its demographic dividend is international net migration. A migration dividend can help some older economies where growth is stagnating,[12] while dragging on some younger countries' economies through brain drain as lowered economic growth rates encourage further migratory outflows.[13] Brain drain disrupts human capital accumulation and can reduce productivity growth so severely that the damage may be permanent.[14] Our Migration-Productivity score draws together migrant demographics, reasons for migration, volume of remittance flows, and national and local institutional strength (**Exhibit 5**).

Bottom-Up scores indicate where corporate assets may be more appealing

Exhibit 4: Top-Down and Bottom-Up scores; shading based on quintile rank (red = lowest, green = highest)

Market	Top-Down score	Bottom-Up score
Germany		
Canada		
UK		
Australia		
Japan		
U.S.		
South Korea		
Taiwan		
France		
Hong Kong		
Chile		
Qatar		
UAE		
Spain		
Malaysia		
Italy		
Saudi Arabia		
Bahrain		
Thailand		
South Africa		
Brazil		
Vietnam		
China		
India		
Morocco		
Indonesia		
Turkey		
Colombia		
Egypt		
Philippines		
Mexico		
Kenya		
Nigeria		

Source: Heritage Foundation, Penn World Table, Transparency International, World Bank Worldwide Governance Indicators, J.P. Morgan Asset Management; data as of 2021.

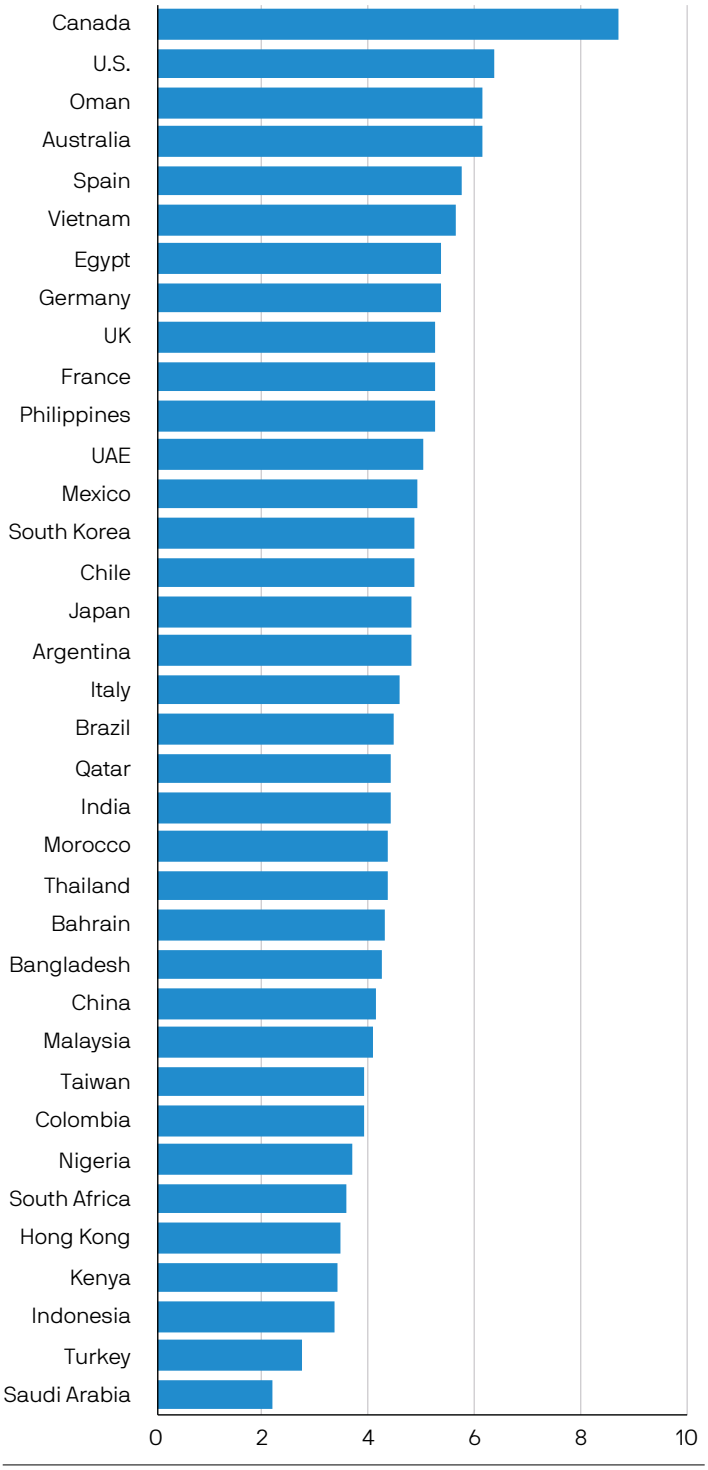
[12] An academic consensus supports the view that migration can be hugely beneficial to an economy's productivity and growth, via knowledge and skills transfer, improving labor market efficiency and migrants' disproportionately high fiscal contributions. Hillel Rapoport and Dany Bahar, "Migrants are key to productivity gains for countries," London School of Economics and Political Science, June 2018; George J. Borjas, "Does Immigration Grease the Wheels of the Labor Market?" Brookings Papers on Economic Activity 2001, no. 1 (2001); Jonathan Portes, "Immigration has made the UK more productive and prosperous – and will again in the future," UK in a Changing Europe, October 2018.

[13] Low scoring economies such as Indonesia and Mexico have negative net migration rates and are hit hard by brain drain. Likewise, despite its high net migration, Saudi Arabia's immigrant integration institutions (immigrant education, political participation, labor market mobility) rank worst.

[14] Still, net negative migration is not all bad. Remittances have increased sevenfold this century and now stand at USD 702 billion annually. The U.S. has remained the top source of remittances since 1995, primarily flowing to India and China, economies that would otherwise be losing out on their migration dividend.

Migration can help older economies with stagnation but may harm some younger economies

Exhibit 5: Migration-Productivity score



Source: J.P. Morgan Asset Management; data as of December 2021.

We can observe that **Europe**, the **U.S.** and **Canada**, older economies that attract strong net migration of working-age people, couple these inflows with institutions to integrate newcomers. This migration dividend can help offset the older age of their native populations. Migration has been a partial solution to the secular stagnation that has characterized these more developed, older economies, and it can continue to play this role.[15]

Consumption growth and the challenge of inequality

Across young EM economies, rising average income levels,[16] urbanization and favorable demographics are important drivers of strong consumption growth. Investment opportunities should be abundant for businesses that can capture the imagination and concerns of these new consumers.

But this promise is severely constrained by a major challenge: inequality.

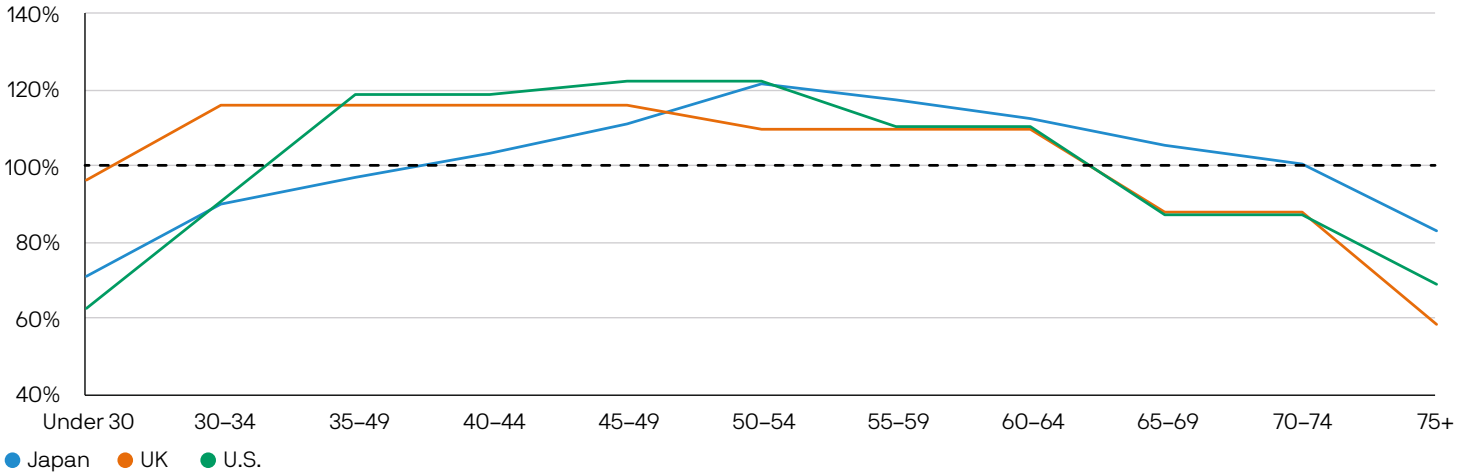
People can't spend money they don't have. The poorest half of the world's population earns only 8.5% of total income and owns 2% of total wealth.[17] Lowering fertility could help ease inequality. Economies that bring down fertility rates (for example, by promoting family planning) can achieve a fairer distribution of resources, increase income per capita more quickly[18] and offer substantial investment opportunities.

Despite the challenges of inequality, favorable demographics should nonetheless make EM consumers a key driver of global consumption growth in the next 10 to 15 years. Younger households (30 to 64 years old), which typically spend more than average (**Exhibit 6**), are expected to increase about 1 percentage point (ppt) as a share of the total in sub-Saharan Africa and Southeast Asia while declining about 4ppt in the U.S., the UK and Japan.[19]

[15] José Alves and Sandro Morgado, "Secular Stagnation: Is Immigration Part of the Solution?" CESifo Working Paper no. 9561, 2022.
[16] The association between consumption and income is stronger for low income compared with middle income economies. Paula-Elena Diacon and Liviu-George Maha, "The Relationship Between Income, Consumption and GDP: A Time Series, Cross-Country Analysis," *Procedia Economics and Finance* 23, July 2015.
[17] *World Inequality Report 2022*, World Inequality Lab, December 7, 2021.
[18] "Children per woman vs. GDP per capita, 2019," Our World in Data, 2019; Penn World Table 2.0; United Nations Population Division, 2015.
[19] The distribution of households by age is estimated using population forecasts from the U.S. Census Bureau for people age 20+.

Younger households tend to spend more – and their numbers are falling in developed economies

Exhibit 6: Household expenditures by age (% average)



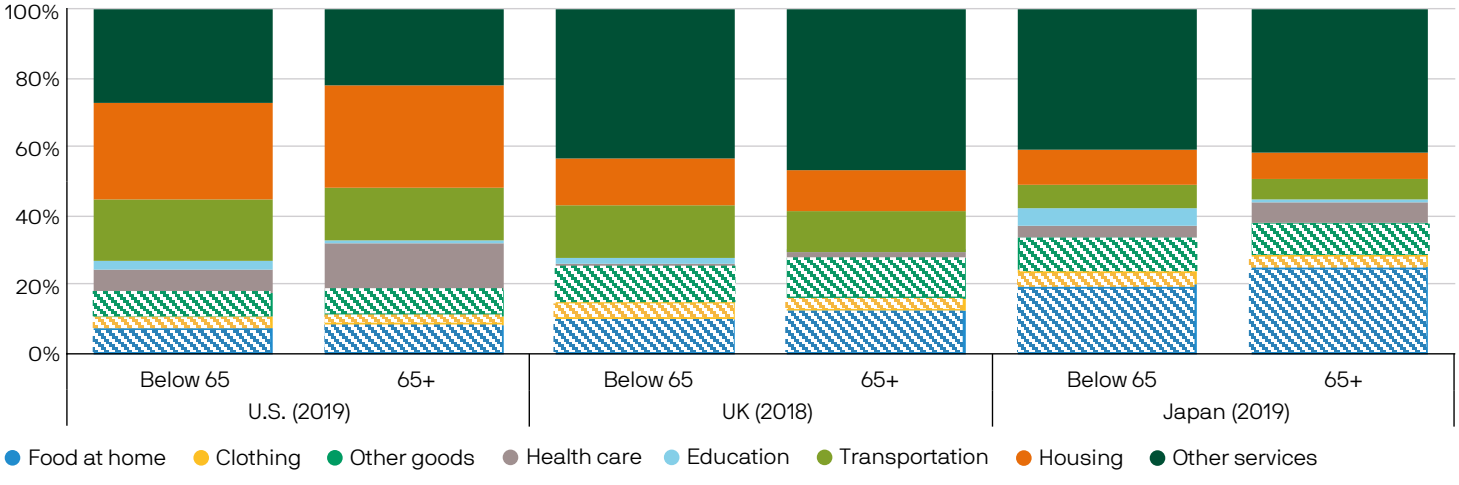
Source: Haver Analytics, MIAC Analytics, ONS, J.P. Morgan Asset Management; data as of December 2019 (U.S., Japan) and December 2018 (UK).

In which categories is EM consumer spending likely to pick up? As GDP per capita increases, we expect food's share of consumption to fall, manufactured goods' share to stay flat and services' share to rise.[20] Consumption patterns also vary with age. Looking across categories of purchases in developed countries (**Exhibit 7**), younger households spend disproportionately more on clothing, educational services and transportation, and less on food at home and medical services. A similar generational pattern, plus EM households' skew younger, would have clear implications for EM consumer markets.

The emergence of new consumers provides attractive investment opportunities. But the increase in consumption equally puts added pressure on current production systems and on the planet overall.

Younger households tend to spend more on clothing, education and transportation

Exhibit 7: Household expenditures by age (% average)



Source: Haver Analytics, Japan Ministry of Internal Affairs and Communication, ONS, J.P. Morgan Asset Management; data as of December 2019 (U.S., Japan) and December 2018 (UK).

[20] Margarida Duarte, "Manufacturing consumption, relative prices, and productivity," *Journal of Macroeconomics* 65, September 2020.

The strain of 10 billion people: Challenges as opportunities

Having considered the demographic and consumption changes ahead for a planet of 10 billion, we turn now to resource constraints and the possibility of investment opportunities.

The population-resource problem is a critical one. The rise of GDP per capita alongside population growth has and will continue to severely strain the earth's energy, water, food, ecosystems and infrastructure. Existing industries, institutions, supply chains and industrial processes need to be reimagined and revamped with adequate investment if the stress on the planet is to be mitigated. We examine those challenges and investment opportunities by theme.

Energy

Energy consumption is the primary source of human-induced greenhouse gas emissions (GGEs), and with more people comes greater energy demand.[21] It's been theorized that economic growth over time eventually brings about large gains in energy efficiency and the tapering of demand.[22] But from where the world stands today, efficiency gains would need to be dramatic – 2.8% in energy efficiency gains per year, well above the 1.8% of recent years – to keep global temperature rise by 2050 below the 2° Celsius threshold that may be catastrophic.[23] This will require significant investment to decarbonize and increase efficiency in all facets of the existing global energy system.

Rapid urbanization – city populations may be 1.5 times larger in 2045 – can offer efficiency gains by spurring structural changes such as transportation economies of scale and better, sustainable technologies.[24] But investment will be needed. Green buildings, electric vehicle charging stations, efficient street lighting and other, as yet undiscovered technologies[25] may all present investment opportunities.

Ships generate about 3% of the world's GGEs but are an essential component of global markets, carrying about 90% of all goods transported globally. Maritime trade volumes are expected to triple by 2050.[26] The industry's climate footprint could range from 90%–130% of 2008's emissions, based on a range of economic and energy scenarios.[27] Those trajectories are incompatible with the International Maritime Organization's emissions target: to halve GGEs by 2050. To achieve that, a significant share of greenhouse gas (GHG) reduction will need to come from the use of alternative fuels; about USD 1 trillion in capital will be needed in land-based and shipping infrastructure to shift from carbon- to hydrogen-based fuels. Investors can participate in this critical global transition.

Food

Without changes to consumption habits, some scientists estimate that in 2050, the planet's human population will use the equivalent of 2 planets' worth of renewable resources each year.[28] For a century, food supply has kept pace with population growth, thanks to chemical fertilizers, vast volumes of water and deforestation. The marginal gains of this model are rapidly diminishing due to GHG reduction commitments,[29] water scarcity, climate change and the need to protect forests as natural carbon sinks. The agriculture sector will need to invest massively in more efficient irrigation and GPS-guided fertilizer spreaders (and other new technologies) for crop yields to continue growing consistently yet sustainably.

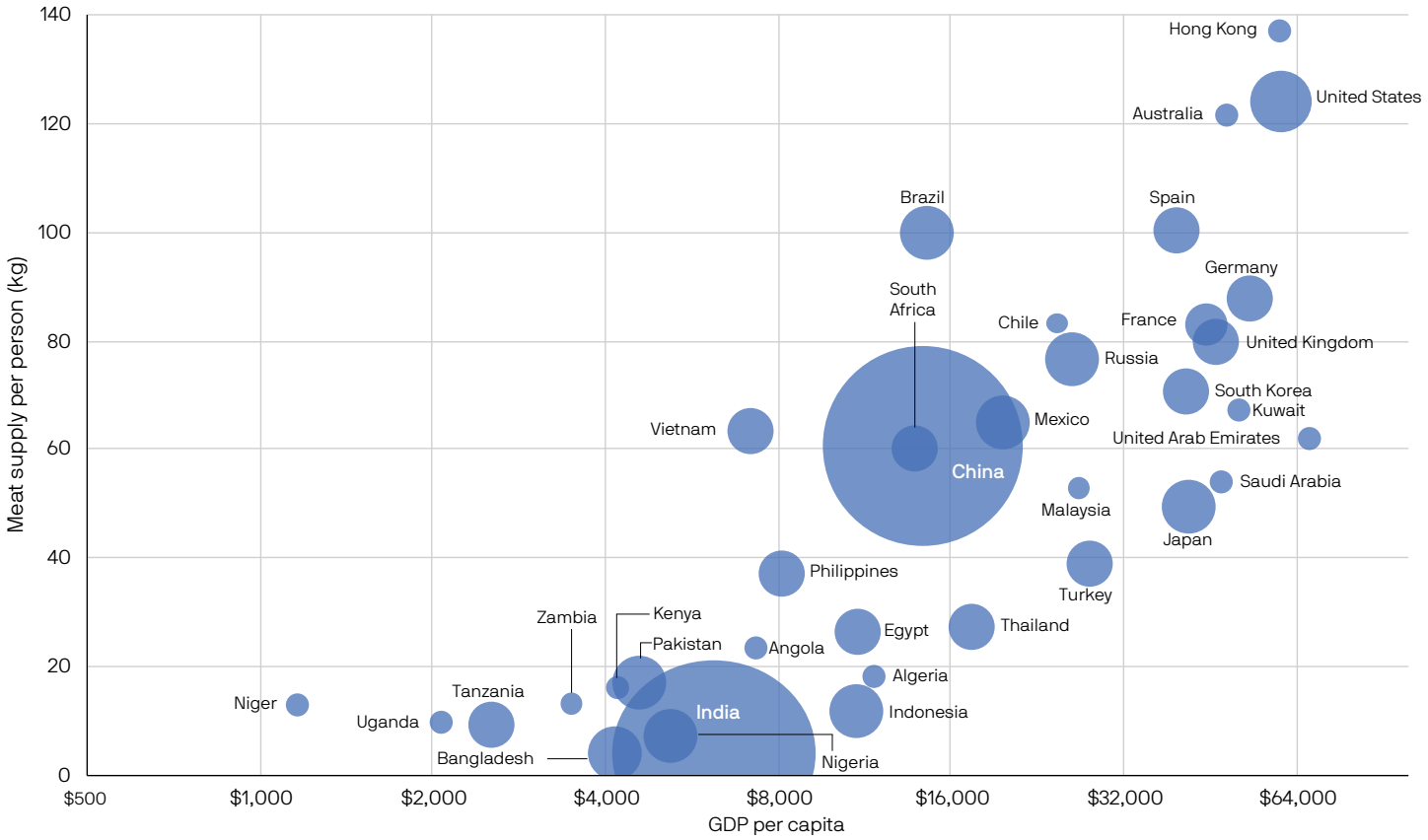
What is grown, farmed and consumed and how land is used must change, too. Meat production is most harmful in GGEs[30] and deforestation. The richest and oldest economies dominate in the consumption of animal protein, although as GDP per capita increases globally, so does the share of animal protein in human diets – growth that is not sustainable[31] (**Exhibit 8**).

Feeding 10 billion people sustainably will require fundamental dietary change – "less meat, more plants," a transition achievable through investment in alternative protein sources. Combined with new, sustainable agriculture technologies, the sector can reduce its carbon intensity and feed a surging world population.

[21] Angel Gurría, "Sustainable Energy Consumption and Climate Change," speech to Centre for International Governance Innovation, October 27, 2007.
[22] According to the Kuznets curve hypothesis, environmental degradation worsens early on as per capita income growth rises, but at a certain level of economic wealth this dynamic reverses and growth is accompanied by environmental improvement.
[23] "Global Energy Transformation: A Roadmap to 2050," International Renewable Energy Agency, 2018. A gain of 2.8% is far above recent years' annual efficiency gains of 1.8%.
[24] Yufeng Chen, Zhitao Zhu and Xi Yu, "How Urbanization Affects Energy-Environment Efficiency: Evidence from China," *Singapore Economic Review* 65, no. 6 (December 2020).
[25] "Rise of Renewables in Cities: Energy Solutions for the Urban Future," International Renewable Energy Agency, 2020.
[26] *Fourth IMO Greenhouse Gas Study*, International Maritime Organization, 2020.
[27] "World Nations Agree to at Least Halve Shipping Emissions by 2050," U.N. Climate Change News, April 14, 2018.
[28] "The Human Footprint," WWF, retrieved October 2022.
[29] The agriculture sector accounts for 18% of global GHG emissions. Countries have committed to reduce this, as they have for other top GHG-emitting industries. This will require reducing the use of chemical fertilizers.
[30] Mainly, this is due to the emission of methane, which has a higher warming potential than CO_2.
[31] Agricultural land covers only 10% of the earth's surface, but 77% of it is dedicated to the production of meat and dairy, disproportionate relative to their contribution to global calories and the protein supply (18% and 37%, respectively).

Consumption of animals is rooted in the oldest, richest nations

Exhibit 8: Share of calories from animal protein vs. GDP per capita, 2017 (dots sized by population)



Source: World Bank, U.N. Food and Agriculture Organization, Maddison Project Database 2020, J.P. Morgan Asset Management; data as of September 2022.

Ecosystems

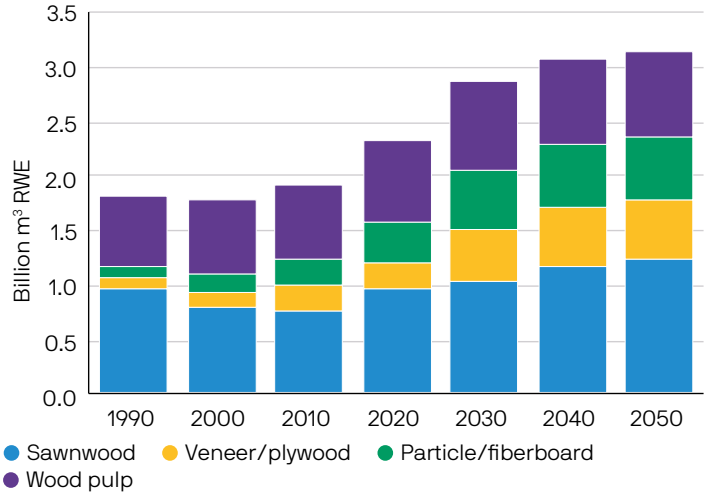
Forests are integral to sustaining life. They are home to half of the world's land-based species, and more than 1 billion people live in and around forests.[32] Population growth has intensified timber demand (the wood-based paneling trade has skyrocketed 800% in 30 years),[33] and global demand is expected to increase 37% by 2050, due in large part to urbanization and economic growth (**Exhibit 9**), driven by demand for new housing construction and new wood products.[34] This growing demand puts our planet at risk, given that forests are the second-largest storehouse of carbon (after oceans) and have a critical role to play in the fight against climate change.

Forest restoration is increasingly complex and expensive yet must move to the forefront of global priorities, given that its cost is a fraction of the risks of inaction.[35] This highlights the importance of managing forests for optimal health as a mitigant to wildfires. Investing in timber as an institutional asset goes back almost 50 years, but total institutional investment is estimated at less than USD 100 billion.[36] This figure should grow, given timber's sought-after historical investment attributes, such as consistent yield, inflation protection and public equity diversification. But this is only part of the story. Demand for forests is also growing because they offer potential carbon sequestration, which fulfills the growing demand for carbon offsets. Living trees as carbon offsets can provide investors with another income stream.[37]

[32] "Deforestation Fronts: Drivers and Responses in a Changing World," World Wildlife Fund, 2021.
[33] World Wildlife Fund – Timber Overview.
[34] Housing construction is being driven by global population growth, and new wood product consumption is driven by cross-laminated timber used in construction and wood fibers used to make sustainable clothing.
[35] As estimated by the CDP, "the cost of responding to forest-related risks remains a fraction of the potential impacts from risks" – just 14%, or USD 3.2 billion. From "The collective effort to end deforestation: A pathway for companies to raise their ambition," CDP, March 2021.
[36] Fiona Stewart and Samantha Power, "Seeing the forest for the trees: Why pension funds should take another look at forestry as an asset class," World Bank Blogs, March 1, 2021.
[37] This year, LTCMA introduces return projections for global core timberland, a maturing asset class suitable for institutional investors for which we forecast annual long-term returns of 6.4%. Anthony Werley, Pulkit Sharma et al., "Alternative asset assumptions: Sourcing uncorrelated returns in a period of rising market risk," 2023 Long-Term Capital Market Assumptions, J.P. Morgan Asset Management, November 2022.

Driven by urbanization, decarbonization and housing demand, timber consumption could rise 37% over the next 30 years

Exhibit 9: Global historical and projected consumption of wood products



Source: Food and Agriculture Organization, J.P. Morgan Asset Management; data as of 2022. M³: cubic meters; RWE: roundwood (log) equivalent, a measure of volume used in wood product manufacturing.

Infrastructure and the leapfrogging opportunity

Younger nations have the biggest need to build infrastructure, as well as the least-established institutions. Studies point to an astounding USD 94 trillion infrastructure investment gap for just 50 economies through 2040.[38] While this is a daunting challenge, we see significant opportunities for countries to avoid the legacy infrastructure of older countries and to leapfrog directly into modern ones.

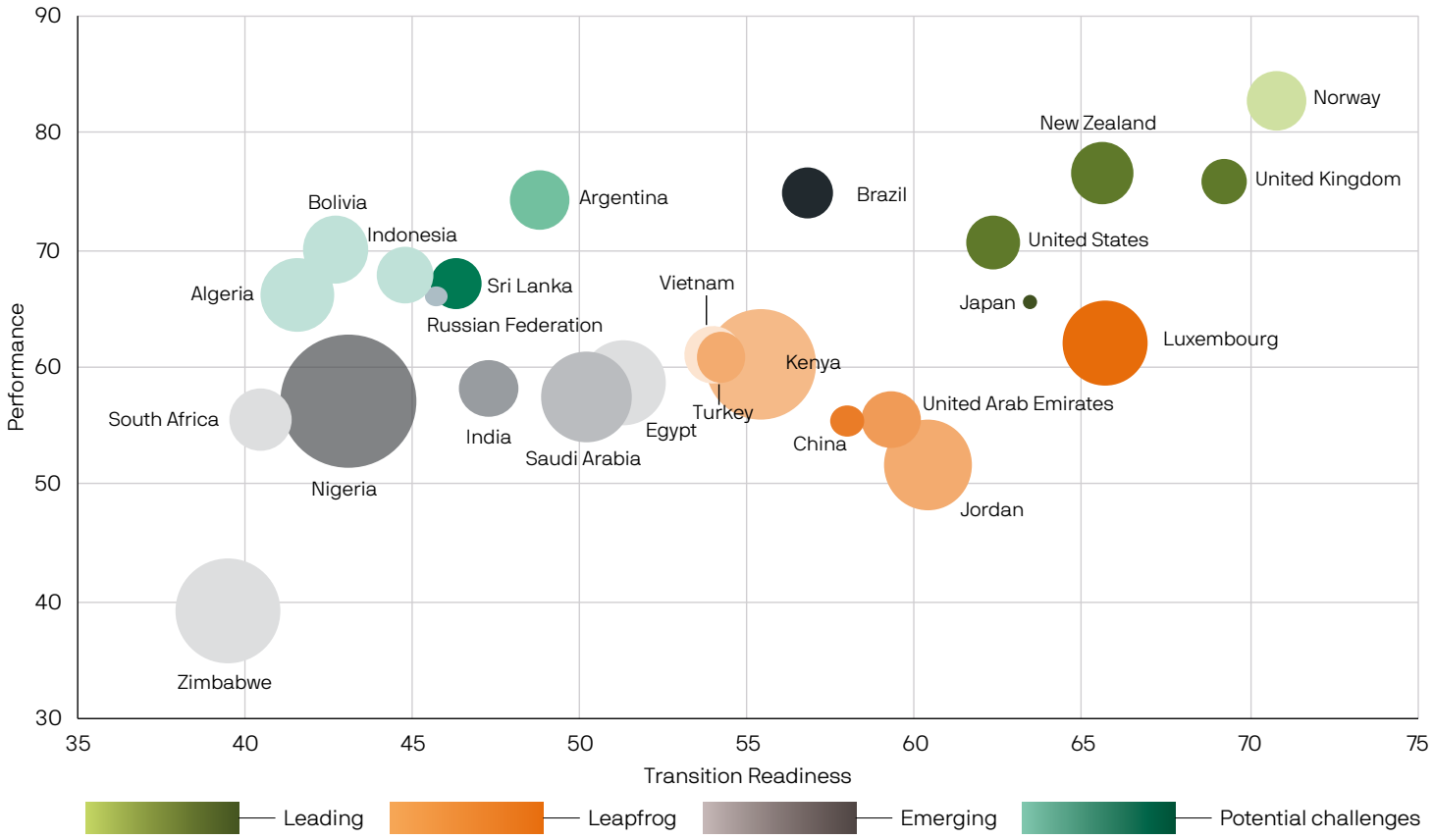
One clear leapfrogging opportunity is in energy infrastructure. There are 940 million people worldwide currently living without access to electricity, representing latent demand.[39] New energy infrastructure can center on renewables, digitalization and decentralization.[40] One example: In Zimbabwe, only 30% of households have electricity, but 85% of people have a mobile telephone. This allows for the development of a market for clean energy through the penetration of pay-as-you-go technology, a mechanism for off-grid customers to pay for decentralized, solar-powered household electricity on a rent-to-own basis.[41] This could solve the problem of solar energy's high upfront costs, lower CO_2 emissions and potentially save EM consumers money vs. other, dirtier energy sources.

The World Economic Forum has looked at the potential trajectory of green energy, based on current transition readiness and performance (Exhibit 2). It identifies "leapfrog countries" as those with high transition readiness but which are constrained by low current performance, indicating a political will to improve but the constraint of a low level of energy infrastructure and economic development. This is where opportunities for investment to have a major impact are likely to be magnified, especially when rapid population growth is added to the mix. South Africa, Malaysia, Vietnam, India, the UAE and Saudi Arabia stand out in this regard (**Exhibit 10**).

[38] Global Infrastructure Hub and Oxford Economics' Global Infrastructure Outlook, 2017.
[39] Hannah Ritchie and Max Roser, "Access to Energy," Our World in Data.
[40] Lorenzo Colantoni, Luca Franza and Giulia Sofia Sarno, "Africa's Energy Future: Energy Leapfrogging Potential in Four African Countries," Istituto Affari Internazionali, 2021.
[41] Ibid.

Economies with high transition readiness and high expected population growth, but low current performance, present the greatest leapfrog opportunities

Exhibit 10: Leapfrog economies



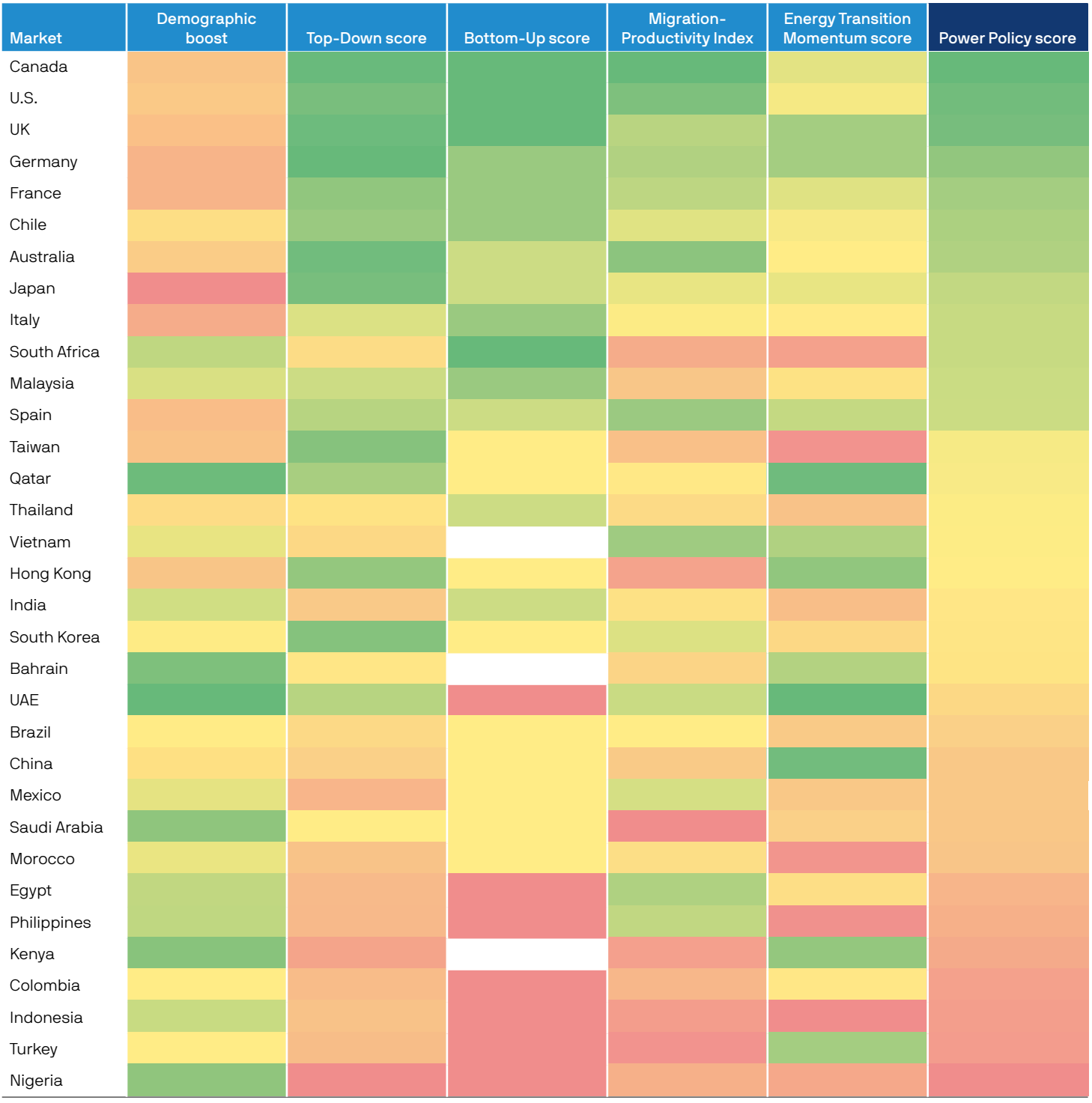
Source: World Economic Forum; data as of 2021. Bubble size based on population growth rate (2022–35). Color indicates strength of net-zero commitment (no pledge, political pledge, in policy document, in law); data from Energy & Climate Intelligence Unit. Transition readiness: Energy Transition Index (capital and investment, energy system structure, human capital and consumer participation, infrastructure, institutions and governance). Performance: World Economic Forum System Performance index (environmental sustainability, energy access, energy security, economic growth and development).

The investment implications of a planet of 10 billion people

Population growth is a precondition for economic growth, yet that outcome is far from inevitable. An economy needs sound national and corporate governance, sustainable resource management and efficient infrastructure. Together, they can turn population growth into a demographic dividend, with robust markets providing goods and services, and spurring innovation to improve living standards (**Exhibit 11**). Among younger economies, India, Vietnam, Malaysia, South Africa, Saudi Arabia and the UAE stand out as the likeliest to attract private capital and find a place in investors' portfolios. Among older countries, Canada, the UK, the U.S., Germany and France have the most potential to deliver better results than their demographics alone would suggest.

Combining demographics with policy helps highlight investment opportunities – and potential pitfalls

Exhibit 11: Power Policy scores by economy



Source: Heritage Foundation, Penn World Table (PWT), Transparency International, World Bank Worldwide Governance Indicators (WGIs), World Economic Forum, J.P. Morgan Asset Management. Demographic boost is based on the old-age dependency ratio, which is the number of people aged 65+ per 100 people of working age (20–64). Top-Down score is based on J.P. Morgan Asset Management country-level analysis. It is a blended governance and education score based on 40% WGI Rule of Law (measures the extent to which agents have confidence in and abide by the rules of society), 20% Index of Economic Freedom (measures jurisdictions against one another in terms of parameters such as trade freedom, tax burden, judicial effectiveness, etc.), 20% Corruption Perceptions Index (measures how corrupt each country's public sector is perceived to be), 20% PWT Human Capital Index (measures average years of schooling and an assumed rate of return to education). Score components as of Heritage (2021), PWT (2021), WGI (2021). Bottom-Up score and Migration-Productivity Index are based on proprietary J.P. Morgan Asset Management analysis. Energy Transition Momentum score is based on the World Economic Forum Energy Transition Index (capital and investment, energy system structure, human capital and consumer participation, infrastructure, institutions and governance). Data as of 2021.

Some of the world's youngest economies (many in sub-Saharan Africa) have access to massive natural and renewable energy resources but currently lack the institutions to convert these into an economic dividend. They need to develop stronger governance and infrastructure, and links to global supply chains in order to attract more global capital.

All of this growth requires the raw inputs of the earth. However, the alarming pace of depletion of these resources is straining the planet. Yet, exciting investment opportunities can be found in solutions to the challenges – in rethinking infrastructure, energy and food consumption habits; in more sustainable land use, agriculture and forestry. The themes include green infrastructure, sustainable agriculture technologies, alternative sources of protein and reforestation.

Ultimately, private capital should complement public initiatives to unlock the potential demographic dividend in the most sustainable way. In a world of higher rates, sound policy will be the key to attract scarcer funding, creating winners and losers along the way. Our scores and investment themes may help investors decide where they can best participate in the opportunities being generated by a still fast-growing global population.

II Assumption articles

Currency exchange rate assumptions

Rich U.S. dollar headed toward fair value

Authors

Michael Feser, CFA
Portfolio Manager
Multi-Asset Solutions

Michael Akinyele
Global Strategist
Multi-Asset Solutions

In brief

- Our long-term fair value exchange rate assumptions change relatively little, as projected inflation differentials have remained stable despite rapidly rising inflation and aggressive monetary policy tightening over the past year.
- We maintain our conviction that the U.S. dollar – markedly richer since our last edition due to rapidly tightening monetary policy and increasing recession risks – unwinds much of its overvaluation over the Long-Term Capital Market Assumptions time horizon.
- Since currency weakness through easy monetary policy adds to inflation, we believe central bankers will prioritize, to varying degrees, their inflation targets above currency competitiveness. This should enable some currencies to fully converge to fair value over our long-term horizon.
- We expect the Australian and Canadian dollars, the Swiss franc, the Swedish krona and eventually even the euro to converge to fair value vs. the USD.
- The Chinese renminbi appreciates less vs. the USD than fair value would imply, since a competitively valued currency remains an important support for the export sector. Consequently, other Asian currencies, such as the Japanese yen, the Korean won and the Taiwanese dollar, also likely appreciate less than their fair value would imply.

Our 2023 FX return assumptions are directionally little changed, but our expectations for the dollar's decline have grown in magnitude. The forceful monetary policy response of the Federal Open Market Committee (FOMC) made the USD more attractive in the near term and widened the gap between its value at the time of writing and fundamental fair value. On a nominal trade-weighted basis, we now forecast the dollar to depreciate 1.5% per annum, compared with last year's projection of 0.8%.

As we publish, global monetary policy is nine months into a regime shift: After an uncomfortable rise in long-term inflation expectations, the FOMC has tightened monetary policy rates at the fastest pace in four decades. Global monetary policy is progressing beyond neutral territory, and developed market (DM) central banks' forward guidance has maintained its hawkish stance. With current conditions changing so swiftly, it is perhaps surprising that we are leaving our assumptions for long-term fair value in currency exchange rates largely intact.

We continue to believe that the USD is due for a sustained period of gradual decline, given the U.S. economy's higher inflation profile relative to most other developed markets. But 2022's broad USD appreciation leaves its mark as we update our expectations for the magnitude of the dollar's decline (**Exhibit 1A** and **1B**).

We have argued that the successful reflation of the global economy, and a return to trend growth, were necessary catalysts for currencies to converge toward fundamental fair value. Reflation has finally occurred: Through 2022, inflation surged globally and hawkish turnabouts by the European Central Bank (ECB), the Reserve Bank of Australia and other major central banks narrowed the lead of the Federal Reserve (Fed), which remains at the vanguard of the DM central bank hiking cycle.

Yet, a return to trend growth outside of the U.S. has remained elusive in the face of the ongoing energy crisis in Europe, a lingering drag from COVID-19 in many places and a worsening real estate market in China. As a consequence, in nominal terms the broad USD index was, at publication time, at its richest valuation the 1980s.

We expect the impact of these headwinds to fade well within our LTCMA time horizon – and with them, the USD's strength. But until then, the dollar should enjoy some more time in the spotlight.

The wider gap between today's spot rates and our estimates of fair value dominates the y/y change in our long-term assumptions for foreign exchange returns

Exhibit 1A: LTCMA FX return drivers: Major DM currencies vs. USD

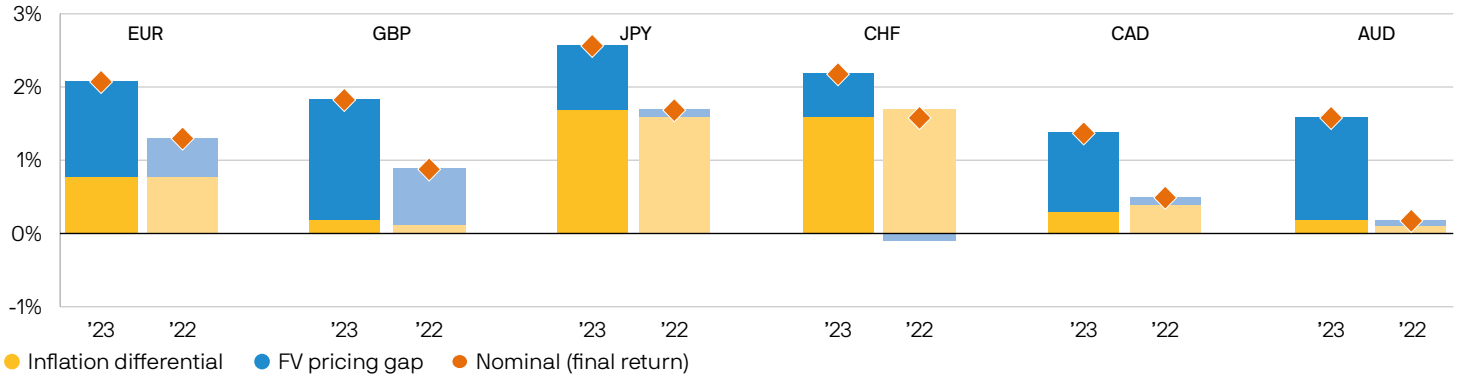
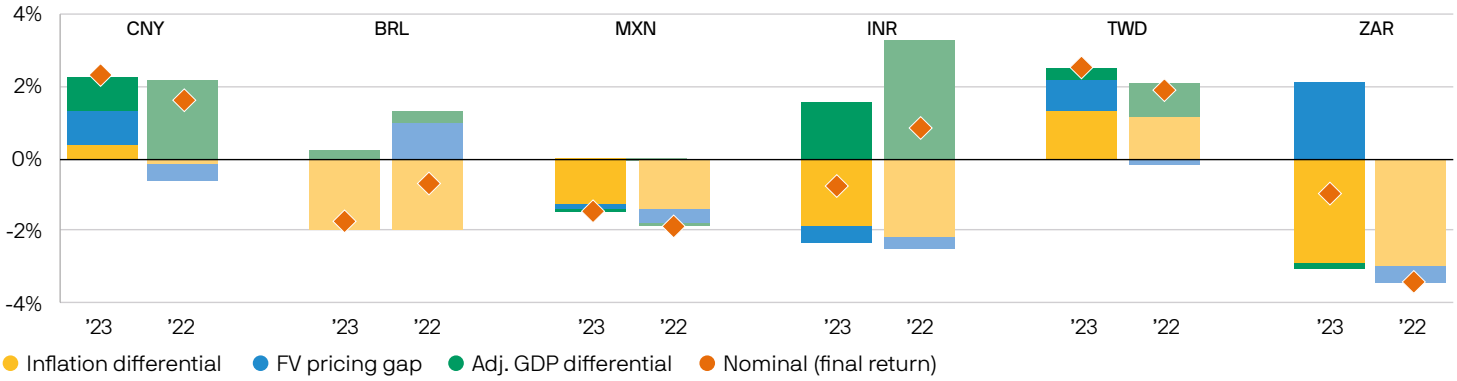


Exhibit 1B: LTCMA FX return drivers: Major EM currencies vs. USD



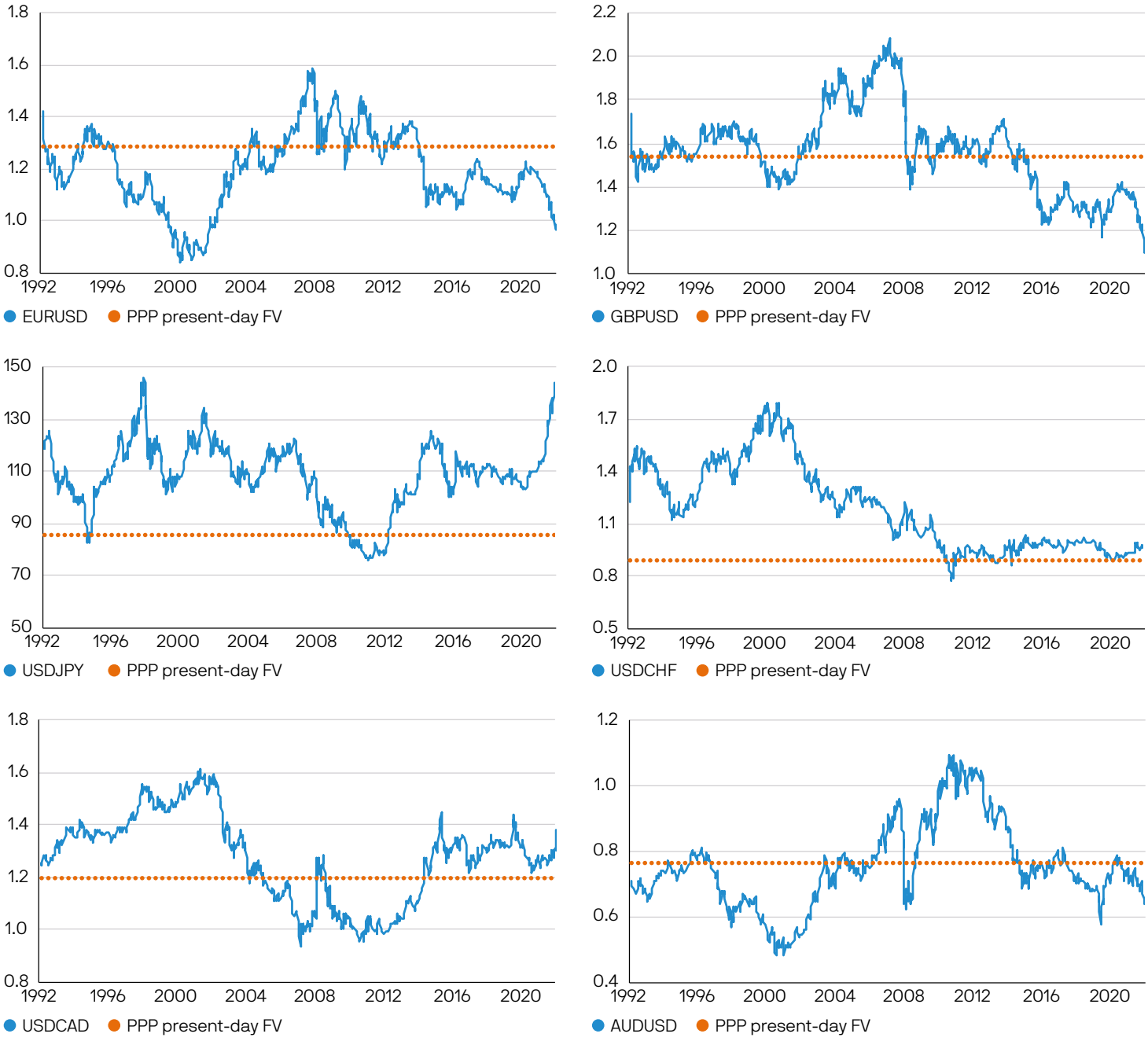
Source: J.P. Morgan Asset Management; data as of September 30, 2022. FV: fair value; EUR: euro; GBP: British pound; JPY: Japanese yen; CHF: Swiss franc; CAD: Canadian dollar; AUD: Australian dollar; CNY: Chinese renminbi; BRL: Brazilian real; MXN: Mexican peso; INR: Indian rupee; TWD: Taiwanese dollar; ZAR: South African rand.

Model and methodology

A purchasing power parity (PPP) framework continues to be the basis of our approach to determining the present-day fair value exchange rates (**Exhibit 2**). PPP itself is a simple enough concept, but national statistical agencies use different methodologies when measuring price levels, introducing complexity when we set out to use data series across countries. Leveraging the results of a recently completed research project, we now systematically strip out one of the more notable differences among national price series data – housing-related inflation – from our calculations of present-day fair value.

The deviation between spot exchange rate to USD and PPP fair valuations has widened across developed markets

Exhibit 2: PPP fair value and spot exchange rates for selected currencies



Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022.

To arrive at our long-term exchange rate assumption (future fair value), we project present-day fair values forward using the Long-Term Capital Market Assumptions' (LTCMAs') underlying macroeconomic assumptions, as follows:

- **Developed market currencies**: We reflect the expected change in a country's terms of trade over 10 to 15 years by adjusting today's fair value by the differential between the two countries' projected inflation rates.
- **Emerging market (EM) currencies**: We make an additional adjustment for the expected differential in GDP growth per unit of labor. As part of this year's process, we update our calibration for the impact of the per capita growth rate differential. We now expect the exchange rate to change at roughly half the rate of the per capital growth rate differential.
- **Implications of our assumptions' reliance on PPP**: An unprecedented mix – economic normalization after the depths of COVID-19, geopolitical tensions, and monetary and fiscal stimulus – has clearly generated a global inflationary impulse. However, our assumptions' reliance on the concept of PPP implies that an individual economy's inflation outcome matters comparatively less when, as now, it is mirrored globally.
- **Safe-haven currencies**: Our computation of the present-day fair value evolves over time, but does not explicitly incorporate a temporary or cyclic safe-haven premium. Today's monetary policymakers are (almost) uniformly combating inflation and tightening financial conditions, meaningfully raising the risk of a near-term recession.

  A portion of the overvaluation that we observe in the U.S. dollar today is likely the result of its safe-haven properties amid recessionary risks. Our more aggressive projection of USD depreciation does not account for how long this premium may persist in the near term. We expect that the USD cedes some richness over the full LTCMA horizon but the catalyst for depreciation may not be imminent.

Normalization and sensitivity

The key sensitivity issues underlying our currency assumptions modeling are how much hotter an economy's rate of inflation runs above our projected rate, and how much higher a real GDP growth rate it realizes above our macro forecast.

A 1% increase in an economy's equilibrium rate of inflation (absent an increase in another economy's inflation rate) mechanically implies about 1% currency depreciation per year over our forecast horizon. This holds true in emerging markets, plus we add the following: 1% of real GDP growth per unit of labor by a single economy implies about 0.5% of additional currency appreciation per year. Thus, economies' transitions from their current inflation rates to our lower projected equilibrium rates should have a substantial impact on the U.S. dollar's trajectory.

As the macro assumptions chapter discusses, higher wage growth, higher inflation expectations and the lagged impact of higher home prices mean that most countries' inflation may for a prolonged period remain above central bank targets, and above our long-run inflation trend estimates. Should CPI inflation across the global economy fall toward the equilibrium trend rate even more slowly than expected, our currency assumptions would then likely overstate USD depreciation. This is particularly pertinent for the euro, the pound sterling and the Mexican peso, currencies of the U.S.'s major trading partners, where we estimate the transition of inflation back to equilibrium could be most challenging.[1]

The cost of a cheap currency

One can see how the rest of the world's currencies are under threat from a cycle of undervaluation: Sticky inflation implies depreciation under PPP, and a weak currency imports higher prices. In the prior economic cycle, low inflation globally meant there was little cost to policymakers encouraging relative export price competitiveness, particularly to the U.S., via direct intervention or easy monetary conditions. The Chinese renminbi and Japanese yen's cheapness to the dollar were chief examples. Looking ahead, we expect the world's central banks to varying degrees will stop making currency competitiveness a priority.

As such, while we generally have high regard for policymakers' ability and desire to achieve inflation targets (helping explain why we maintain our conviction in secular USD depreciation), not all currencies are projected to fully converge to fair value.

[1] Michael Hood and David Kelly, "Inching forward: Lingering inflation, moderate growth," 2023 Long-Term Capital Market Assumptions, J.P. Morgan Asset Management, November, 2022. See exhibit 7.

Major currency pairs

We have grouped currencies thematically into three buckets: "cyclical reversers" likely to appreciate as much as their fair value would imply and relatively more when returns are compared to the prior cycle; "competitive devaluers" likely to appreciate less than their fair value would imply as those central banks continue to favor export competitiveness; and the "structurally challenged," which we believe face idiosyncratic hurdles that they will need to overcome before a full appreciation to their fair value may occur.

Cyclical reversers: AUD, CAD, CHF, EUR and SEK

These currencies remained undervalued vs. the USD through the prior cycle, relative to their LTCMA-implied end points. The ECB's recent repeal of negative interest rate policy, the introduction of anti-fragmentation tools[2] and the Swiss National Bank's preference for unwinding its FX reserves to prevent CHF weakness suggest a departure from deliberate currency suppression and a movement toward a new regime of higher nominal yields and stronger exchange rates.

The euro area's energy dependence is its key vulnerability during the current Russia-Ukraine war. Until oil pipelines and energy supplies are more secure, euro area current account balances stand to deteriorate because of elevated commodity import bills. Nonetheless, from a capital account perspective, the high quality of euro area sovereign debt – that no longer has a negative yield – is likely to have strong, long-standing implications: attracting capital inflows into the region.

We expect the net effect of higher yielding debt on the euro area's balance of payments to be sustained appreciation toward LTCMA-implied fair values. We anticipate appreciation of 2.1% per annum over our assumptions' horizon for the euro and 2.2% for the Swiss franc (**Exhibit 3**).

We maintain our conviction in broad based USD depreciation

Exhibit 3: Assumptions for changes in selected currency exchange rates vs. USD,* nominal and real

		Nominal			Real			Forecast level (conventional)			
	Current Spot	2023	2022	Chg	2023	2022	Chg	2023	2022	Chg	Chg %
Australian dollar	0.64	1.60%	0.20%	1.40%	1.40%	0.10%	1.30%	0.78	0.74	0.04	5.41%
Brazilian real	5.41	-1.80%	-0.70%	-1.10%	0.00%	1.00%	-1.00%	6.79	5.96	0.83	13.93%
Canadian dollar	1.38	1.40%	0.50%	0.90%	1.10%	0.10%	1.00%	1.16	1.19	-0.03	-2.64%
Swiss franc	0.98	2.20%	1.60%	0.60%	0.60%	-0.10%	0.70%	0.75	0.76	-0.01	-1.38%
Chinese renminbi	7.11	2.30%	1.60%	0.70%	0.90%	-0.40%	1.30%	5.35	5.29	0.06	1.21%
Euro	0.98	2.10%	1.30%	0.80%	1.30%	0.50%	0.80%	1.27	1.36	-0.09	-6.54%
British pound	1.12	1.90%	0.90%	1.00%	1.70%	0.80%	0.90%	1.40	1.51	-0.11	-6.98%
Japanese yen	144.74	2.60%	1.70%	0.90%	0.90%	0.10%	0.80%	105.01	90.13	14.88	16.51%
Mexican peso	20.12	-1.50%	-1.90%	0.40%	0.00%	-0.40%	0.40%	24.30	26.18	-1.88	-7.16%
Swedish krona	11.11	2.60%	1.40%	1.20%	2.10%	0.90%	1.20%	8.06	7.37	0.69	9.39%

Source: J.P. Morgan Asset Management; data and forecasts as of September 2022. * All exchange rates are quoted in market conventional format.

[2] In July 2022, the ECB introduced an instrument allowing it to buy eurozone bonds, amid concerns tightening monetary policy could cause very sharp bond yield spikes at different maturities, destabilizing monetary policy transmission, known as fragmentation. "ECB's New Anti-Fragmentation Tool to Reduce Fiscal Risks as Rates Rise," *Fitch Wire*, Fitch Ratings, August 3, 2022.

Competitive devaluers: JPY, CNY, KRW and TWD

We expect that these Asian economies are likely to retain comparatively low underlying inflation, implying a low cost to maintaining an easy monetary policy bias. We expect that each economy's central bank will continue to engineer relative export price competitiveness. Our assumptions therefore reflect a smaller appreciation than a full convergence to fundamental fair value would imply.

In particular, we expect that the appreciation of the yen will be delayed owing to the Bank of Japan's efforts to reflate the economy through negative interest rate policy (despite today's historically cheap currency valuations). We also anticipate more of China's onshore commodities trade to be denominated in renminbi because of Russia's exclusion from the global SWIFT (Society for Worldwide Interbank Financial Telecommunication) banking system, further limiting the likelihood of inflation and reducing the impetus for the People's Bank of China to adjust its currency intervention policy.[3]

The structurally challenged: GBP, BRL, MXN and ZAR

We see this group of currencies facing idiosyncratic hurdles that lead us to forecast that they will not fully converge to fundamental fair value over our LTCMA time horizon. Most notably, the British pound and the Brazilian real are likely to encounter substantial political event risk during the first half of the LTCMA horizon.

The GBP's outlook is obscured by tensions surrounding the Northern Ireland Protocol, the call in some quarters for a second Scottish independence referendum and the UK's dependence on Russian energy, to name a few. The BRL confronts Brazil's deteriorating fiscal position and the possibility that a new administration, led by the Workers' Party, could directly intervene in FX markets to contain undesirable volatility.

It is too soon to have a conviction about how these challenges will be resolved. However, inflation concerns are expected to linger in these regions throughout the assumptions horizon, limiting our expectation that the British pound and the Brazilian real will recover vigorously.

Easing inflation concerns, more balanced global growth should trigger USD normalization

Our currency assumptions project that the U.S. dollar unwinds a significant portion of its broad-based overvaluation. We posit that a reversal in USD strength has not occurred so far because the usual cost of maintaining export price competitiveness – inflation – was not onerous in a world of low inflation. Going forward, however, that is no longer the case: We expect monetary policymakers globally to face greater price pressures, leading them to converge to a more hawkish stance, and a sole focus on export price competitiveness to no longer be regarded as a favorable policy outcome.

We already see the start of this policy convergence, but the USD has cyclical strength at the present time. Markets will require a catalyst for that to be discounted. Such a catalyst will take time to materialize; at the earliest, it may come when the Federal Reserve steps back from the hawkish stance that prevailed at the time of writing.

[3] The People's Bank of China's rather long-standing intervention policy, purchasing foreign exchange in currency markets, sometimes limits CNY appreciation vs. other currencies, in effect maintaining a currency peg.

Fixed income assumptions

Bonds are back – after the biggest-ever drawdown

Authors

Michael Feser, CFA
Portfolio Manager
Multi-Asset Solutions

Sean Daly, CFA
Portfolio Manager
Multi-Asset Solutions

Jason Davis, CFA
Portfolio Manager
Global Fixed Income,
Currency & Commodities

Usman Naeem
Portfolio Manager
Global Fixed Income,
Currency & Commodities

In brief

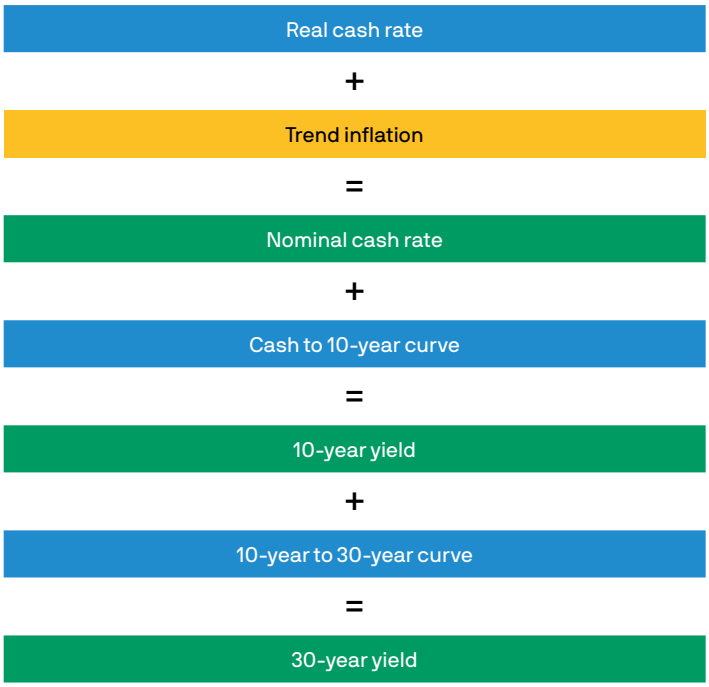
- For the first time since the global financial crisis, the expected normalization of yields raises our long-term return forecasts across most markets: With bond yields now at or above expected cycle-neutral averages, our return forecasts rise significantly and the outlook is more stable.
- High inflation and hawkish central banks sent bond yields much higher since our last edition; almost all the increase in our 2023 fixed income return forecasts derives from these higher starting points.
- Our cycle-neutral bond and cash rate return assumptions rise across developed markets. In inflation-linked bonds, higher inflation forecasts should shift the breakeven curve higher. Our long-term credit and loan spread assumptions are little changed.
- Emerging market (EM) debt assumptions are little changed, despite greater regional heterogeneity. Middle Eastern petroleum producer economies, for example, look healthier. Some Latin American economies are fighting inflation and many frontier economies face crises, helping to lift index starting yields and spreads – we view that as a reflection of near-term risk. We do not adjust our EM credit spread assumptions.
- Increasingly, we believe bonds are again becoming a good risk hedge if we are correct in our expectation that inflation will eventually retrace back toward central bank targets.
- Leverage does not seem stretched in credit markets; while defaults may drift higher over our Long-Term Capital Market Assumptions horizon, recovery rates should also increase towards historical average levels. We leave our overall loss rate forecast unchanged.

Model and methodology

Our Long-Term Capital Market Assumptions (LTCMA) cycle-neutral forecasts follow a building-block approach (**Exhibit 1**). We first combine our estimates of real cash rates with the latest LTCMA inflation projections to generate estimated nominal cash rates. Next, we forecast the slopes of government bond curves to generate 10-year and 30-year bond yields, interpolating across the curve for other maturities. This produces a sovereign yield curve in each currency. These sovereign yield curves form the base for all our fixed income assumptions. To these curves, we add spread forecasts for corporate and other nonsovereign debt sectors that we believe are fair based on the projected macroeconomic environment and the structural changes we anticipate. By combining an expected transition path from current yields to these projected yields over time with the compositional characteristics of each relevant debt market index, we ultimately arrive at forecast returns across all fixed income markets (**Exhibit 2**).

How we produce our fixed income return forecasts

Exhibit 1: LTCMA fixed income building blocks, sovereign debt



Source: J.P. Morgan Asset Management; as of September 30, 2022.

Normalization of rates is no longer a drag on average returns in most markets

Exhibit 2: Building-block fixed income return projections for G4 countries

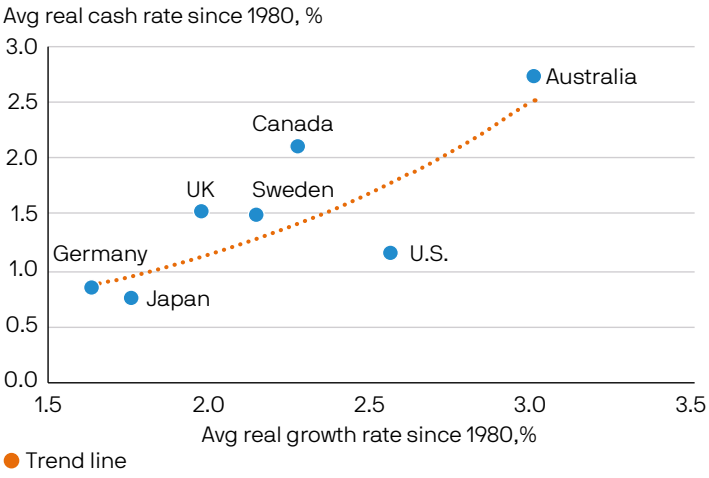
	USD		GBP		EUR		JPY	
	Cycle-neutral average yields	Return	Cycle-neutral average yields	Return	Cycle-neutral average yields	Return	Cycle-neutral average yields	Return
Inflation	2.6%		2.4%		1.8%		0.9%	
Cash	2.3%	2.4%	2.2%	2.2%	1.4%	1.3%	0.5%	0.4%
10-year bond	3.2%	4.0%	2.6%	3.8%	2.2%	3.0%	1.0%	0.6%
Long maturity	3.5%	4.2%	2.7%	4.4%	2.5%	3.6%	1.0%	0.7%
Investment grade credit	4.7%	5.5%	4.3%	5.7%	3.2%	3.6%	1.3%	1.1%
High yield	7.7%	6.8%			5.9%	5.7%		
Emerging market debt*	6.9%	7.1%						

Source: J.P. Morgan Asset Management; estimates as of September 30, 2022.
Long-maturity government bond index: Citi EMU GBI 15+ yr EUR; Citi Japan GBI JPY; FTSE UK Gilts Under 15+ yr GBP and Bloomberg U.S. Treasury 20+ yr USD. High yield: Bloomberg US High Yield 2% Issuer Cap USD and Bloomberg Pan-European High Yield EUR. Emerging market debt: J.P. Morgan EMBI Global Diversified Composite. Cycle-neutral: the average yield we expect after normalization.
* Emerging market local currency debt.

Real cash rate forecasts take into account our view on each economy's economic equilibrium rate (R*) and how dovish or hawkish that central bank would need to be, on average, relative to this level to achieve its objectives. In general, while real growth rates and real cash rates across economies have differed, one consistent theme is the positive relationship between the real growth rate and the real cash rate (**Exhibit 3**).

Our forecasts reflect the positive cross-sectional relationship between growth and real cash rates

Exhibit 3: Average real cash rates vs. growth since 1980



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Our yield curve slope forecasts reflect our estimate of the term premium and average rate expectations over a cycle. Both depend heavily on expected monetary and fiscal policy, and the net supply outlook for each part of the curve.

For corporate credit and other nonsovereign debt markets, our approach also aims to forecast average neutral spreads for investment grade (IG), high yield (HY) and emerging market (EM) corporate debt. We begin with historical long-term spreads and adjust them for any structural changes we believe will impact their level over the assumptions horizon. To do this, we break the current index down into smaller, more homogeneous components, calculate average historical spreads and then adjust for duration changes that these market sectors may have experienced over time. We then re-create the overall index using the projected spreads. Finally, we qualitatively adjust the spreads to incorporate projected structural trends.

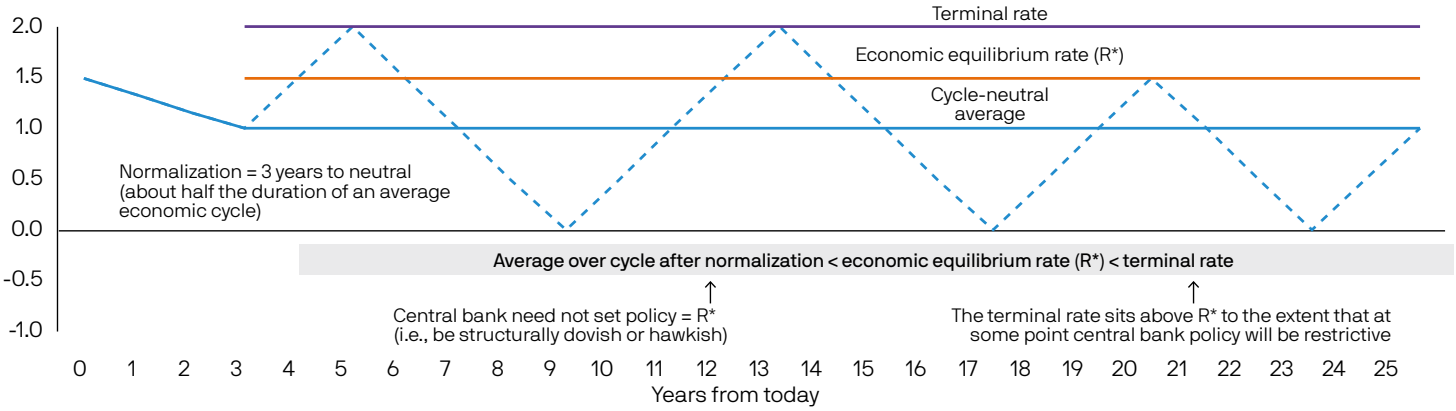
The key building blocks of our return forecasts combine these long-term spread forecasts with the path for sovereign yields, projected default rates and the associated recovery rates.

Terminology: What we are, and are not, forecasting

The LTCMA forecasts for cash and longer-term sovereign bond yields, as well as the spread at which we expect different sectors of nongovernment debt to trade, are cycle-neutral averages. They represent the average yields we expect to prevail across several cycles after an initial period of interest rate normalization (**Exhibit 4**). We forecast cycle-neutral averages to create and maintain consistency between the LTCMA's macro assumptions, the path of monetary policy and structurally informed market trends. Of course, to generate average per annum returns, we also need to forecast how long it will take to return to these cycle-neutral averages – the normalization period.

We forecast cycle-neutral average rates we expect after normalization – not R* or terminal rates

Exhibit 4: Cycle-neutral average, equilibrium and terminal rates – representative example



Source: J.P. Morgan Asset Management; data as of September 30, 2022. This year, for the first time in many years, prevailing rates for most assets are close to or above the neutral level we forecast in the LTCMA. In this case normalization will have a positive impact on the returns. This year we also revert to a 3-year normalization time horizon as default, ending the years where we showed a stylized two-stage normalization process with an initial low-for-longer period followed by a linear rise in rates to neutral. The 3-year default continues to be stylized, with linear steps and in duration based on the average length of an economic cycle. The actual pace and duration may differ and rates may continue to move further away from neutral first, before reverting over time to our forecasted neutral rate, on average.

We are not explicitly forecasting items such as an economic equilibrium rate (R*, an unobservable real cash rate that is neither expansionary nor contractionary). While our view on where R* will settle is very important, central bank policymakers set nominal cash rates and will differ from R* depending on their monetary policy stance. For example, over the last decade, central banks have spent much more time below what would be considered the economic neutral rate than above it.

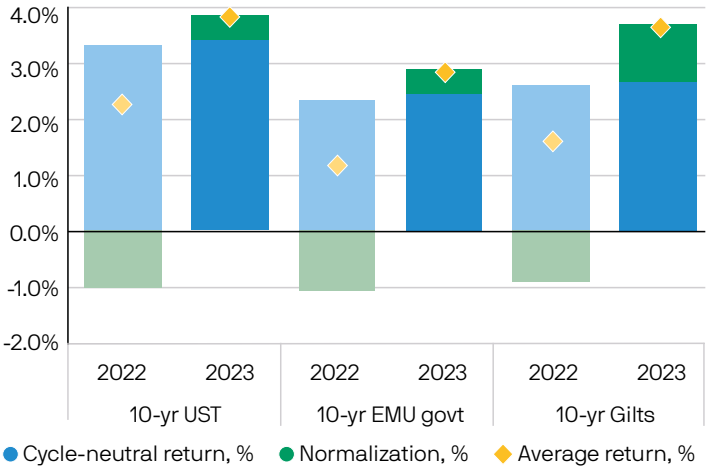
We are also not explicitly forecasting a terminal rate, the highest cash rate a central bank will achieve, although, of course, our view on terminal rates will play an important role in determining our forecasts for average yields and the slope of the curve.

Normalization and sensitivity analysis

Unlike our previous set of assumptions of the last 10 years, we no longer see normalization as a drag on long-term returns. Last year, the embedded drag reduced the annual average expected return approximately 1 percentage point (ppt) on a 10-year government bond. Since then, fixed income markets effectively have more than fully reversed this normalization drag (**Exhibit 5**).

No more drag from normalization

Exhibit 5: Major fixed income market return assumptions with normalization component, 2022 vs. 2023



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

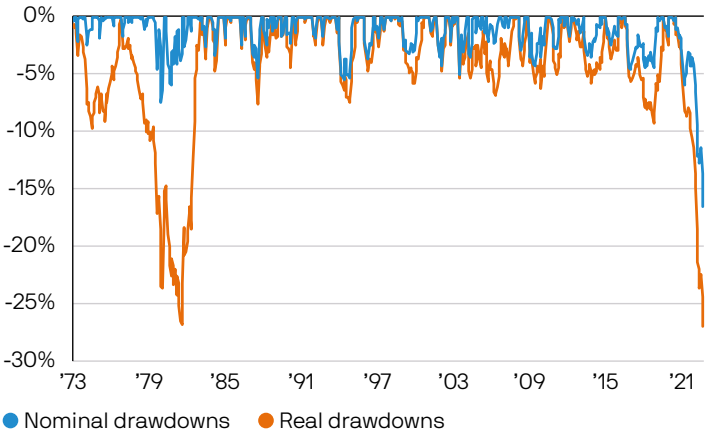
Our return forecasts are therefore much higher and more evenly distributed over time. With bond yields currently close to their cycle-neutral averages, the length of the normalization window becomes a far less important input. We therefore have reverted to our default length of three years for yields to normalize to our forecasts.

Key markets and asset classes: Back to fair value

A combination of persistently high inflation and more hawkish central banks in 2022 sent cash and bond yields markedly higher. The J.P. Morgan Government Bond Index (GBI) and 10-year U.S. Treasury yields have risen more than 225 basis points (bps) since our last edition – for the Treasury index, this resulted in the biggest nominal drawdown since the creation of the Bloomberg Treasury index, on par with the 1970s in real terms (**Exhibit 6**). At long last, bond yields are at or above our cycle-neutral averages, resulting in much higher expected returns. The improved starting valuations imply that investors can expect to earn a total return in excess of the forecasted average yield on most indices.

High inflation and more hawkish central banks prompt the biggest-ever nominal decline

Exhibit 6: U.S. Treasury index drawdowns (% from peak)



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Government bond yields

Our long-term cash rate assumptions rise across developed markets, driven by higher assumptions for inflation and real cash rates (reflecting marginally more symmetrical central bank policies). With inflation closer to targets, central bank policy should be less likely to get stuck again at the lower bound.

Our 10-year cycle-neutral U.S. Treasury yield forecast rises slightly, to 3.2%, and to 2.2% for its euro area equivalent. We expect flatter curves at the long end and leave unchanged our forecast for the 30-year yield, at 3.5% in the U.S. and 2.5% in the euro area. Our forecast for 10-year U.S. Treasury returns rises from 2.4% to 4.0%, and for euro area 10-year bonds from 1.2% to 3.0%.

Cash rates: Opposing forces are acting on yield curves this year

While greater inflation uncertainty should require a higher term premium to be priced into bond yields at the back end, this was already, to some extent, built into our past two years' forecasts. On the flip side, we expect a re-anchoring – not a de-anchoring – of inflation expectations over the assumptions horizon. This should allow for higher cash rates, on average, as central banks achieve their targets more frequently, and yield curves should be flatter, as the path of rate expectations should be shallower.[1]

Inflation-linked bonds

Over the last two years, we incorporated a lot of upside inflation risk via higher inflation risk premiums (IRPs). Consequently, we keep our IRPs constant this year. We believe central bank commitment to inflation targets will limit breakeven moves; however, we expect higher macro inflation forecasts to cause a parallel shift higher in the breakeven curve. We also expect a flattening in the real yield curve, driven by central banks achieving their targets more frequently. Hence, all the flattening in the nominal curve comes from the expected change in the real yield curve.

Credit and loans

Our fair value credit spread assumptions change little this year (**Exhibit 7**). IG and HY long-term spread assumptions are unchanged, and many themes remain intact. Much of the IG market continues to be BBB rated, leverage has fallen from the pandemic's historic highs, and we do not foresee meaningful further moves. Although default rates may rise from recent levels in some sectors, as we discuss below, we believe that the aggregate recovery rate at the index level will also be closer to historical averages because of the improvement in credit ratings. This impact leaves our overall default adjustments unchanged, despite changes in underlying factors.

Within credit, a key focus recently has been on the levels of defaults and recovery rates, after the recent energy sector default cycle saw particularly low recovery rates in U.S. high yield. We believe that default rates are likely to pick up in HY and loans from the historic lows of the past few years, but that this will largely be offset by higher recovery rates. HY in particular has become a higher rated index over the past decade, which we believe will improve recovery rates. This ultimately leaves our adjustments unchanged.

The U.S. loan market, a worthy competitor for U.S. high yield after doubling in size over the past decade, has seen its quality mix decline over 10 years (it is now 65% single B rated, up from 45% a decade ago). Private equity sponsorship and loan-only structures, along with the narrower quality differential from high yield, lead us to widen discount spreads by 30bps since the last set of LTCMAs.

Our long-term credit and loan spread assumptions are little changed

Exhibit 7: LTCMA spread assumptions, 2022 vs. 2023

Spread assumptions vs. last year

Credit spread assumptions	2022 LTCMA	2023 LTCMA
U.S. IG	160	160
U.S. HY	480	480
EUR IG	120	120
EUR HY	400	400
U.S. loans	490	520
EMD corp	400	400

Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Emerging market debt

We also see little change in our fair value assumptions for emerging market debt, although the market pricing has changed significantly over the past year. Two themes stand out: Within EM sovereign debt, the world has become increasingly heterogeneous. While some regions are looking very healthy, like the Middle Eastern petroleum producers, others are still fighting inflationary pressures with ever-higher interest rates, such as in Latin America, while many frontier economies remain very much in crisis mode, fighting rising food and energy costs and political unrest.

This has led to the second development, an optically high starting yield and spread. In particular, countries going through restructuring or viewed as approaching financial distress are raising the index level yield, but these are more reflective of near-term default risk than long-term drivers of return through spread compression.

[1] Implicitly, a flatter curve reflects little change in our view on potential growth rates and thus economic neutral rates but more our view that central banks can set policy closer to these levels, on average, going forward.

For emerging market local currencies, the strength in the U.S. dollar and the rise in local yields through tighter monetary policy have created historically attractive levels today; however, given the ongoing tightening of financial conditions, timing will be very important. Although we believe sounder underlying economic fundamentals limit the risk of a broad crisis today, continued dollar strength could still create further local, periodic market stress, despite the much improved valuation levels today.

In emerging market credit, we continue to believe that the composition of the J.P. Morgan Broad Diversified Core Index (CEMBI CORE) will remain stable, both in terms of maturity structure and ratings breakdown. We expect long-term default and recovery rates to remain close to historical levels and, as such, do not adjust our 400bps spread assumption.

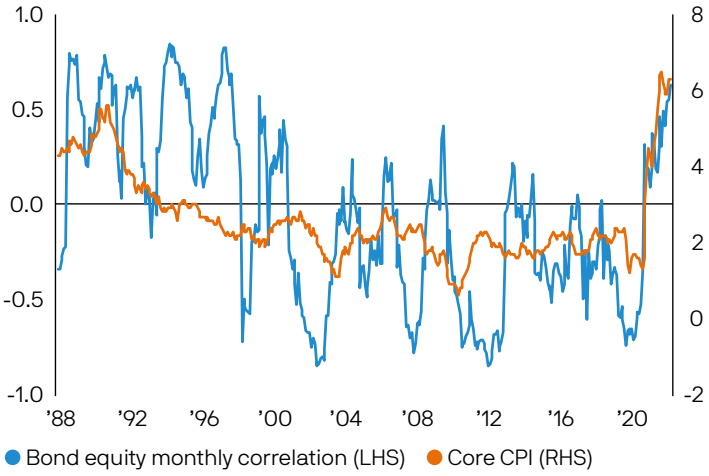
Conclusion and implications

Bonds are offering diversification once more

Higher inflation and hawkish central banks have pushed current bond yields back toward our cycle-neutral forecasts. Our return assumptions have improved dramatically, given these better starting points, while our cycle-neutral forecasts themselves have changed only slightly. Bonds are offering income again and, we believe, will again be a good hedge, regaining their safe-haven status in times of market stress. Historically, the correlation between risk assets and bonds has turned positive during periods of very high inflation (**Exhibit 8**). Our base case is for inflation to be lower and more stable, and hence for this correlation to return to more normal levels over time.

Bonds are a good risk hedge if inflation remains anchored

Exhibit 8: Bond-equity correlation (monthly) and core CPI

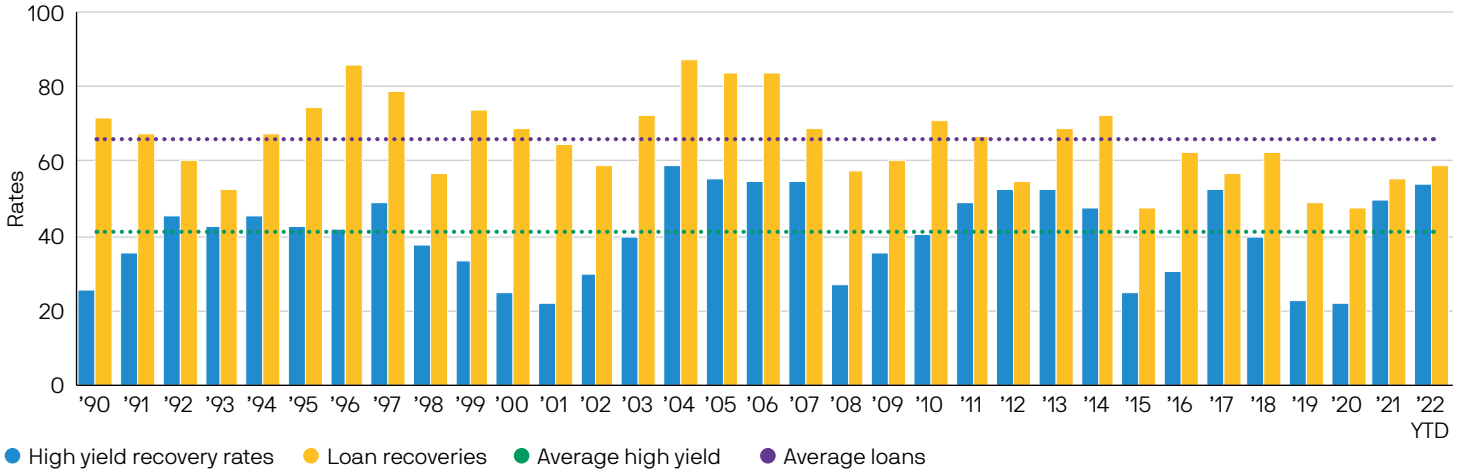


Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Credit in particular is starting to look attractive as investors benefit from both the normalization of underlying yields and spreads that fairly compensate risks. In HY, we believe that the growth of the leveraged loan and private credit markets, each now worth over USD 1 trillion, has seen the development of a higher quality index, which should better protect investors in case of default. So, while defaults mean-revert over our LTCMA horizon, recovery rates should also rise, leaving our overall loss rate forecast unchanged (**Exhibit 9**), despite the higher starting yields and spreads.

Defaults may drift higher, but so should recovery rates – we leave our loss rate unchanged

Exhibit 9: Recovery rates: High yield bonds, first-lien loans



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Equity assumptions

Better starting point, higher forecast returns

Authors

Rajesh C. Tanna
Portfolio Manager
International Equities

Tim Lintern
Global Strategist
Multi-Asset Solutions

Danielle Hines, CFA
Associate Director of US Equity Research

Ayesha Khalid
Global Strategist
Multi-Asset Solutions

Michael McQuiston, CFA
Equity Research
US Equities

Preeti Parashar
Global Strategist
Multi-Asset Solutions

Stephen Parker
Head of Advisory Solutions
Private Bank

Nandini Ramakrishnan
Macro Strategist
Emerging Markets and Asia Pacific Equities

Christopher Sediqzad, CFA
Research Analyst
Multi-Asset Solutions

Sylvia Sheng
Global Strategist
Multi-Asset Solutions

Winnie Yingyi Liu, CFA
Portfolio Manager
International Equities

Garrett Norman
Investment Specialist
Asset Management Solutions

In brief

- We raise our long-term (10 to 15 year) equity return assumptions across regions. The biggest driver of increased return expectations is better starting valuations.
- Today's corporate margins are elevated and are set to decrease. But our forecasts still leave margins at high levels vs. history, mainly reflecting a shift in sector composition.
- In the U.S., our expected return increases from 4.10% to 7.90%, primarily due to the reduction in the drag from valuation normalization. We see similar dynamics in other developed markets.
- Emerging market (EM) returns are also better this year, but to a more moderate degree than in developed markets. We downgrade our revenue growth expectations for emerging markets, reflecting both lower nominal GDP forecasts in key regions and less optimism on EM corporates' ability to earn revenues in high inflation environments.
- We expect the USD to weaken over our forecast horizon. This is a tailwind to international equity returns for U.S. dollar-based investors.

Valuations no longer a headwind

Our expected equity return assumptions move higher compared with last year's assumptions (**Exhibit 1**).

We highlight two key drivers of this step up in expected returns.

1. **Starting valuations**: Equities are more attractively valued than they were last year (**Exhibit 2**).
2. **Model enhancements**: In conjunction with our Global Equities team, we have improved our forecasting framework. Now, our top-down reading of equity markets, which reflects our forecasts for GDP, inflation, rates and other macroeconomic inputs, is cross-checked against a bottom-up aggregation of the 3,000 companies for which our Global Equities team forecasts earnings. Their insights shape our views of earnings, valuations and shareholder returns in the markets we cover.

The proportional impact of these key drivers varies by market. But in aggregate, the valuation shift explains 70% of this year's return uplift, model enhancements explain 20%, and other factors 10%. More generally, our modeling of the equity market reflects:

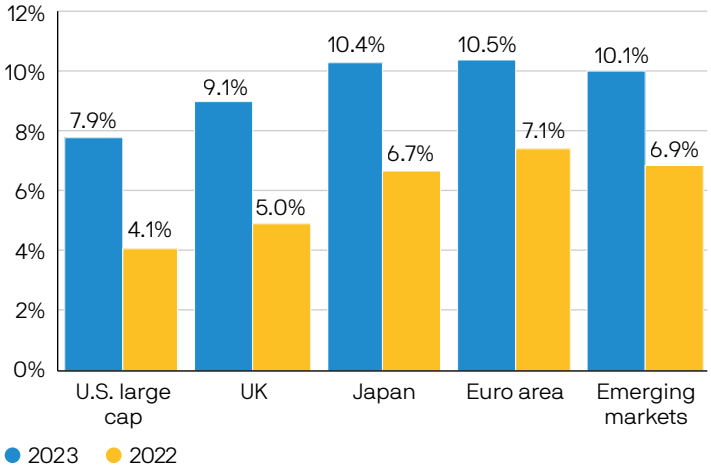
- **High single-digit returns**: We forecast high single-digit equity market returns over our 10- to 15-year investment horizon, with moderate dispersion in developed markets and more dispersion in emerging markets.
- **A much improved starting point**: In many markets, profit margins are higher than our long-term estimates of fair value. But P/E ratios are much closer to fair value than they have been in recent years - meaning valuation is now no longer a headwind.
- **The importance of shareholder returns**: Anticipating modest earnings growth and continued strong corporate balance sheets, we expect a significant portion of returns will come from buybacks in developed markets and from dividends in emerging markets.
- **Reduced international premium**: Since U.S. stocks de-rated over the past year, the international premium between other developed markets and the U.S. is much reduced.
- **The impact of foreign exchange**: At a time of mid-single digit equity returns, currency is an important consideration. We expect the USD to weaken over time relative to key developed market (DM) currencies, making markets outside the U.S. even more attractive to U.S. dollar-based investors.

Model and methodology

As in previous years, our equity assumptions methodology breaks equity returns into distinct building blocks. First, we forecast earnings per share, by considering revenue growth, margins and the share count. We then forecast P/E ratios to establish a price return forecast. Finally, we forecast dividend yields to create a total return expectation (**Exhibit 3**).

Our LTCMA equity forecasts move significantly higher this year

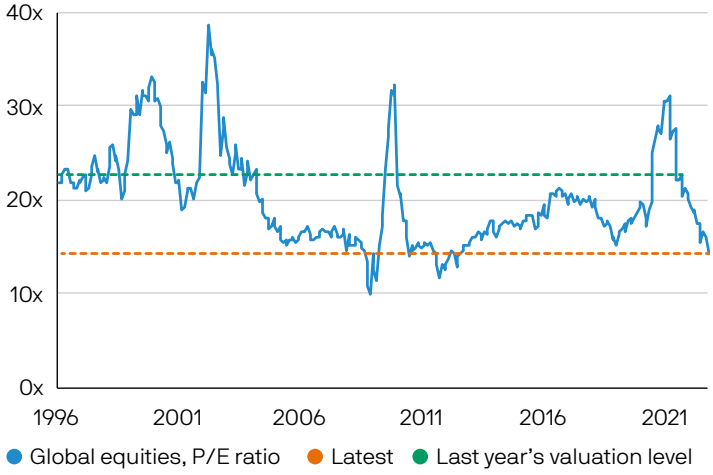
Exhibit 1: LTCMA forecasts, 2023 vs. 2022, USD terms



Source: J.P. Morgan Asset Management; data as of September 30, 2022. Please note that we changed our forecasting methodology for MSCI China this year, now treating the market as an asset whose local currency is CNY. The change in our emerging market equity returns reflects this change.

Global equities are considerably cheaper than they were last year

Exhibit 2: Global Equity P/E ratio, 1996-2022

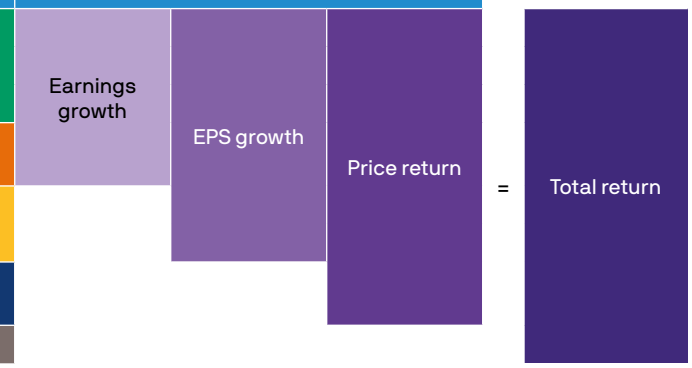


Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022.

Our forecasting methodology breaks down equity returns into different drivers

Exhibit 3: Equity forecasting building blocks

Component	Subcomponents	Component	Driver
Revenue growth	Domestic growth	Revenue growth	Earnings growth
	International contribution		
	Sales % GDP		
Margins	Change from margin today to equilibrium margin	Margins	
Net dilution	Buybacks	Net dilution	
	Gross dilution		
Valuations	Change from P/E today to equilibrium P/E	Valuations	
Dividend yield	Dividend yield forecast	Dividend yield	



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Normalization and sensitivity

A key part of our methodology is normalization, the path that key equity market metrics take before reaching equilibrium targets. Our equilibrium targets represent where we think specific indicators, such as the P/E ratio or profit margin, lie at the end of our forecast period. For stocks covered by our Global Equities research team, we include the team's estimates over the first half of the forecast period before trending after that point toward our equilibrium targets.

Our equilibrium targets are sensitive to several inputs:

- **Revenues**: Corporate revenues are a function of the nominal GDP environment in the regions where revenues are earned. Higher real GDP and inflation expectations thus support higher revenue growth in our equity model.
- **Margins**: Although we do not make specific forecasts for the capital/labor share in various economies, our margin assumptions aim to be consistent with our understanding of trends in this metric. In most developed markets, we think that margins will be higher than historical averages, reflecting increased capitalization of particularly profitable, high return on capital "new economy" stocks.
- **Valuations**: A market with higher secular growth potential, a healthier capital structure and lower volatility of earnings will – all else equal – trade at a higher P/E ratio than other markets. As discussed in previous Long-Term Capital Market Assumptions (LTCMA) publications, our P/E forecasts are higher than long-term averages, largely due to secular shifts in index sector composition.

Exhibit 4 approximates the sensitivity of the equity return forecasts to changes in some of our forecasted inputs. Each equity market metric is unlikely to move in isolation, and our approach does not account for the introduction of nonlinearities when carrying out such a stress test. Instead, the table offers a rough estimate of the return impact created by tweaking the forecast variables.

U.S. markets

Our expected return for U.S. equities increases markedly, from 4.1% to 7.9% in U.S. dollar terms. In making last year's forecast, valuations were a significant headwind, but with current earnings multiples near our long-term expectations, U.S. large cap equities are at a much better starting point.

The durability of corporate profitability is once again reflected in our equilibrium assumptions. Between the pandemic-driven recession and, more recently, broad inflationary pressures on input costs, U.S. large cap profitability has remained resilient. This resilience validates our decision to place more emphasis on secular changes, sector composition and capital structure than on mean reversion to long-term historical averages.

Forward-looking return projections are sensitive to both the starting point and forecasted end point for various equity market metrics

Exhibit 4: Forecast sensitivity table

U.S. large cap equities, forecast sensitivities			
Starting valuations	-1x	Actual data	+1x
Impact	17.6x	18.6x	19.6x
Approximate return impact	8.4% (+0.5%)	-	7.4% (-0.5%)
Equilibrium valuations	-1x	Actual data	+1x
Impact	20.1x	21.1x	22.1x
Approximate return impact	7.5% (-0.4%)	-	8.3% (+0.4%)
Equilibrium margins	-1%	Actual data	+1%
Impact	8.4%	9.4%	10.4%
Approximate return impact	7.0% (-0.9%)	-	8.7% (+0.8%)

Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Additionally, we expect that the forces that have benefited capital at the expense of labor are unlikely to fully mean revert, further supporting our view that equilibrium corporate margins will be higher than historical averages.

The forces that benefit large caps generally present a headwind to U.S. small cap equities. Less favorable sector composition and profitability dynamics continue to weigh on the asset class. In addition, the increase in private capital formation has persuaded many companies to remain private for longer. Both factors continue to widen the quality gap between large and small cap equities, resulting in a lower premium for small caps relative to prior LTCMAs. Forecasting a P/E ratio for the U.S. small cap universe is especially difficult; history shows that the P/E ratio can move particularly sharply in the small cap space. Our assumptions are close to long-term averages; at a high level, they are consistent with the small cap market's large share of nonearners.

Ex-U.S. developed markets

Our European equity assumptions move significantly higher this year, to 8.4% in local currency terms from 5.8% last year. The increase reflects substantial de-rating of valuations in 2022, as is the case in many other markets. Margins remain a key detractor. But we continue to be optimistic about European equities over the longer term. We increasingly expect investors to recognize the improved quality of the market, which has shifted toward sectors and companies with a much better growth profile (such as luxury goods and semiconductors) and away from sectors that are inherently low growth (telecoms and banks).

We continue to emphasize the diversification potential of European equities. European stocks depend much less on the domestic economy than investors appreciate. This is made clear by the market's outperformance this year, even amid a European energy crisis. EUR breakup risk is low and will likely stay that way, as policymakers aim for more integrated and sustainable capital markets.

Return assumptions for UK equities increase from 4.1% to 7.3% in local currency terms. With a higher exposure to energy and materials companies, the UK market has been one of the best-performing stock markets recently. Still, because the earnings recovery has been so strong, the market has significantly de-rated in P/E ratio terms, and thus better valuations support our outlook. Our dilution assumptions are lower, too, reflecting balance sheet strength and strong cash flow generation. Margins are a detractor, though, especially given the market's more cyclical sector composition.

We see much better prospects for UK small and mid cap vs. large cap companies. Many of these companies are exceptionally innovative in the niche markets that they lead and have developed a global and growing footprint. This is particularly the case in industries such as retail and fintech, and in the broader industrial complex, where innovation is leading to market share gain. Our small cap return assumption improves from 7.2% to 9.4% in local currency terms.

Expected returns for Japanese equities increase from 5.0% to 7.8% in local currency terms. Stocks look attractively valued (vs. fairly valued last year). Even though margins remain slightly above our equilibrium assumption, we expect them to stay well above historical averages. With modest improvements in the domestic growth environment, coupled with increased efficiency, we expect higher EPS growth as the quality of the market improves over time.

Emerging markets

As in previous publications, we expect EM equites to outperform DM equities over our investment horizon. Emerging market stocks earn revenues in regions where nominal GDP is growing faster, supporting their earnings streams. This year, we update our methodology, taking a closer look at the nominal GDP growth pass-through to revenue growth. In some cases, we acknowledge, high inflation might support nominal GDP but hurt revenue growth in other ways.

This dynamic is particularly relevant in today's high inflation environment, especially for countries that face persistent inflation issues and steady long-term currency depreciation (India, South Africa and Brazil, for example). In such cases, we lower our revenue growth projections. Even with these adjustments, revenue expectations in emerging markets surpass those in developed markets. Additionally, compared with prior periods, we are less concerned about dilution in EM markets in the coming decades.

We raise our EM equity return assumptions 3.20% to 10.10% in USD terms. This compares to a 3.6% increase for DM equities. Regionally, EM Asian returns are 3.30% higher vs. last year at 10.20% in USD terms. We maintain the adjustments that we implemented last year to reflect the sectoral mix of China's equity market, which is leaning more toward technology and consumer sectors, with high margins. But this boost is offset by a valuation penalty, given ongoing risks of regulation in the country's corporate space. Together, these adjustments net out and we end up with a 9.40% local return for MSCI China and 9.50% for China A shares. In Korea and Taiwan, our expectations (7.9% for Korea, 7.5% for Taiwan) suggest more mature, DM-like equity markets.

Valuations are no longer a significant drag to our equity return forecasts

Exhibit 5A: Selected developed market equity long-term return assumptions and building blocks, in local currency terms

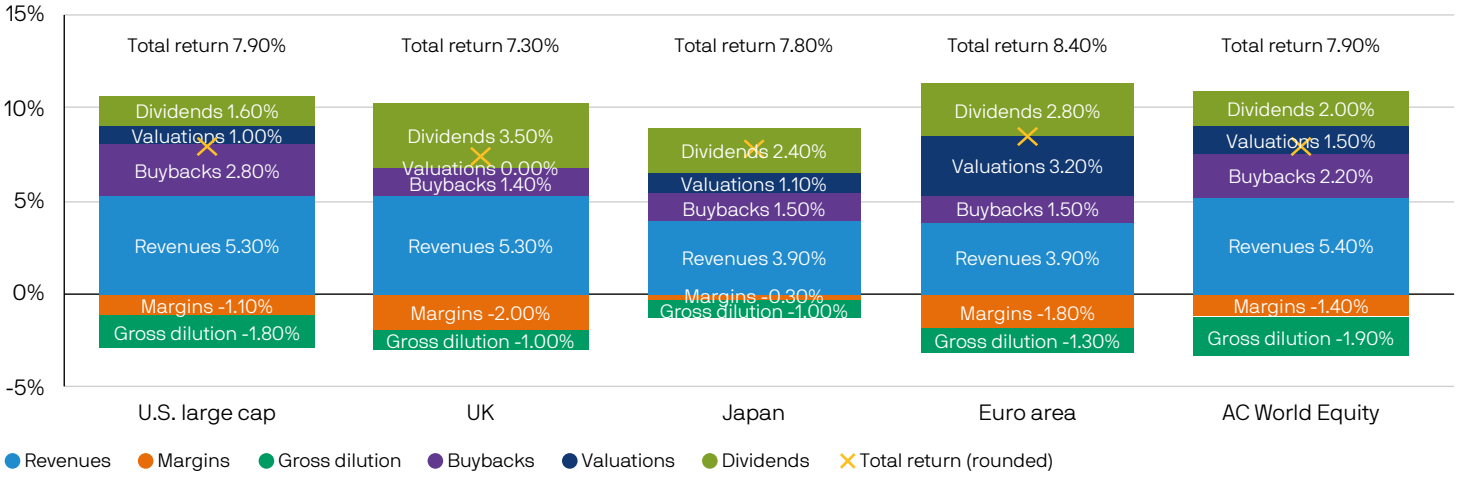
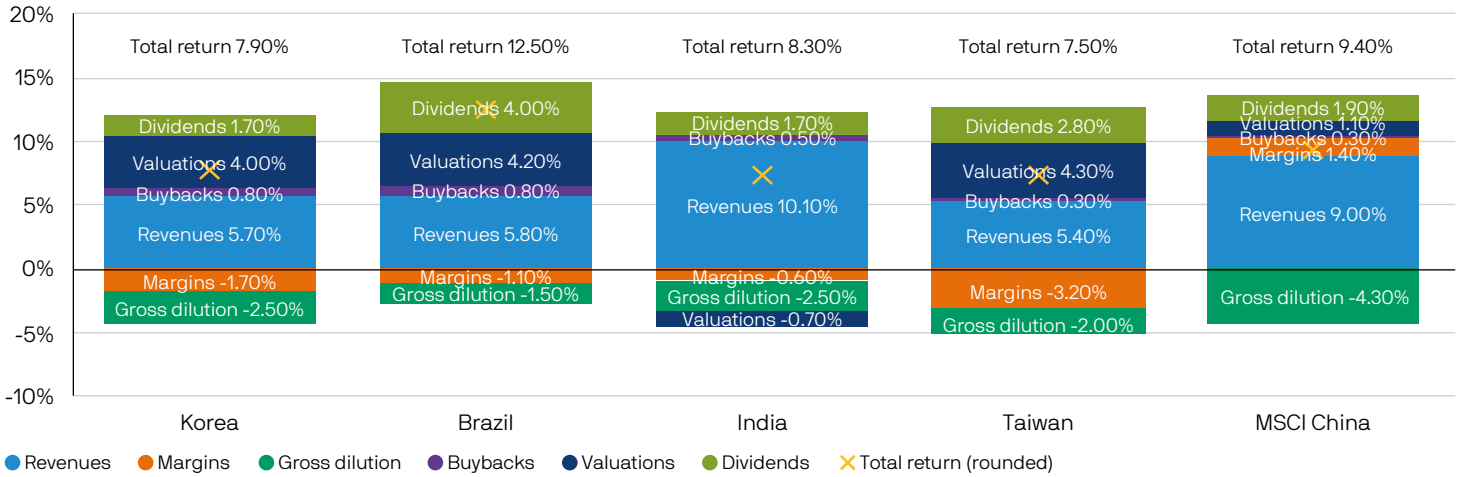


Exhibit 5B: Selected emerging market equity long-term return assumptions and building blocks, in local currency terms



Source: J.P. Morgan Asset Management; data as of September 30, 2022. Please note that figures may not sum up due to rounding. MSCI China is treated as an asset whose local currency is CNY.

We increase our Latin America return projections by 2.1% to 10.2% in USD terms. We expect more support from valuations, and a better dividend yield over the forecast horizon. Brazil ranks high in global equity returns in local terms (12.5%), but we note that currency risk and volatility are likely to be higher here. In **Exhibits 5A** and **5B** we present our long-term return assumptions and building blocks for developed market (DM) and emerging market (EM) equities.

Factors

Our long-term assumptions include return estimates for a range of long-only equity factor strategies. We cover five individual factor strategies (value, quality, momentum, minimum volatility and dividend yield) and multi-factor strategies in four geographies (U.S., global developed, international developed and emerging markets), with U.S. assumptions included in this report.

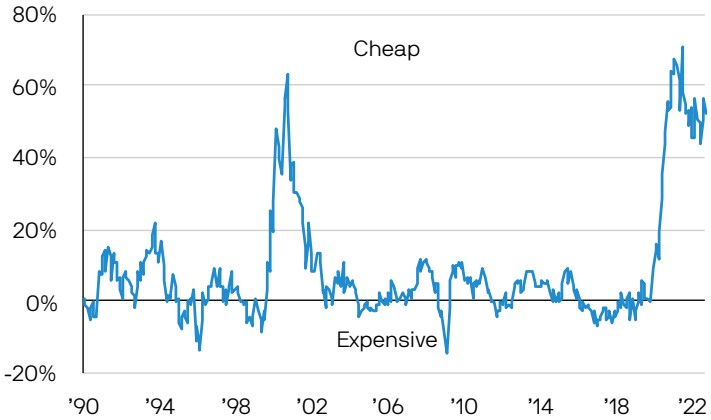
Our long-only factor strategy return assumptions reflect favorable valuations across a wide range of factors and signal the potential for significant excess returns relative to passive U.S. large cap equity exposures. Indeed, we see the most favorable valuation environment for factors in around 20 years (**Exhibits 6A** and **6B**).

Our long-only factor strategy return assumptions reflect favorable valuations across a wide range of factors

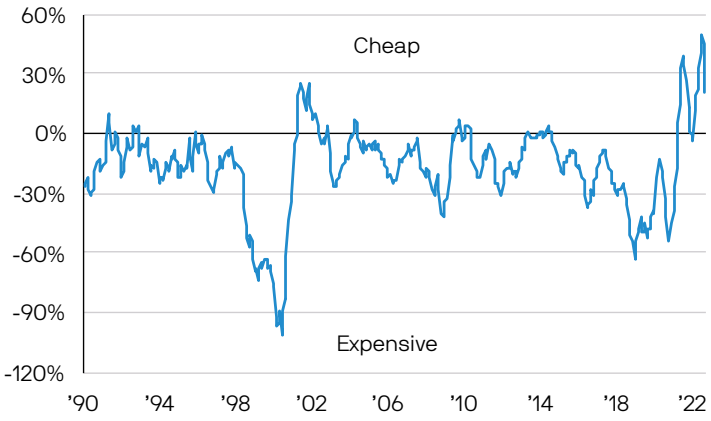
Exhibit 6A: Factor valuations, 1990–2022

U.S. Value: E/Y spread**

U.S. Quality: E/Y spread**



U.S. Momentum: E/Y spread**



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

** Valuation spread is defined as the difference in valuation (forward earnings yield) between top-ranked (Q1) and bottom-ranked (Q4) stocks, relative to a broad market universe.

Our long-term assumptions include return estimates for a range of long-only equity factor strategies

Exhibit 6B: Factor return building blocks

		U.S. diversified	U.S. value	U.S. quality	U.S. momentum	U.S. dividend	U.S. min vol
Equity market beta	(1)	0.85	1.00	0.90	1.10	0.90	0.75
Market return contribution (assuming equity market return: 7.90%)	(2)	7.09%	7.91%	7.36%	8.46%	7.36%	6.54%
Factor return contribution	(3)	2.35%	2.14%	0.48%	0.42%	1.49%	1.63%
Long-only factor strategy return assumption (2023)	**(2)+(3)=(4)**	**9.44%**	**10.05%**	**7.84%**	**8.88%**	**8.85%**	**8.18%**

Source: J.P. Morgan Asset Management; data as of September 30, 2022.

Methodology

We determine our long-term assumptions by examining properties of two index suites, designed by J.P. Morgan Asset Management and calculated by FTSE Russell. The J.P. Morgan Diversified Factor Suite describes the performance of stocks chosen for their characteristics across multiple factors; the J.P. Morgan US Single Factor Suite describes the performance of large U.S. companies chosen to target a single factor or characteristic. While there is no unambiguous, natural choice of index to represent long-only strategies in these spaces, we hope that these assumptions will help inform how investors think about asset allocation with respect to factors.

A long-only factor strategy return assumption is made up of a return contribution from equity market exposure and a contribution from its exposure to the factor itself. To reach a factor return assumption, we first make assumptions about the relative performance of the best and worst stocks according to a factor. Significantly, we measure them relative to their sector and geographical peers, isolating the pure factor performance. We rebalance the quartile portfolios monthly and incorporate conservative estimates for the cost of trading. We then apply a haircut to these returns to account for potential selection bias effects and market adaptation. These steps form a long-term baseline for our long-short factor return assumptions.

Next, we adjust for the current richness/cheapness of factors under the assumption that long-short factor returns are persistent but cyclical. Mechanically, we assume that the forward earnings yield differential between top-quartile stocks and bottom-quartile stocks will revert toward its long-term average over time, and adjust the factor return assumption accordingly. This year, the value and quality factors receive significant boosts from our valuation adjustment step, reflecting that the value factor is as cheap as it has been since the dot-com bubble, while the quality factor is nearly as cheap. In addition, momentum, which is typically biased to more expensive growth stocks, is currently favoring value stocks to the greatest extent since the dot-com bubble burst, removing what is usually a headwind to returns.

While the momentum factor is currently cheap, we do not assume a tailwind to returns based on valuations, given the potential for valuation spreads to converge because of composition shifts among top-ranked and bottom-ranked momentum stocks rather than price action.

Convertible bonds

Convertible bonds can improve the risk-adjusted returns of balanced stock-bond portfolios due to their asymmetric return profile and diversification benefits. In addition, convertible valuations can benefit from increased volatility, as they are implicitly long volatility via the optionality embedded within them. As a credit alternative, convertible bonds offer an income component and structurally lower duration than credit broadly. Consequently, convertibles will generally be more positively affected by rising stock values than negatively affected by rising interest rates due to their low duration.

For our convertible bond assumptions, we incorporate LTCMA return estimates for equity and fixed income, along with the convertibles' delta, credit quality and the underlying stock beta. While the geographic composition of the global convertible bond universe is similar to that of the MSCI World Index, it has historically been biased toward smaller companies and growth sectors. Our convertible bond assumptions estimate regional betas based on a historical regression, which is then applied to our regional weight and delta expectations.

In our view, the current trend of more issuance coming from North America and Asia ex- Japan will continue. We think the beta of the underlying equity of convertible bonds will continue to move higher as more growth and small and mid cap companies issue convertibles. For the fixed income component of convertible bonds, we make an assumption of future investment grade vs. high yield issuance and use our LTCMA regional credit return assumptions. We believe there will be more high yield issuance as a result of higher growth companies issuing convertibles as well as some cross-over activity from traditional sub-investment grade companies.

This year, our expected return for global convertible bonds and global credit sensitive convertible bonds (hedged into USD) are 9.10% and 7.20%, respectively. Credit-sensitive convertibles are securities whose underlying stock trades significantly below the conversion price, resulting in behavior more akin to debt than equity (**Exhibit 7**).

Conclusion

Following a meaningful correction in global equity markets in 2022, valuations look far more attractive than they did at the time of our last LTCMA publication. Our return assumptions increase significantly, from 5.0% to 8.5% for global equities in U.S. dollar terms, thanks in large part to greater optimism for U.S. markets.

Profit margins remain above historical averages, a potential headwind to returns. We expect some mean reversion from elevated levels, but our equilibrium margins are above historical averages. That reflects our conviction that the market's sector composition and capital structure enhancements have made corporate profitability more resilient. Additionally, compared with previous decades, we expect buybacks and dividends to play a larger role in total returns.

The sharp rotation in market leadership from secular growth to commodity and value markets has reminded us of the importance of diversification. While the expected return premia of non-U.S. markets and small cap stocks have decreased relative to the past, we still see attractive opportunities to complement U.S. large cap holdings. FX will also be an important tailwind to international markets for U.S. dollar-based investors given our view of USD weakness over time. Greater expected divergence among regions, countries and sectors should also support active management as part of an overall investment toolkit.

Expected returns move significantly higher across sectors and regions

Exhibit 7: Convertible bond long-term return assumptions, 2023 vs. 2022

	2023 return assumptions*	2022 return assumptions	Change y/y
Global convertible bonds	9.10%	5.50%	3.60%
Global credit sensitive convertible bonds	7.20%	4.60%	2.70%
Global investment grade convertible bonds	7.30%	4.10%	3.20%
U.S. convertible bonds**	9.00%	4.50%	4.50%
Europe convertible bonds	8.30%	4.90%	3.30%
Japan convertible bonds	6.20%	3.90%	2.30%

Source: J.P. Morgan Asset Management; data as of September 30, 2022. * All returns are hedged in USD. ** U.S. convertible bonds have a higher expected return compared to U.S. large cap and U.S. high yield, as the underlying equities of U.S. convertible bonds typically have higher beta (we assume beta of 1.2). Moreover, compared to the U.S. large cap and U.S. high yield markets, the U.S. convertible bond market is more biased toward growth sectors such as technology and health care. As the growth sector has de-rated significantly, the starting valuations of convertible bonds are much more attractive, resulting in higher expected returns.

Alternative asset assumptions

Sourcing uncorrelated returns in a period of rising market risk

Authors

Anthony Werley
Chief Investment Officer, Endowments & Foundations Group

Pulkit Sharma, CFA, CAIA
Head of Alternatives Investment Strategy & Solutions

Shay Chen, CFA, CAIA
Alternatives Strategist, Alternatives Investment Strategy & Solutions

Jason DeSena, CFA
Alternatives Strategist, Alternatives Investment Strategy & Solutions

In brief

Changes – both positive and negative – impact our alternative asset outlook, but these strategies and sectors continue to play an important role in portfolio diversification, return and cash flow in the context of volatile markets.

Private equity: Our return assumptions rise, driven by the public market component. Cyclical factors deflate returns in the near term while dry powder raises potential future returns. We see ample potential for alpha across a broadly changing economy.

Venture capital: We expect to see venture capital continue to marginally underperform private equity, as it has historically, with much higher return volatility.

Direct lending: Return estimates increase as base rates rise and available financial capital becomes increasingly scarce. Although fundamental headwinds are strengthening, the nature of direct lending transactions supports premium returns vs. public market equivalents.

Hedge funds: Assumptions rise moderately across all strategies, with particular emphasis on macro. The overall environment for alpha improves, based on rising risk asset volatility, interest rate projections and strong positive momentum for commodities.

Real estate: Return estimates for private real estate decline across all regions due to exit capitalization expansion and the rising cost of capital, although sector dispersion may offset some challenges. The outlook for **REITs**, however, has improved, based on attractive starting valuations.

Infrastructure: Return projections remain robust. We expect infrastructure to continue to provide meaningful inflation protection and portfolio diversification in a rising rate environment.

Transport: Operating yield for global core transport continues its upward trajectory, supported by strong demand and dynamic seaborne trade flows; key return drivers include COVID-19 disruptions, inflation, geopolitical tensions and high asset utilization.

Timber: Timberland's operating yield has increased given the constrained supply of the asset globally. Driven by timberland's environmental, social and governance attributes and inflation-hedging qualities, strong growth in investor interest and limited timber supply support our return projections.

Commodities: Our return assumptions for long-term broad-basket commodities improve on the margin despite the aging of the cycle.

Across all alternative sectors and strategies, future performance may exhibit wider dispersion of returns

Exhibit 1: Selected alternative strategies – return assumptions (levered,* net of fees, %)

Financial alternatives	2023	2022
Private equity (USD)**		
Cap-weighted composite	9.90	8.10
Private equity - small cap	9.50	7.40
Private equity - mid cap	9.40	7.60
Private equity - large/mega cap	10.20	8.40
Private debt (USD)		
Direct lending	7.80	6.90
Venture capital (USD)		
Venture capital	8.50	n/a
Hedge funds (USD)		
Equity long bias	5.00	3.30
Event-driven	5.40	3.20
Relative value	4.90	3.80
Macro	4.10	2.70
Diversified†	5.00	3.60
Conservative††	3.70	3.30

Real assets	2023	2022
Real estate - direct (local currency)		
U.S. core	5.70	5.80
U.S. value-added	7.70	7.70
European core	4.70	4.80
European value-added	6.70	6.80
Asia-Pacific core	6.10	6.50
REITs (local currency)		
U.S. REITs	6.80	5.70
European REITs	6.10	5.10
Asia-Pacific REITs	5.10	5.00
Global REITs‡	6.40	5.40
Global infrastructure (USD)		
Core	6.30	6.10
Global transport (USD)		
Core	7.50	7.40
Global timber (USD)		
Global timber	6.70	n/a
Commodities (USD)		
Commodities	3.10	2.60
Gold	3.50	3.00

Source: J.P. Morgan Asset Management; estimates as of September 30, 2021, and September 30, 2022.

* All return assumptions incorporate leverage, except for commodities, where it does not apply.

** The private equity composite is AUM-weighted: 65% large cap and mega cap, 25% mid cap and 10% small cap. Capitalization size categories refer to the size of the asset pool, which has a direct correlation to the size of companies acquired, except in the case of mega cap.

† The Diversified assumption represents the projected return for multi-strategy hedge funds.

†† The Conservative assumption represents the projected return for multi-strategy hedge funds that seek to achieve consistent returns and low overall portfolio volatility by primarily investing in lower volatility strategies such as equity market neutral and fixed income arbitrage. The 2023 Conservative assumption uses a 0.70 beta to Diversified.

‡ The global composite is built assuming the following weights: roughly 65% U.S., 15% Europe and 20% Asia-Pacific.

Overview

With resurgent risks affecting all public markets, alternatives once again demonstrate their strength as sources of less correlated returns in diversified multi-asset portfolios (**Exhibit 1**). Unlike last year, however, we expect to see future performance across sectors and strategies affected by these risk inputs and exhibiting wider dispersion in returns. In **financial alternatives**, we anticipate that challenging market crosswinds will affect potential alpha generation within both private equity (PE) and hedge funds – but with very different results. In **real assets**, the return outlook varies by category; our projections now fall broadly between public equities and fixed income on the efficient frontier, in line with their long-term average positioning. Diversification, stable returns and inflation protection are all central to their ongoing appeal.

In **private equity**, we anticipate a rising long-term market outlook for public equity to be supportive of future performance, with the uplift in private equity entirely driven by market beta. In the short term, however, the risk of valuation markdowns creates a potential drag on returns. Although alpha is lower, it remains solidly above the 15-year average – even if stubbornly below the 20-year average – and we consider it adequate for the risks taken.

Although many investors assume that **venture capital** (VC) has outperformed over time, looking at annualized returns since 1981 shows that private equity has actually outperformed venture capital, primarily due to the higher volatility of venture capital returns. Although a return to a lower interest rate environment would support venture capital performance – a scenario that is implicit in our macroeconomic forecast – it will not happen overnight. Furthermore, given the extreme dispersion of returns across managers, we currently expect to see VC continue to marginally underperform private equity, as it has historically, with much higher return volatility.

For **hedge funds**, increased market volatility begets price dislocations – and greater opportunity. Rising interest rates are also a direct positive for most hedge funds. From our perspective, a diversified hedge fund strategy can make a favorable portfolio contribution by delivering less correlated returns and dampening volatility.

Direct lending benefits from a confluence of market factors that we expect to persist in the medium term as interest rates rise and lenders reap the rewards of enhanced post-pandemic contracts and still-low default rates. The impact of rising rates on issuer interest coverage ratios, financing costs and net asset value (NAV) stability constitute the most significant near-term risks to our 2023 assumptions.

In an inflationary environment, many real asset sectors – such as global **real estate** and **infrastructure** – offer implicit or explicit inflation linkage characteristics and downside protection; historically, real estate performs well when there is tight supply and inflationary tailwinds. This scenario provides pricing power to reset rents, and valuations rise due to higher input costs. Our outlook for infrastructure also remains stable, thanks to the steady income and inflation protection attributes of the asset class, which provides essential services.

Unsurprisingly, today's lower starting equity valuations (and higher fixed income yields) contribute to the **REITs'** enhanced returns in our current assumptions: Supported by attractive valuations, the outlook for REITs has improved recently, creating a divergence in our views on private and public real estate.

Current market tailwinds also benefit the operating yield of several real asset categories: global core **transport** and **timberland**. Transport continues its upward trajectory, supported by strong demand and dynamic trade flows. Similarly, timberland's operating yield exhibits strong momentum, thanks to the rebound of new home construction in the U.S., which is now in line with the long-term average. For all real assets, debt has become significantly less accretive due to the increased cost of borrowing, resulting in a more modest leverage assumption.

In **commodities**, recent developments in an array of sub-asset classes support our above-inflation return outlook, including supply tightness (and modest demand growth) in energy and metals extraction, and climate change-related impacts to agricultural production. The war in Ukraine and the geopolitics of energy serve to highlight the fragility of supply across the entire commodity complex.

In an investment landscape in which traditional assets offer improved returns, active management in financial alternatives and real assets – via thoughtful allocation and the selection of top-tier managers – becomes more critical in realizing alternatives' potential for alpha, inflation sensitivity and diversification.

Financial alternatives

Headwinds strengthen, but opportunities for alpha generation remain

Private equity

Our 2023 private equity return assumptions rise noticeably from last year's projections. The public market component drives all of the increase, while cyclical valuation factors and ongoing trends deflate returns on the margin (**Exhibit 2**). Although alpha has declined modestly year over year, it still surpasses the 15-year average for a median manager, which reflects our economic change thesis (below). In the near term, cyclical valuation write-downs affect our outlook, and secular factors – including the rising cost of debt and strong competition for deal flow amid a wall of dry powder – weigh on returns. Exit multiple compression may also burden the return outlook, although most of that impact is embedded in the valuation write-down noted above.

We believe the PE return premium will provide adequate compensation for the illiquidity and leverage risk taken vs. public markets, particularly in an environment of increased asset volatility.

Private equity assumptions rise, primarily driven by higher public market return expectations

Exhibit 2: Private equity and venture capital return assumptions (USD, %)

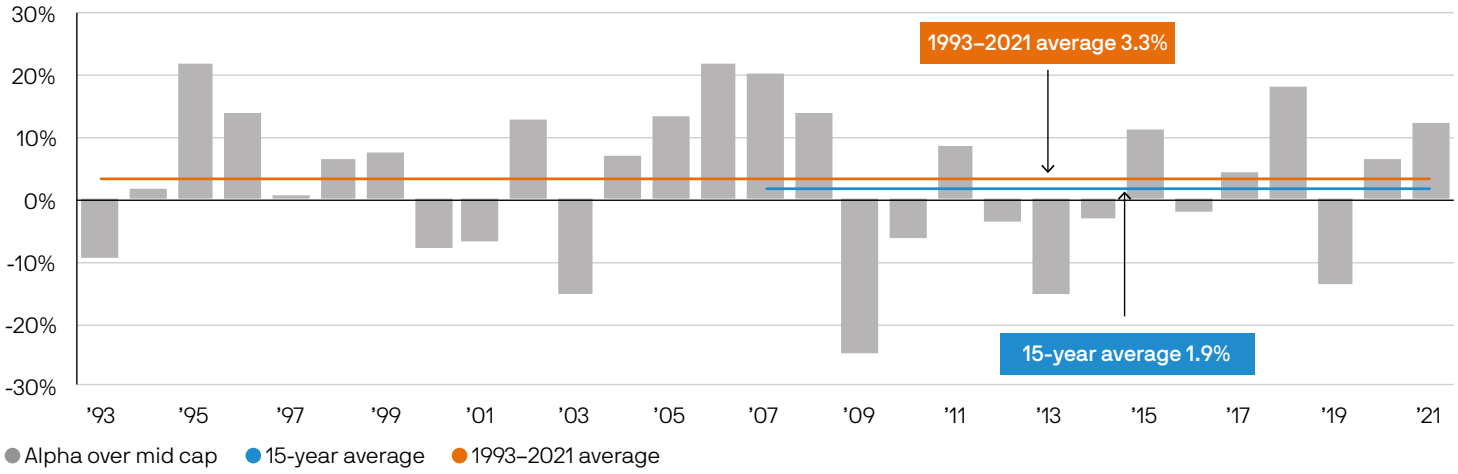
Private equity fund size	2023	2022
Cap-weighted composite	9.90	8.10
PE – small cap (<USD 1bn)	9.50	7.40
PE – mid cap (USD 1bn–USD 5bn)	9.40	7.60
PE – large/mega cap (>USD 5bn)	10.20	8.40
Venture capital	8.50	n/a

Source: J.P. Morgan Asset Management; estimates as of September 30, 2022.

We model financial sponsors as change agents, enhancing growth and operational efficiency, especially those ranking average or above average in their peer group. As such, we see ample investment potential across a broadly changing economy (**Exhibit 3**). Managers will uncover opportunities in digitalization; housing; health care; environmental, social and governance (ESG); and cybersecurity, and will also face the challenges of geopolitical risk and globalization that is past its peak. We expect PE investing will increasingly involve growth capital, direct investing, subscription lines of credit and commitment drawdown fee economics.

We see ample investment potential across a broadly changing economy, which should allow managers to generate adequate – if moderately lower – alpha

Exhibit 3: Historical premium of PE to U.S. mid cap equity (1993–2021)*,**



Source: Bloomberg, Burgiss Private iQ, J.P. Morgan Asset Management; data as of March 31, 2022.

* Includes buyout and expansion capital funds

** The historical premium to U.S. mid cap returns (shown here) is not directly comparable to the forward-looking PE cap-weighted composite alpha trend assumption. Our alpha trend assumption reflects a range of public market exposures (across regions and size categories) in addition to U.S. mid cap, the dominant market exposure.

Building blocks: Public market beta, alpha

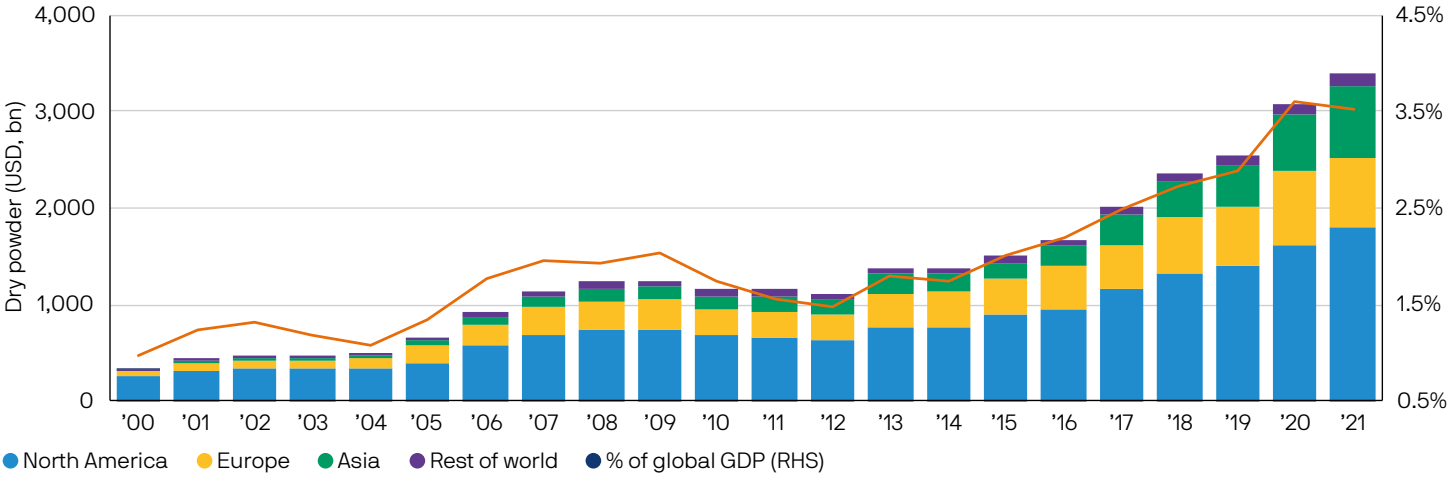
We base our core buyout/growth capital return projections on public market beta, derived from our Long-Term Capital Market Assumptions (LTCMA) public market return expectations. The PE return premium we add is slightly higher than it has been in previous periods, reflecting the role that growth sectors and the growth capital style of investing now play in PE investing, as well as the widespread use of operational tools, such as subscription lines of credit. The geographic investment breakdown follows from industry sources' intentions for dry powder, with the U.S. market's percentage modeled by mid and small cap markets (**Exhibit 4**).

We base our alpha expectations primarily on average alpha trends, with an eye toward periods that seem closest to the investment environment facing the industry over the next 10–15 years. In previous LTCMAs, we referenced the more robust alpha environment of the 1993–2000 period. In this year's projection, we focus on the alpha potential encompassed by the opportunity of a changing global economy that, in part, harkens back to the strong industry alpha regime of the 1990s. Our return projections remain bounded, however, by dry powder, near-term markdowns (which we have explicitly identified as a separate line item this year, given their potential impact on future performance) and the rising cost of debt (**Exhibit 5**). Our outlook now aligns more closely with the less robust alpha environment of the past 15 years.

We make adjustments in our forecasting model to reflect the broader PE environment, including levels of dry powder and the use of investment options such as direct investment, lines of credit and fees.

Growth sectors and the growth capital style of investing are playing a rising role in PE, and managers now have access to record amounts of dry powder

Exhibit 4: Volume of dry powder by geographic region and as a % of global GDP



Source: International Monetary Fund, Preqin; data as of December 31, 2021.

Our methodology reflects our assessment of the alpha potential of the current period, adjusted for excess capital to invest (reserves), the rising cost of debt and the use of various investment options

Exhibit 5: Components of return

	Small PE (<USD 1bn)	Mid PE (USD 1bn–USD 5bn)	Large/mega PE (>USD 5bn)*	Cap-weighted**
Public market exposures				
U.S. small cap	100%	40%		
U.S. mid cap		50%	55%	
Europe		10%	20%	
Japan†			5%	
Asia ex-Japan			20%	
Assumptions (USD, %)				
Public market exposure	8.10	8.30	9.00	8.70
Alpha trend	2.30	2.20	2.40	2.30
NAV public market adjustment††	-0.90	-1.10	-1.20	-1.10
2023 LTCMA‡	**9.50**	**9.40**	**10.20**	**9.90**
2022 LTCMA‡	7.40	7.60	8.40	8.10

Source: J.P. Morgan Asset Management; estimates as of September 30, 2022.

* The regional weights for Large/mega PE composite are: U.S. 55%, Europe 20%, Japan 5% and Asia ex-Japan 20%. These capitalization weights were calculated using data from Preqin.

** The private equity composite is AUM-weighted: 65% large cap and mega cap, 25% mid cap and 10% small cap. Capitalization size categories refer to the size of the asset pool, which has a direct correlation to the size of companies acquired, except in the case of mega cap.

† The Japan weight is an extrapolated number.

†† The NAV public market adjustment accounts for the drawdown in public equity market returns.

‡ Includes impact of translation into USD.

Dispersion in managers' performance

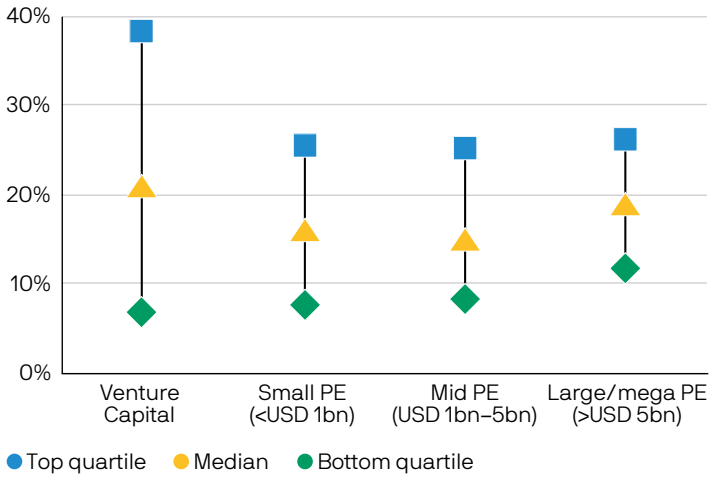
Our PE return projections are founded on managers' average or median returns. Dispersion in PE manager performance has been historically wide relative to public market manager dispersion (**Exhibit 6**). We think this trend will continue. Manager selection thus remains a key element in achieving an above-adequate PE return premium.

Conclusion

Since last year, the environment for PE investing has become more problematic. Discount rates have risen, valuations have plummeted, and dry powder remains high. With those shifts, PE-owned companies' NAVs – which remain wide vs. those of listed companies – are likely to narrow, further challenging our beta and alpha projections. The economy is now in transition, but direct investing and modest fee accommodations should help offset the industry's wall of dry powder and NAV markdowns.

Historically, manager dispersion in PE has been wide – and it will continue to be, underscoring the importance of manager selection

Exhibit 6: Historical returns by manager percentile ranking (IRR, USD)*



Source: Burgiss Private iQ, J.P. Morgan Asset Management; data as of March 31, 2022.
* Includes buyout and expansion capital funds for vintages 2006 to 2022.

Venture capital

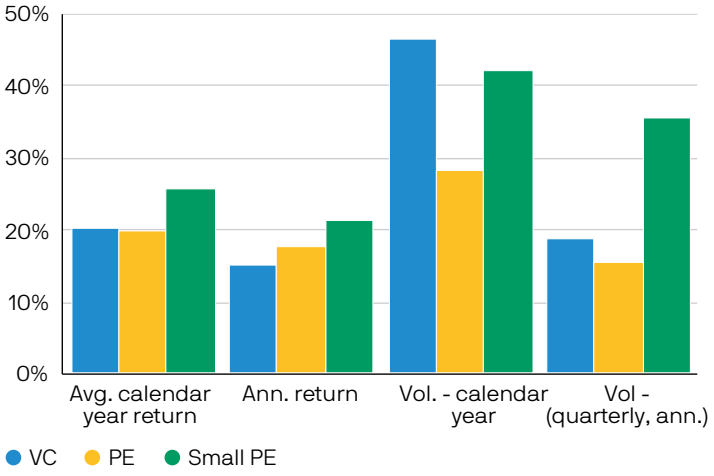
This year, we introduce return projections for venture capital alongside our private equity assumptions. Our 2023 return forecast calls for venture capital to deliver annual returns of 8.50% over our 10–15 year investment horizon.

Building blocks and methodology

In forming a return estimate for venture capital, it is important to review the characteristics of the historical data set. Although many investors assume that venture capital has outperformed over time, annualized returns since 1981 show that private equity has outperformed venture capital, primarily due to the higher volatility of venture capital returns (**Exhibit 7**). In the aftermath of the tech bubble collapse in the early 2000s, for example, venture capital saw outsize losses.

Over a 40-year period, venture capital has underperformed private equity and proven more volatile

Exhibit 7: Venture capital vs. private equity returns and volatility (1981–2021)



Source: Burgiss, J.P. Morgan Asset Management; data as of August 31, 2022.

In an effort to capture the true trend in what is a very idiosyncratic asset class, we have chosen a statistical approach to generate our long-term assumption. In calculating an expected return for venture capital, we took both a fundamental, bottom-up approach and a top-down view.

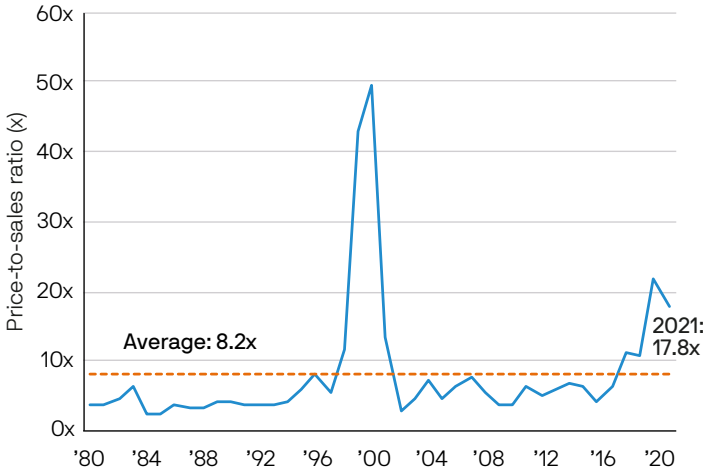
We ran two bottom-up analyses using different combinations of independent variables,[1] whereas our top-down approach looked at the relationship between private equity and venture capital returns over time. For the first iteration, we added the average historical spread between year-over-year quarterly venture capital and private equity returns on both an arithmetic and a geometric basis. The second iteration of our top-down approach used the historical statistical relationship between quarterly venture capital and private equity returns on a year-over-year basis.

Conclusion

Looking ahead, we recognize the outsize returns experienced during the pandemic and the revaluation of assets that has occurred alongside the rerating in public markets this year. Valuations may continue to fall, and our forecast implies that valuations will be in line with the average across the forecast horizon (**Exhibit 8**).

Venture capital valuations ended 2021 well above long-run averages

Exhibit 8: Venture capital IPO price-to-sales ratio (1980-2021)



Source: Burgiss, J.P. Morgan Asset Management; data as of August 31, 2022.

A return to a low interest rate environment, as seen in the expansion following the financial crisis, would support venture capital returns – a scenario that is implicit in our macroeconomic forecast. However, this will not happen overnight. Furthermore, given the extreme dispersion of returns across managers, we expect to see venture capital continue to marginally underperform private equity, as it has historically, with much higher return volatility. Investors need to be aware that venture capital remains a challenging asset class to navigate – and may not deliver returns commensurate with greater risk.

[1] Independent variables include: small private equity buyout returns (zero to USD 500 million), 10-year U.S. Treasury yield, U.S. real GDP growth, S&P 500 total returns, relative performance of the the Russell 2000 Index vs. the Russell 2000 Growth Index (total return), price-to-sales (P/S) ratios of VC-backed IPOs and the number of VC-backed IPOs.

Direct lending

Our 2023 projections for private debt climb to 7.8% from 6.9% last year, reflecting starting spreads of more than 6.0% as well as our view that the base cash/secured overnight financing rate (SOFR) will rise from current levels. This increase is partially offset by higher financing costs. The current sweet spot we have observed recently in direct lending investing (with the strategy offering premium spreads and fees vs. poorer public market options and negligible underwriting losses) is likely to shrink over time, however, as assets under management surge and underwriting standards fall.

Return estimation methodology and building blocks

Our 2023 assumptions reflect two enhancements we made to our methodology this year that impact the all-in cost of financing: We replaced "illiquidity" with "fees" as a category to represent typical fees obtained on middle market loans. We also included a new category called "administration fees" to incorporate fees managers typically charge back to funds (**Exhibit 9**).

Direct lending as market risks rise

Our 2023 outlook starts from a position of strength. Previous portfolio performance has been – and, we expect, will continue to be – driven by select industry exposures, seniority within the capital structure (evidenced by managers choosing to originate a larger percentage of transactions as senior secured first-lien debt) and a focus on assets with resilient business models.

As recently as late 2021, financing competitors were retreating from the space, which had experienced a post-pandemic uptick in underwriting standards. Barriers to entry remain high: Direct lending providers need to have strong origination networks and the capacity to provide customized, one-stop services and swift execution in the midst of uncertain syndicated loan market conditions. The apparent "free lunch" of 550 basis points (bps) and 650bps, which are representative of spreads (plus fees) for large and midsize deals, respectively, ignores the reality on the ground. In the capital markets, there is a material cost for customization, illiquidity and shrinking financing options. Those variables appear – at least for now – to be fully priced in current spread and fee terms.

Financing costs and fee adjustments filter through our enhanced methodology for direct lending

Exhibit 9: Building blocks for direct lending return assumptions

USD, %	Rate/spread	
Base rate (cash)	2.40	LTCMA assumption for cash
Weighted-average spread	6.10	Based on anticipated leveraged loan spreads, weighted for issuance quality and seniority
Fees	1.00	Represents additional return relative to liquid loan alternatives in the form of upfront fees and pre-payment premiums (amortized over a three-year period).
Starting yield	**9.50**	**Cash + spread + fees**
Leverage	9.50	Reflects 1x turn of leverage added
Credit cost	-1.90	Assumed defaults, net of assumed recoveries in restructuring scenarios
Cost of financing	-5.00	Estimated total cost of funding for an asset-based facility (spread, LTCMA cash rate and fees)
Administration fees	-0.80	Based on manager discussions of fund administration fees.
Fees	-3.50	Based on manager discussions of management and performance fees on levered assets
2023 Net levered return	**7.80**	**Sum of starting yield + leverage + credit cost + cost of financing + fees**
2022 Net levered return	**6.90**	

Source: J.P. Morgan Asset Management; estimates as of September 30, 2022, and September 30, 2021.

Deal flow diminishes

Fundamental headwinds for lenders are rising as private equity volumes shrink and the slowing economic outlook puts pressure on corporate fundamentals. The impact of rising rates on issuer interest coverage ratios, financing costs and NAV stability – and the prospect of experiencing an actual credit default cycle – constitute both near and longer-term considerations.

The current credit cycle is not yet over, however, and commentaries from the larger publicly traded direct lending vehicles (business development companies, which primarily power direct lending) indicate healthy credit performance to date. We model our direct lending outlook in the context of such active management, which will (we assume) work to offset fees and moderate exposure to potential losses when more normal credit cycle patterns reemerge.

Conclusion

Our latest return assumptions reflect our concerns with the maturing of the credit cycle – and its probable impact on direct lending industry underwriting performance, by reducing the all-in return premium for private debt vs. leveraged loans and high yield bonds, which now drops below historical return spreads.

Hedge funds

Our 2023 hedge fund return projections rise moderately across all strategies (**Exhibit 10**). Although the drivers of the increase are mixed, the overall environment for industry alpha has improved over the past two years, since the post-pandemic economic recovery began; therefore, we are projecting it to be slightly above average vs. the past 15 years. By strategy type, some clear distinctions emerge: We anticipate a better outlook for macro strategies, for example, and more subdued performance for the equity long-biased style.

Hedge fund returns remain attractive as a portfolio diversifier. Expectations of increased market volatility, coupled with potential return contributions from niche private market strategies (particularly within the private debt and structured debt space), add to the hedge fund sector's appeal. The relatively wide dispersion of manager returns also contributes to the allure of the strategy class, although strong due diligence is required – as is access to top-tier managers.

In line with last year's LTCMA return assumptions, we again note an uptick in the performance outlook for macro strategies, which is entirely due to continued improvement in expected alpha. We attribute this trend to rising risk asset volatility generally and in particular to the projected interest rate outlook and positive price momentum for commodities over the next few years. Cross-asset factor and intra-asset returns – especially within foreign exchange – also contribute materially to this improved outlook.

Hedge fund assumptions rise, driven by higher public market return and alpha expectations for most strategies

Exhibit 10: Hedge fund return assumptions (USD, %)

Strategy	2023 LTCMA	2022 LTCMA
Equity long bias	5.00	3.30
Event-driven	5.40	3.20
Relative value	4.90	3.80
Macro	4.10	2.70
Diversified*	5.00	3.60
Conservative**	3.70	3.30

Source: J.P. Morgan Asset Management; as of September 2022.

* The Diversified assumption represents the projected return for multi-strategy hedge funds.

** The Conservative assumption uses a 0.70 beta to Diversified for the 2023 assumption. The 2022 Conservative assumption used a 0.65 beta to Diversified.

Return estimation methodology and building blocks

Our return projections are primarily based on a multi-factor modeling framework that captures the most important systematic risks and performance generators for each fund strategy class. Essentially, this approach uses regression analysis based on historical industry performance data to extract the beta, or public market drivers of return, from the alpha, or idiosyncratic skills-based return contributors. What our statistical analysis cannot identify as a market factor we attribute as alpha, and every strategy's return projection is the sum of its beta and alpha components. Ultimately, we arrive at a return projection by overlaying the factor model's output with our own judgment, which is informed by various historical beta and alpha regimes (**Exhibit 11**).

Differentiating between beta and alpha drivers of hedge fund strategies

Exhibit 11: Components of hedge fund strategy returns

2023 forecast	Equity long bias	Event-driven	Relative value	Macro	Diversified*	Conservative**
Beta return	3.57	3.31	1.54	1.38	2.66	1.86
Alpha trend line	1.44	2.04	3.36	2.76	2.33	1.85
Return expectation	5.01	5.35	4.90	4.14	4.99	3.71
Rounded	**5.00**	**5.40**	**4.90**	**4.10**	**5.00**	**3.70**
2022 LTCMA	3.30	3.20	3.80	2.70	3.60	3.30
Change	1.70	2.20	1.10	1.40	1.40	0.40

Source: J.P. Morgan Asset Management; as of September 2022.

* The Diversified assumption represents the projected return for multi-strategy hedge funds.

** The Conservative assumption uses a 0.70 beta to Diversified for the 2023 assumption. The 2022 Conservative assumption used a 0.65 beta to Diversified.

More recently, we have enhanced our approach by migrating from a long-only based regression model to a spread methodology that utilizes long-only and long-short data factors to better capture the industry's investment dynamics over time. The enhanced predictive power of this new approach can be seen in the R-squared value, which ranges between 0.86 and 0.93 for all strategies (save macro), indicating the improved "fit" of the data to our analysis (**Exhibit 12**). Although macro's constantly changing investment profile and multiple asset class positions are harder to capture with our analytical model, the results are still meaningful.

Conclusion

If, as we anticipate in our latest LTCMA assumptions, fixed income delivers modest returns and equity performance strengthens in an environment of rising market volatility, a diversified hedge fund strategy can make a favorable portfolio contribution by delivering less correlated returns and dampening volatility. More importantly, our return, volatility and correlation assumptions, when deployed within an optimization framework, suggest that hedge funds can actually play a larger role than that indicated by the 5.0% return assumption, especially if manager performance exceeds the mean returns modeled in our 2023 projections (**Exhibit 13**).

Hedge fund monthly alpha assumptions mostly rise driven by higher expected r^2 expectations for most strategies

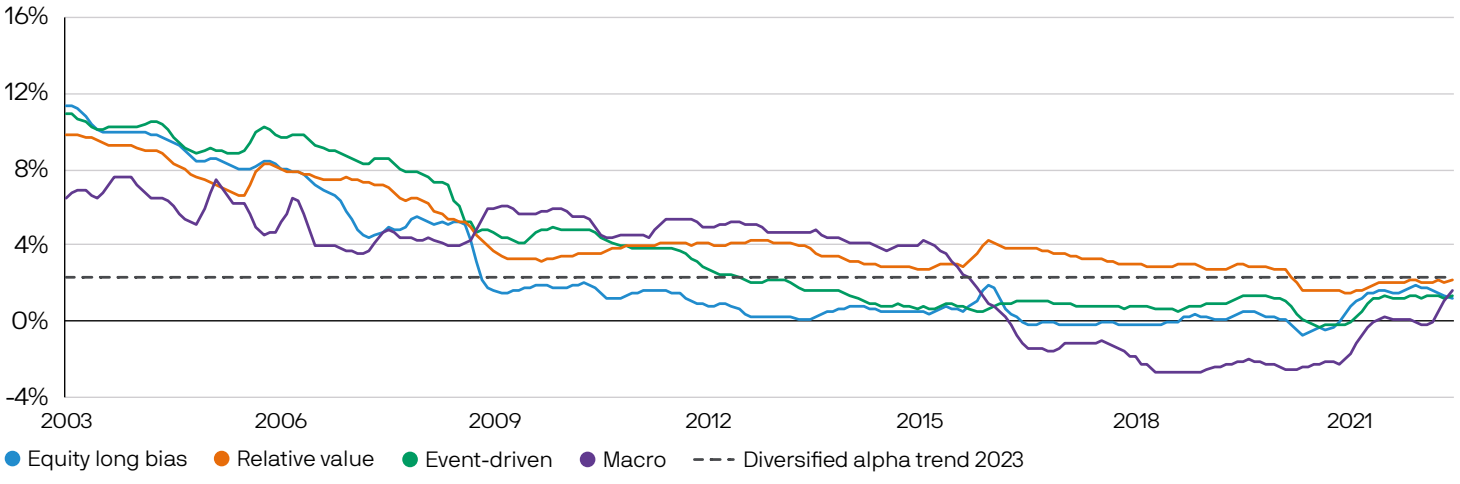
Exhibit 12: Hedge fund model assumptions

2023 forecast	Monthly intercept	SPTR	SC_LC	EAFE_ SPTR	EM_ EAFE	HY_IG	EMD_IG	CNVT_ SPTR	US10Y	COMDTY	DXY	r-sq
HFRI Equity Hedge Index	0.12%	0.44	0.21	0.04	0.01	–	–	–	–	–	–	0.87
HFRI Event Driven Index	0.17%	0.14	–	0.08	(0.00)	0.43	0.15	0.25	–	–	–	0.88
HFRI Relative Value Index	0.28%	–	–	–	–	0.32	0.29	0.13	0.00	–	–	0.86
HFRI Macro Total Index	0.23%	0.10	–	0.02	0.00	–	(0.13)	–	0.11	0.14	0.06	0.24
HFRI Fund Weighted Composite Index	0.12%	0.29	0.08	0.13	0.04	(0.00)	0.13	0.18	(0.00)	0.07	0.07	0.93

Source: J.P. Morgan Asset Management; estimates as of September 2022.

Hedge fund alpha trend line assumptions mostly rise; diversified alpha's 2023 trend line rises to 2.3%

Exhibit 13: Hedge fund alpha trend line assumptions



Source: J.P. Morgan Asset Management; as of September 2022.

Real assets

Stable, inflation-sensitive and differentiated return

Our long-term assumptions for real assets have remained stable or declined slightly from last year's assumptions. As public markets experienced severe drawdowns recently, real assets demonstrated strong return resiliency – with real estate in particular generating record returns. Given the improved return outlook for many traditional public market asset classes, the relative attractiveness of real assets has declined. However, real assets are projected to continue to deliver low volatility returns driven by income, which – coupled with attractive downside risk resiliency – have the potential to provide diversification benefits as part of an overall portfolio.

Model and methodology

Real assets

We apply a building-block approach to constructing our leveraged return assumptions for global real assets, on a net of fees basis. For private core real assets, we start with net operating income (NOI) and adjust for maintenance capital expenditure, net cash flow growth and exit yield; we incorporate leverage and then deduct industry fees. To capture the unique nature and distinct return drivers of each real asset category more specifically, we incorporate slight deviations in the building blocks, but our approach is broadly consistent (**Exhibit 14**).

In real estate, for example, the value-added return uses the core real estate return as a starting point and adjusts for the valuation spreads between core and non-core assets. For REITs, we start from an unleveraged property return, given that REITs are ultimately subject to the same underlying fundamentals as private real estate. We also take into account differences in sector composition, leverage and amortization-to-net asset value discounts (or premiums) in deriving our performance projections.

Our approach to constructing leveraged return assumptions is broadly consistent across real asset categories

Exhibit 14: Real assets illustrative building blocks

	Core real assets returns
=	Starting NOI yield
-	Maintenance capex
+	Net cash flow growth
+	Exit yield adjustment
-	Standard industry fees
+	Leverage impact

Source: J.P. Morgan Asset Management.

Commodities

For commodities, however, we take a slightly different approach in constructing our return projections: Our model begins with a cash return assumption and then adds a premium or discount based on current commodity cycle positioning and expected price trajectories. We make further adjustments related to per capita consumption patterns in emerging markets and the anticipated decline in trade-weighted USD. Finally, we layer in a gold premium based on rising global demand and discount fees to create a total return expectation (**Exhibit 15**).

In looking at price gains for the average cycle going forward, we have modified our thesis as supply issues increasingly take center stage in driving our outlook. We maintain our view that "capital starvation" supply constraints will continue to affect supplies in energy and metals as investors remain unwilling to provide sufficient capital to these sectors. We harbor additional concerns about the impact of geopolitics and environmental regulations on supply availability.

Two approaches to commodities forecasting arrive at the same return assumption

Exhibit 15: Building blocks for commodities return assumptions

Cycle-based methodology	2023	Details	Index-component methodology†		2023
			Index component:	Return assumptions	Composite weights††
Collateral return*	2.40	LTCMA for cash			
Commodity cycle positioning (+premium/-discount)	0.10	Where we are in the current commodity cycle and projections of the next, as indicated by the Commodity Event Index and length/return study of past cycles	- Energy	2.80	36.00
EM per capita consumption adjustment	0.10	Increased growth of EM demand, catalyzed by lockdown reopenings and strong economic growth expectations	- Agriculture+‡	3.10	34.00
Trade-weighted USD decline impact (projected incremental annual decline vs. historical base period)	1.00	The inverse relationship between commodity returns and the U.S. dollar; we use the LTCMA assumption for trade-weighted USD	- Metals‡	3.50	29.00
Total return, gross of fees	**3.60**				
Fees	-0.50	Fees, based on U.S. commodity ETFs and mutual fund average fees			
Total return, net of fees**	**3.10**	Assumption based on the Bloomberg Commodity Total Return Index (a collateralized index composed of futures contracts)	**Weighted total return**		**3.10**
Gold premium	0.40	We assume gold demand benefits relative to overall commodities given greater demand from central banks as well as consumers in China and India	Gold premium		0.40
Gold return, net of fees	**3.50**		**Gold return**		**3.50**

Source: Bloomberg, J.P. Morgan Asset Management, estimates as of September 30, 2022.
* The Long-Term Capital Market Assumption for U.S. cash in the specified year.
** Assumes the impact of roll yield will net to zero over the life of the assumptions.
† Execution dynamics are embedded in the sector-based fundamental methodology.
†† Return assumptions are weighted using Bloomberg Commodity Index weights as of September 30, 2022. Weights may not add up to 100% due to rounding.
‡ "Agriculture+" includes the combination of grains, softs and livestock constituents, while "Metals" combines both precious and industrial metals constituents of the Bloomberg Commodity Index as of September 30, 2022.

Key markets and asset classes

Global real estate

Our 2023 assumptions for core and value-added real estate remain stable or decline slightly across all regions, reflecting its resilient performance during the recent public market downturn, exit capitalization expansion and the rising cost of capital (**Exhibit 16**). In a rising rate environment, however – as rents reset at higher rates and valuations rise due to input costs – we expect real estate to offer attractive implicit or explicit inflation linkage characteristics that will help support performance over the long term.

Our 2023 assumptions for core and value-added real estate are lowered slightly across regions

Exhibit 16: Real estate return assumptions (local currency, %)

Strategy	2023 LTCMA	2022 LTCMA
U.S. core	5.70	5.80
U.S. value-added	7.70	7.70
European core	4.70	4.80
European value-added	6.70	6.80
Asia-Pacific core	6.10	6.50

Source: J.P. Morgan Asset Management; estimates as of September 30, 2021, and September 30, 2022.

U.S. real estate

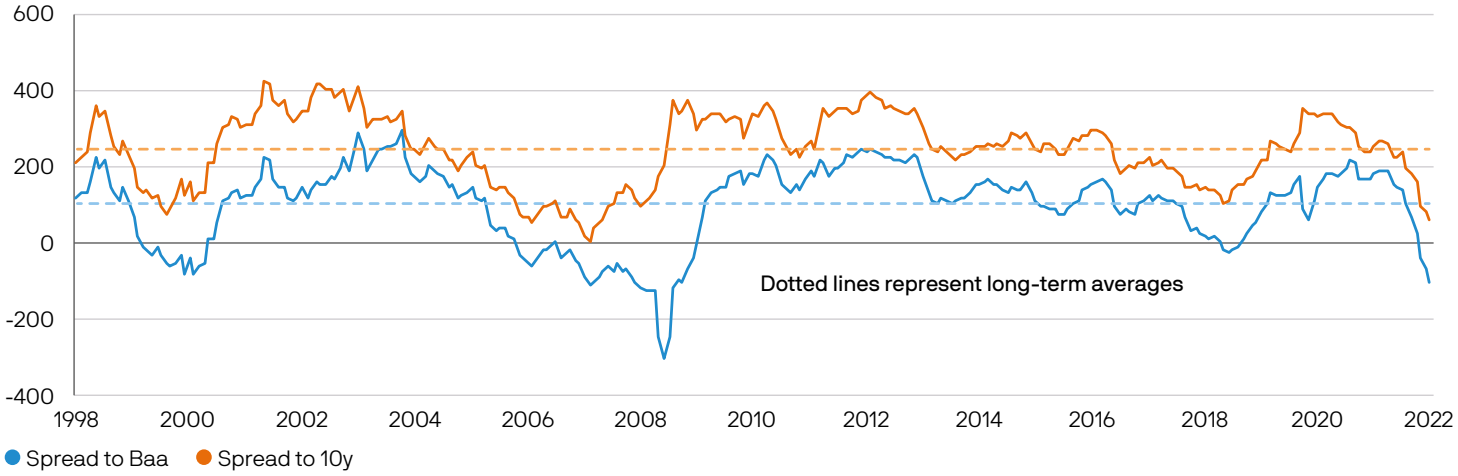
Our return assumption for U.S. core real estate declines to 5.7% from 5.8% last year as real estate reprices in a higher cost-of-capital environment. Our initial capitalization rate assumption incorporates an upward adjustment to reflect the repricing currently taking place in property transaction markets, as investors are underwriting deals to reflect the higher cost of debt amid growing economic uncertainty.

Despite this near-term economic uncertainty, we expect to see NOI growth remain strong. Some sectors, such as residential and industrial real estate, have experienced sharp increases in market rents during the past year; as a result, existing leases are likely to reset higher when rents roll over. In the immediate term, the embedded growth in established portfolios should help insulate NOI growth if economic conditions worsen (and cause market rents to flatten or decline). After assessing these factors – and incorporating higher long-term inflation expectations – we have raised our NOI growth assumption this year.

However, we do not expect higher growth to be strong enough to offset a widening spread over fixed income over time. The current spread to fixed income indices – intermediate Baa bonds and 10-year Treasuries – is lower than the historical average (**Exhibit 17**). Our assumption for value-added real estate is unchanged from last year, given the offsetting factors of higher starting unlevered core real estate returns, stronger cash flow growth and higher exit yield adjustment.

The spread between U.S. core real estate and key fixed income indices has narrowed recently relative to its historical average

Exhibit 17: Core capitalization rate spreads to fixed income indices



Source: J.P. Morgan Asset Management, NCREIF, Moody's Analytics; data as of June 30, 2022.

European real estate

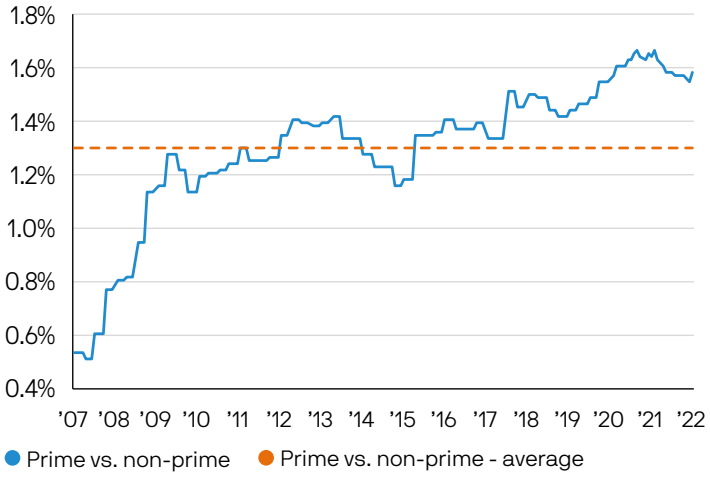
Our 2023 European core real estate return assumption declines slightly to 4.7% from 4.8% last year.[2] We attribute the change to higher exit yields and interest rates. However, relatively robust rental growth forecasts – supported by low vacancy rates and inflation-enhanced cash flows – partially offset the impact of higher rates.

Our starting assumption for core NOI yield[3] increases slightly compared to last year, but viewing the year-over-year comparison doesn't capture the period of yield compression (and subsequent expansion) that characterizes the past 12 months. Although we expect yields to rise further over the short term, our longer-term expectations suggest that they will settle only slightly ahead of current levels as robust long-term rental growth offsets the impact of a higher long-term risk-free rate.

We reduce our European value-added projections, with the lower core return offset by the impact of an accretive yield spread between core and non-core pricing (**Exhibit 18**). With market participants becoming increasingly cautious about the economic outlook for Europe – and the knock-on implications for real estate cash flows and capital values – we expect to see further changes to both core entry yields and core/non-core spreads.

The spread between core and non-core pricing appears poised to increase in the medium term

Exhibit 18: European core and non-core real estate yield spread vs. historical average



Source: CBRE ERIX, J.P. Morgan Asset Management; data as of July 2022.

More broadly, real estate returns in Europe continue to be characterized by dispersion both within and across sectors. The shift to online retail, for example, is likely to continue to support logistics returns and undermine traditional retail performance. It is our view that neither trend is adequately reflected in current market pricing, suggesting opportunities for alpha. In the office sector, hybrid working patterns are strengthening demand for high quality offices while undermining demand for lower quality spaces, creating both investment opportunities and risks. Finally, the residential sector is also benefiting from the shift to hybrid working as demand increases for viable alternatives to traditional office and retail spaces.

Asia-Pacific real estate

Our Asia-Pacific core real estate return assumption drops to 6.1% from 6.5% last year. Macroeconomic conditions and monetary policies vary widely across the region. Overall, we anticipate that long-term growth in Asia-Pacific will be stronger than in other regions – and that investors' allocations to real estate in Asia-Pacific will increase over time.

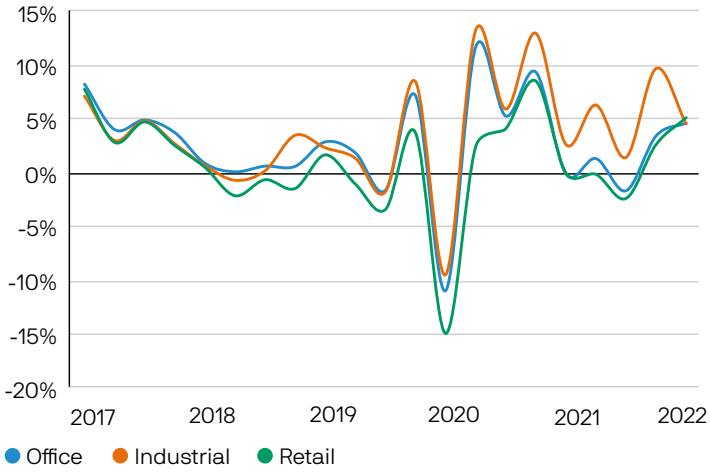
Looking ahead, our NOI growth assumptions for Asia-Pacific remain largely stable, although we have observed a slowdown in the industrial sector following a period of high growth in 2021–22. On the other hand, rising rents in the office and retail sectors continue to drive improvements (**Exhibit 19**).

Entry yields held steady in 2022, as only a few office and retail markets benefited from higher rents even as the leasing market improved, whereas the industrial sector experienced continued tailwinds that drove down entry yield.

[2] For Europe and U.K. real estate, in 2023 we have updated the raw data source from CBRE to MSCI for the volatility and correlation calculation.
[3] Net operating income yield refers to estimated net operating income/asset value at the start of our 10- to 15-year projection period.

Signs of recovery emerge in Asia-Pacific's office and retail sectors

Exhibit 19: Total real estate return by industry sectors in Asia Pacific



Source: MSCI – IPD; data as of June 30, 2022.

Real estate investment trusts (REITs)

Our global REITs return projection rises, with increases across all regions (**Exhibit 20**). We expect that REITs will be well positioned, particularly in periods of inflation, thanks to their diversified access to funding and attractive starting valuations.

Assumptions reflect greater upside potential vs. prior year (estimates for all regions)

Exhibit 20: REITs return assumptions (local currency, %)

REITs	2023	2022
U.S.	6.80	5.70
European	6.10	5.10
Asia-Pacific	5.10	5.00
Global	6.40	5.40

Source: J.P. Morgan Asset Management; estimates as of September 30, 2022.

As we have in previous years, we adjust our assumptions in the U.S. for greater public market exposure to alternative sectors, such as technology-related assets (transmission towers, data centers) as well as health care facilities and manufactured housing. In the past, these adjustments have added meaningfully to U.S. REIT returns. This year, however, the return adjustment is lower for two reasons: The NOI trajectory is slightly lower than in previous years for health care and data centers, and higher for industrial and residential assets; plus, these industrial and residential projects can also be accessed in private markets – and their relative weight has increased as a result of strong performance. In short, the growth gap between different sectors, which investors have been able to access more readily via public markets historically, is narrower than it has been in previous years.

Although leverage has become less accretive, given the higher interest rate environment (and access to funding is key), some of this impact ought to be offset by higher top-line cash flow, particularly for residential and industrial sectors, where strong pricing power exists.

Looking ahead, the amortization-to-NAV discount implies significant upside for REITs across all regions. Markets are pricing in substantial declines in net asset value – an outcome that could potentially materialize in a deep recession scenario. In a mild recession scenario, however, the valuation discount to NAV across all regions looks compelling already, particularly in Europe and the U.S.

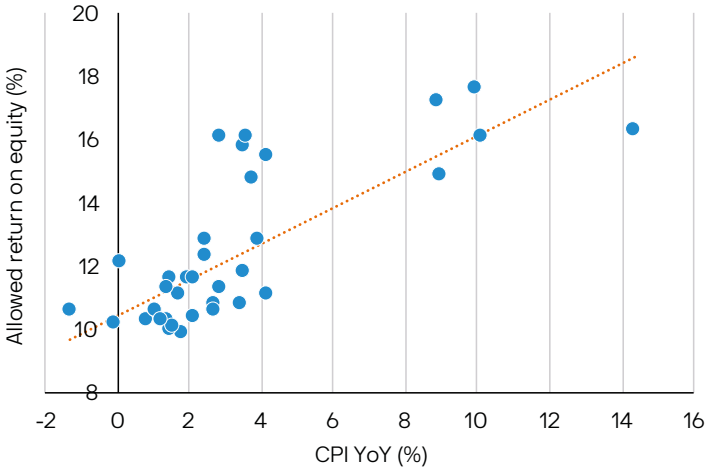
Global core infrastructure

Our 2023 global core infrastructure return assumption increases to 6.3%, up from 6.1% last year. We expect core infrastructure returns to hold up well in the coming 10–15 years, thanks to the fundamentals of the asset class – particularly embedded inflation protection – and the essential nature of the services that core infrastructure provides.

Private core infrastructure offers both explicit (e.g., contractual inflation indexation) and implicit (e.g., allowed return on equity [ROE] and commodity cost pass-through) protection, making the fundamentals of the asset class attractive and particularly well positioned during periods of rising inflation. Over time, we have observed a positive correlation between U.S. utilities' allowed ROE and inflation (**Exhibit 21**), with a two-year lag to account for timings of rate cases (the formal process by which utility regulators assess whether a provider's proposed base rates are fair and reasonable).

Strong correlation is apparent between U.S. utilities' allowed ROE and inflation

Exhibit 21: Inflation vs. U.S. utilities' allowed ROE



Source: Bloomberg, SNL.com, J.P. Morgan Asset Management. Inflation is U.S. Consumer Price Index year-over-year as of 2Q 2022.

Ample investment opportunities exist in this space. The uptick in demand for the asset class is reflected in the rising number of core fund launches and the increasing total of assets under management. However, the widespread need for greater core investment dwarfs the size of funds available, as evidenced by the fact that transaction activity remains high. Additionally, the ongoing energy transition away from fossil fuels has created a pressing need for investments to drive renewable energy adoption – underscored by the current energy crisis in Europe and the UK. The ability of infrastructure assets to directly contribute to these efforts, as well as a sustained industry-wide push to adopt better ESG standards, also inform our positive outlook.

Global core transport

Our 2023 long-term projection for global transport edges slightly higher, from 7.4% last year to 7.5% this year. Operating yields, which have risen over the course of the past year, boost our outlook as increased demand and disrupted supply chains lead to higher asset utilization – and higher lease rates.

Market headwinds are also strengthening: Increasing regulations, rising borrowing costs, labor shortages, and higher maintenance and operating costs present challenges to the asset class, which has outperformed in the past two years as increased demand, congestion and commodity stockpiling led to trade flow readjustments. Although we expect to see demand fall to more historical levels in the medium term for some subcategories, such as maritime leasing (specifically container ships), we anticipate that demand for transport assets over the long term will remain resilient.

Maritime and energy logistics: The maritime sector has witnessed the biggest increase in utilization and operating yields since the post-pandemic economic recovery (**Exhibit 22A**). Russia's invasion of Ukraine – and the ensuing geopolitical turmoil – have sparked a sense of urgency in the energy security conversation globally while also disrupting global supply chains and shipping lanes. These disruptions typically benefit seaborne trade, given the flexibility of travel in delivering cargo to meet sources of demand. Although the initial near-term shifts have led to an increase in European seaborne liquefied natural gas, we expect this trend to be sustained in the longer term as countries look to diversify their sources of energy.

Aircraft: The aircraft industry is also showing signs of recovery, but the prevalence of new COVID-19 variants has limited growth in passenger traffic to intraregional traffic. Although we expect to see longer-term recovery and growth in traffic volumes, rising interest rates, aviation-related labor shortages and looming signs of a recession are potential headwinds that threaten the pace of recovery (**Exhibit 22B**). Similar headwinds also prevail for transportation sectors linked to retail consumption, such as container ships and container leasing, in the near to medium term.

Global core timberland

This year, we introduce return projections for global core timberland, which is maturing as an asset class suitable for institutional investors. Our forecast calls for it to generate annual returns of 6.7% over our 10- to 15-year investment horizon. As inflation rises, investors are seeking to access timberland's income-oriented returns, capital appreciation potential, diversification benefits, low return volatility and strong ESG characteristics.

The increase in investor interest has coincided with a period of timberland shortage: Overall, global timber supply is limited by forest establishment that occurred 25 to 45 years ago. Land conversions and stronger environmental protections are impacting the total forest area available for commercial harvest, even as global demand for sustainable building products continues to rise (**Exhibit 23**). The expected growth in demand for timber is further underpinned by global population growth, China and Europe's ongoing wood requirements, and a 15-year history of residential underbuilding in the U.S.

Constrained supply of softwood timber, which is the predominant material for home construction, also informs our view. Even if the U.S. housing market cooled under pressure from rising rates, we would expect to see ongoing investor interest in forests as a premium-priced source of tradable carbon credits, especially for corporates seeking to meet compliance-based commitments to reduce their carbon footprints. Taken together, these factors create an opportunity for new capital to serve as a resource for timberland development.

The U.S. continues to be the largest investible region for timberland, and local housing demand remains strong, boosting timberland's appeal as an inflation-linked asset class. Although affordability headwinds have recently dampened new home construction forecasts, we expect to see housing starts stay well above the levels recorded in the wake of the global financial crisis (GFC).

Elsewhere, expanding household formation and global population growth continue to propel housing demand. In some international timber markets, such as Australia, demand exceeds domestic timber supply, providing investors with an opportunity to achieve higher returns and greater diversification. We also expect export-driven markets, such as Chile and New Zealand, to continue to benefit from exporting logs to China.

Demand for food, fuel and travel continues to climb despite ongoing trade flow readjustments

Exhibit 22A: Total seaborne maritime and energy logistics trade

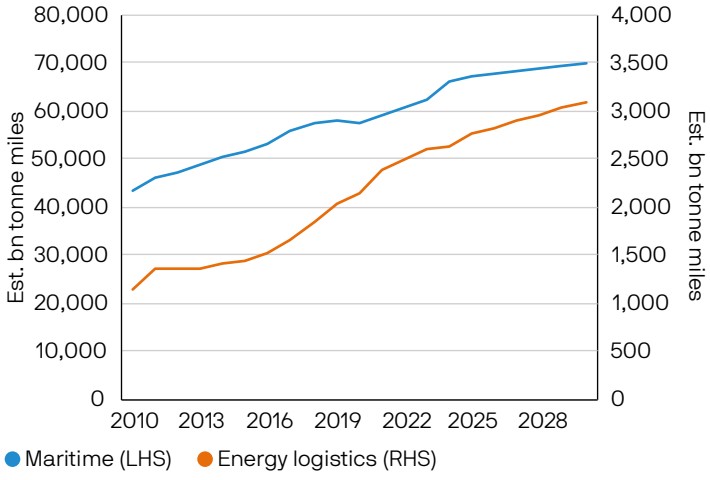
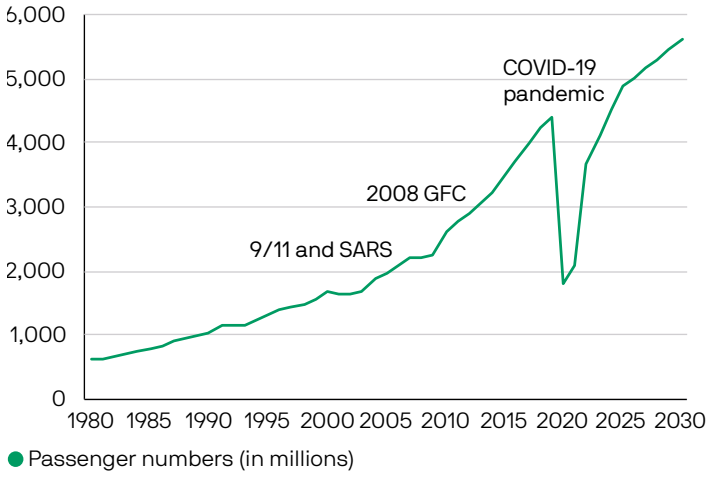


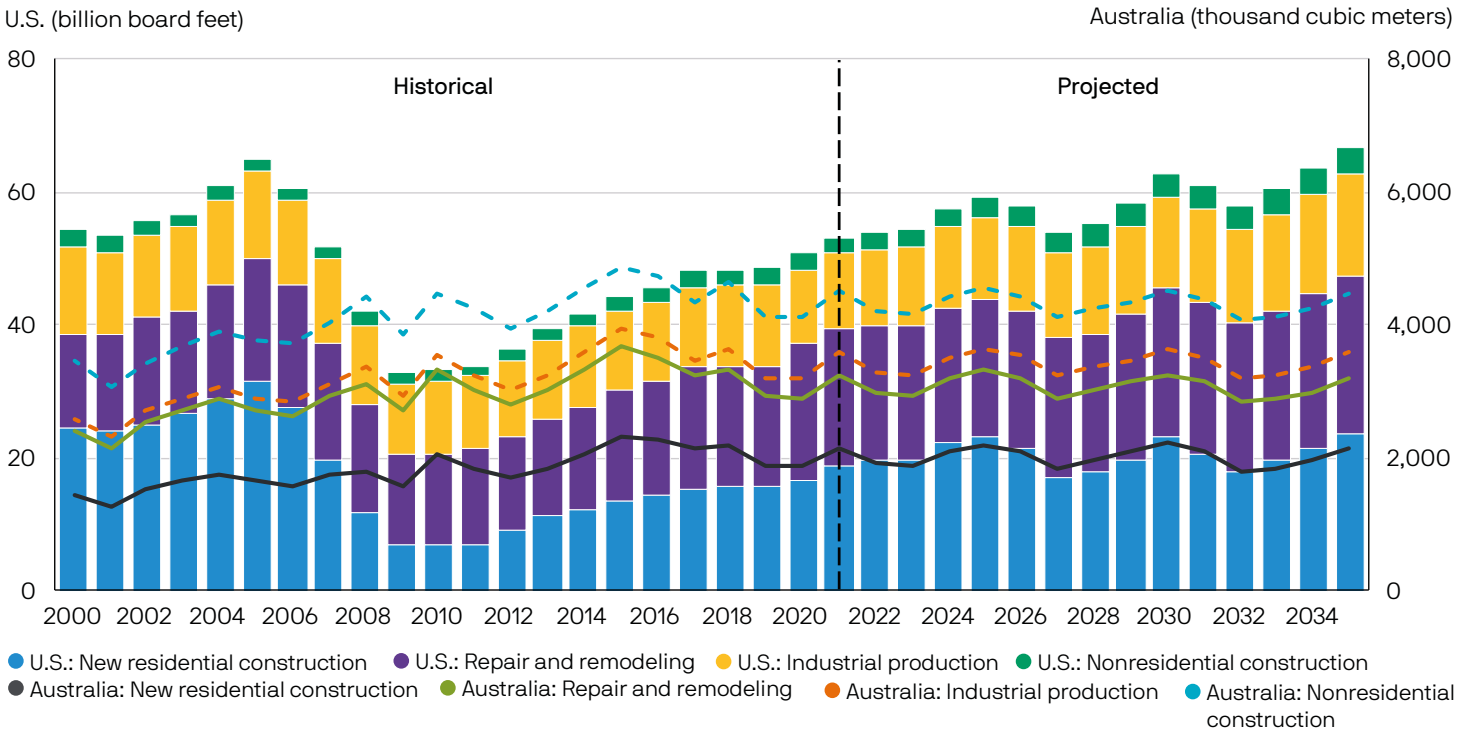
Exhibit 22B: Total air traffic growth outlook



Source: Clarksons Research, MSI, Morten Beyer & Agnew, J.P. Morgan Asset Management Global Alternatives Research; data as of September 30, 2022.

We anticipate a stable demand outlook for softwood lumber across regions

Exhibit 23: Softwood lumber consumption by major end-users in Australia and the U.S.



Source: Forest Economic Advisors, U.S. data as of 2Q 2022; Australia data as of 4Q 2021.

Commodities

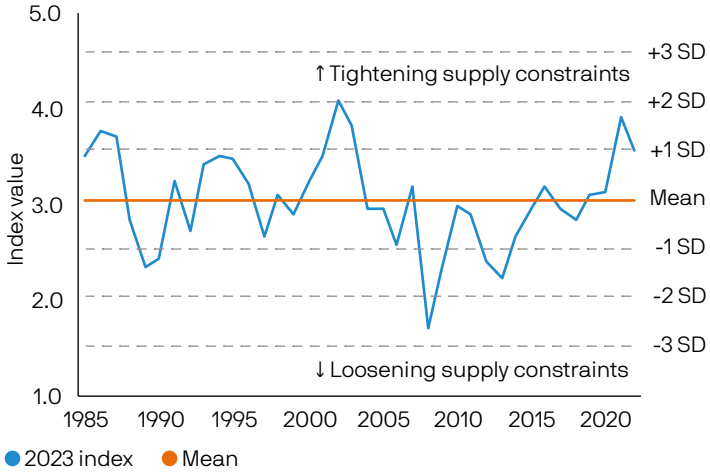
Our 2023 return assumption for long-term broad-basket commodities improves, rising from 2.60% last year to 3.10% as we look out over the coming 12 years – the average length of a commodity cycle, according to our model. Normal cycle dynamics, melded with capex shortfalls in energy and extraction – and combined with a challenging environmental forecast for agriculture – produce a better-than-average return outlook across the entire cycle. This view, which includes the downside of the current cycle and two years of the beginning of a new cycle, draws upon historical dynamics weighted heavily toward our modeling of the average cycle since 1975 (excluding the great commodities supercycle of 1999–2011).

Our cycle clock indicates a modified downturn ahead

Our Commodity Event Index model, which attempts to capture producers' supply constraints and sentiment, indicates above-trend constraint levels consistent with positive but decelerating returns for the current cycle. The war in Ukraine may have accelerated the "up" phase of the cycle – with high prices instigating demand destruction – which has subsequently catalyzed the "down" side of the cycle. We believe, however, that this cycle's unique capital expenditure inadequacy, which is being driven by government policy and ESG pressures (as well as shareholder-driven corporate discipline), will keep cycle prices elevated vs. previous cycles (**Exhibit 24**).

The J.P. Morgan Commodity Event Index attempts to capture producers' supply constraints

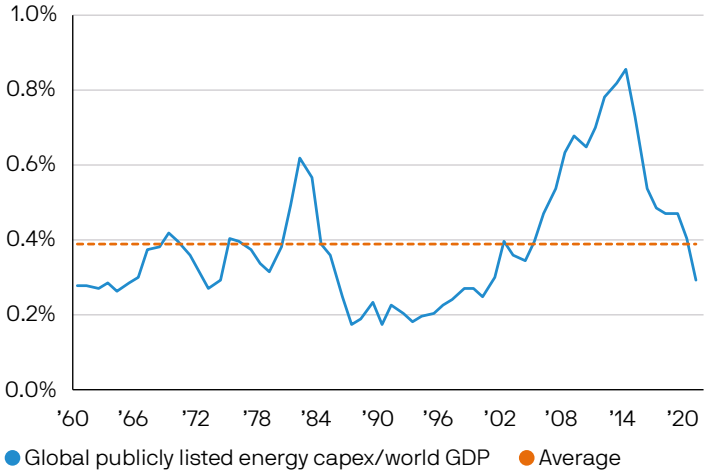
Exhibit 24: The Commodity Event Index



Source: Baker Hughes, Bloomberg Finance L.P., Empirical Research Partners, FactSet, U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of June 30, 2022.

Capital starvation: Capital investment for energy producers is at 20-year lows

Exhibit 25: Publicly listed energy company capex relative to global GDP



Source: Empirical Research Partners, World Bank, J.P. Morgan Asset Management; data as of December 31, 2021.

Above-average cycle return across sectors

Energy: We believe that the equilibrium energy price over our investment horizon will be closer to USD 90–USD 95 in West Texas Intermediate (WTI) terms. That reflects both growing demand for energy through the late 2020s (as modeled by the International Energy Agency[4]) and a cumulative capex shortfall of some USD 1.3 trillion over the next 10 years[5] (as modeled by J.P. Morgan Research's energy research team) (**Exhibit 25**). Additionally, most energy markets are in deep backwardation (that is, spot pricing is higher than futures market pricing), providing a lower starting point for projected returns.

Industrial metals: The industrial metals extraction industry, which currently has fewer constraints on its output than energy, is subject to normal down-cycle dynamics. However, copper – the largest weighting in the industrial metals subindex at approximately 4% – is a core material of the new economy and, as such, may provide a better return profile than normal cyclical conditions would suggest.

Gold: We have modeled a modest return premium of 40bps relative to the Bloomberg Commodity Total Return Index (BCOM) assumption to reflect gold's elevated demand profile from central banks as well as elevated per capita gold consumption from large, fast-growing populations in India and China.

Agricultural/soft commodities: Although limited hard data exists on the impact of supply constraints, we expect an above-inflation return outlook of 3.10% for agricultural and soft commodities. Against a backdrop of demand growth and geopolitical stressors, numerous studies suggest that climate change will impact agricultural/soft commodity prices more than in the past: The OECD-FAO Agricultural Outlook projects that food production will increase by 1.1% while global food consumption will grow by 1.4% over the next eight to 10 years.[6] Similarly, a NASA study projects that corn crop yields will decline 24% by 2030, primarily due to climate change.[7] In this context, our outlook – that food/soft commodities will rise above the rate of U.S. dollar inflation – still appears moderately conservative.

[4] "Oil demand in the Stated Policies Scenario in the World Energy Outlooks 2021, 2020 and 2016," World Energy Outlook 2021, International Energy Agency, October 8, 2021.
[5] Global Energy Strategy, J.P. Morgan Research.
[6] OECD-FAO Agricultural Outlook 2022–2031, Organization for Economic Cooperation and Development and the Food and Agriculture Organization, July 5, 2021.
[7] "Climate impacts on global agriculture emerge earlier in a new generation of climate and crop models," *Nature Food*, November 1, 2021.

Real assets: Conclusions and implications

Our 2023 long-term assumptions for real assets remain stable – or decline slightly – since last year, leading to a modest reduction in their relative attractiveness when compared to traditional public market asset classes. Public markets, which fell sharply in 2022, are now benefiting from better starting valuations and an improved long-term return outlook, but real assets have not lost their appeal: We expect these assets to continue to deliver stable returns, inflation protection, downside risk resiliency and diversification benefits as part of an overall portfolio.

Within real estate, continued sector dispersion may offset some of the challenges presented by lower return expectations. Elevated spreads between core and value-added pricing also suggest clear and potentially growing opportunities for investment. Notwithstanding our cautious short-term outlook, REITs are well positioned through the cycle, thanks to their diversified access to funding and attractive starting valuations.

Strong investor interest in global core infrastructure has led to increased capital flows and greater competition for assets. Against this backdrop, investment managers will need to maintain their underwriting discipline and avoid style drift from truly "core" infrastructure investments – all while maintaining active portfolio oversight – if they are to achieve expected performance.

Although transport has been subject to ongoing COVID-19 pressures, it continues to demonstrate robust risk-adjusted returns. Ongoing demand (relative to available asset supply) is driving both income and price appreciation, particularly as rising inflation pushes up input costs.

ESG considerations are increasingly important to investors, and real assets, such as timberland, should be well positioned to benefit from this theme. The asset class's appeal, which includes steady income and capital appreciation, may be further enhanced by its ability to offset carbon emissions in response to climate change.

Our above-inflation return outlook for commodities is supported by developments across most sub-asset classes: supply tightness and modest demand growth in energy and metals extraction, and climate change-driven headwinds to agricultural production. Additionally, the ongoing conflict in Ukraine and the geopolitics of energy generally highlight the fragility of supply across the entire commodity complex.

Even as the outlook for public market returns improves, real asset mandates will still play an essential role as a diversified source of returns. Importantly, investors need to consider allocating to actively managed core/core-plus real assets, capturing intracategory dispersion at different points in the cycle and layering in diversified exposures to non-core categories by manager, asset type and vintage year selection. By following this approach, investors can position allocations across market cycles and capitalize on the benefits that accrue to different real asset categories.

Volatility and correlation assumptions

Fixed income volatility rises; its diversification benefits weaken

Authors

Grace Koo, Ph.D.
Quantitative Analyst
and Portfolio Manager
Multi-Asset Solutions

Xiao Xiao, CFA
Quantitative Analyst
Multi-Asset Solutions

Shay Chen, CFA, CAIA
Alternatives Strategist
Alternative Investment Strategy & Solutions

Gareth Haslip, Ph.D., FIA
Global Head of Insurance Strategy
and Analytics

Paul Kennedy, Ph.D., MRICS
Head of Strategy and Portfolio Manager
Real Estate Europe

Suzanne Wuebben
Head of Portfolio Analytics
Wealth Management CIO

Natalia Zvereva, CAIA
Quantitative Analyst
Multi-Asset Solutions

In brief

- We forecast higher volatility for most asset classes, most meaningfully in fixed income as rates revert to higher yield levels and returns likely rise back to levels last seen before the global financial crisis.
- Over our long-term forecast horizon, U.S. stock-bond correlations remain negative, although slightly less negative because of the effect of positive short-term correlation.
- Correlation between U.S. equities and Treasuries should remain volatile, lessening the efficacy of core fixed income in smoothing equity volatility, but while the benefits of diversification may have weakened at the margin, they endure.
- Risk dynamics proved challenging in 2022 as short-term volatility deviated significantly from our long-term assumptions. Despite this dislocation, our analysis reaffirms that even as long-term volatility forecasts trend upward, short-term risks don't become long-term forecasts unless today's macro and market environment becomes a multi-year phenomenon.
- Our Sharpe ratio forecast for equities improves, reverting to historical averages, and rises for government bonds and corporate credit. Real assets' Sharpe ratios are stable to declining, yet despite this relative downgrade, alternatives retain their stable and highly diversifying return and risk profiles.

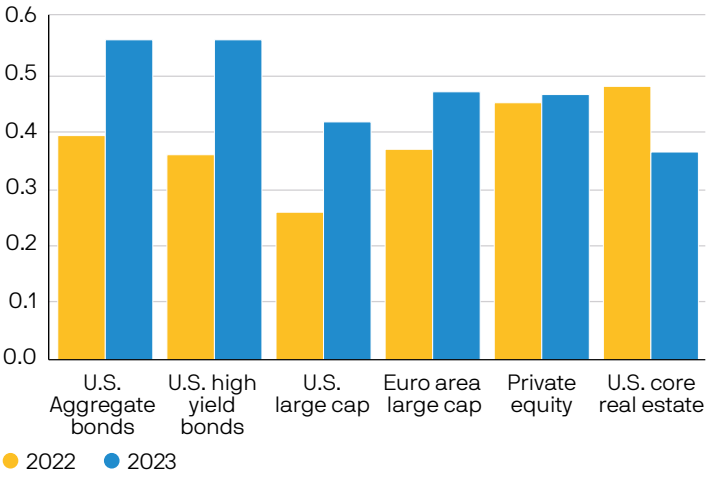
Short-term volatility has been trending upward for many asset classes across global markets, amid extreme economic and market developments: surging inflation, hawkish pivots by monetary policymakers and record asset price movements, especially in fixed income. Some aspects of this new economic, market and interest rate regime could linger as policy makers tackle high inflation and subtrend growth in the next year or so. But even as the economic environment trends toward our long-run equilibrium assumptions, we note that some of these changes may be more structural.

Against this backdrop, the simple addition of asset movements since our last set of assumptions raises our volatility forecast marginally. We also incorporate a risk scenario from last year's forecast as a component in this year's forecast, with a low probability of occurrence. This raises our volatility forecast further, especially for fixed income. We also project weaker stock-bond correlations than in the past 15 years.

Sharpe ratios[1] for equities, fixed income and other publicly traded assets have reshuffled rapidly since our last edition as our Long-Term Capital Market Assumptions (LTCMA) return expectations rise (**Exhibit 1**). We forecast improved Sharpe ratios for equities, government bonds and corporate credit. In contrast, Sharpe ratios for alternative asset classes are stable to declining. Although alternatives' relative risk-adjusted returns weaken, we highlight their stable, highly diversifying return and risk profiles.

Public assets' Sharpe ratio forecasts improve significantly since our last edition

Exhibit 1: Projected Sharpe ratios for key asset classes based on 2023 LTCMAs vs. 2022 LTCMAs



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

In the last edition, we flagged two risks: increasingly frequent extreme events – rising volatility at the tails with a corresponding rise in the volatility of volatility, and a sharp, short-term shift toward positive stock-bond correlation. We were not surprised to see these two risks realized over the past year, a time of transformation in the economic landscape. What did surprise us was the speed at which our forecasts played out, and the magnitude of the shifts.

Why did the risks unfold so rapidly? Because inflation has been much higher, and stickier, than most market participants anticipated, and because of the response of the Federal Reserve (Fed) in an ongoing set of rate hikes. Both the stickier inflation and the Fed's response were influenced, as has been widely observed, by skyrocketing energy costs, inflation's broadening from goods to wages and fears that inflation expectations could become unanchored. Taken together, these factors have created a monetary policy regime not seen in more than 20 years, and fundamentally change the volatility and correlation landscape.

Model and methodology

Long-term asset volatility and correlations are the common starting point for all our assumptions. To calculate our assumptions, our data window starts in 2H 2006 and ends 1H 2022. We use monthly data for liquid assets and quarterly data for private assets, removing outliers that could bias our volatility estimates.[2] To align our forecasts with our forward-looking long-term view, we leverage historical return series but weight each data point by relevance, based on what we expect will be the frequency of various economic regimes.

Over the past few years, we have applied a long-run average probability of 15% to global periods of stress, reflecting our expectations of the likelihood that recession-like conditions will prevail during the next 10–15 years. Applying this probability also mitigates the impact of a rolling data window on the forecasts. Last, we incorporate key themes and structural changes that we expect over the forecast horizon, such as changes in the composition of credit ratings and the maturities of benchmark corporate bond indices.[3]

[1] The Sharpe ratio is approximated by the ratio of compound return less the cash rate to volatility.
[2] For extreme data points above the 99.5% (or below the 0.5%) significance level of normal distribution, we adjust data by capping (or flooring) it at the 99.5% (or 0.5%) level.
[3] For a covariance matrix to be used in optimization, it needs to be symmetric and positive semi-definite (PSD). The final matrix is adjusted to ensure this stable numerical property, PSD, is satisfied.

Sensitivity analysis: Incorporating short-term changes into long-term forecasts

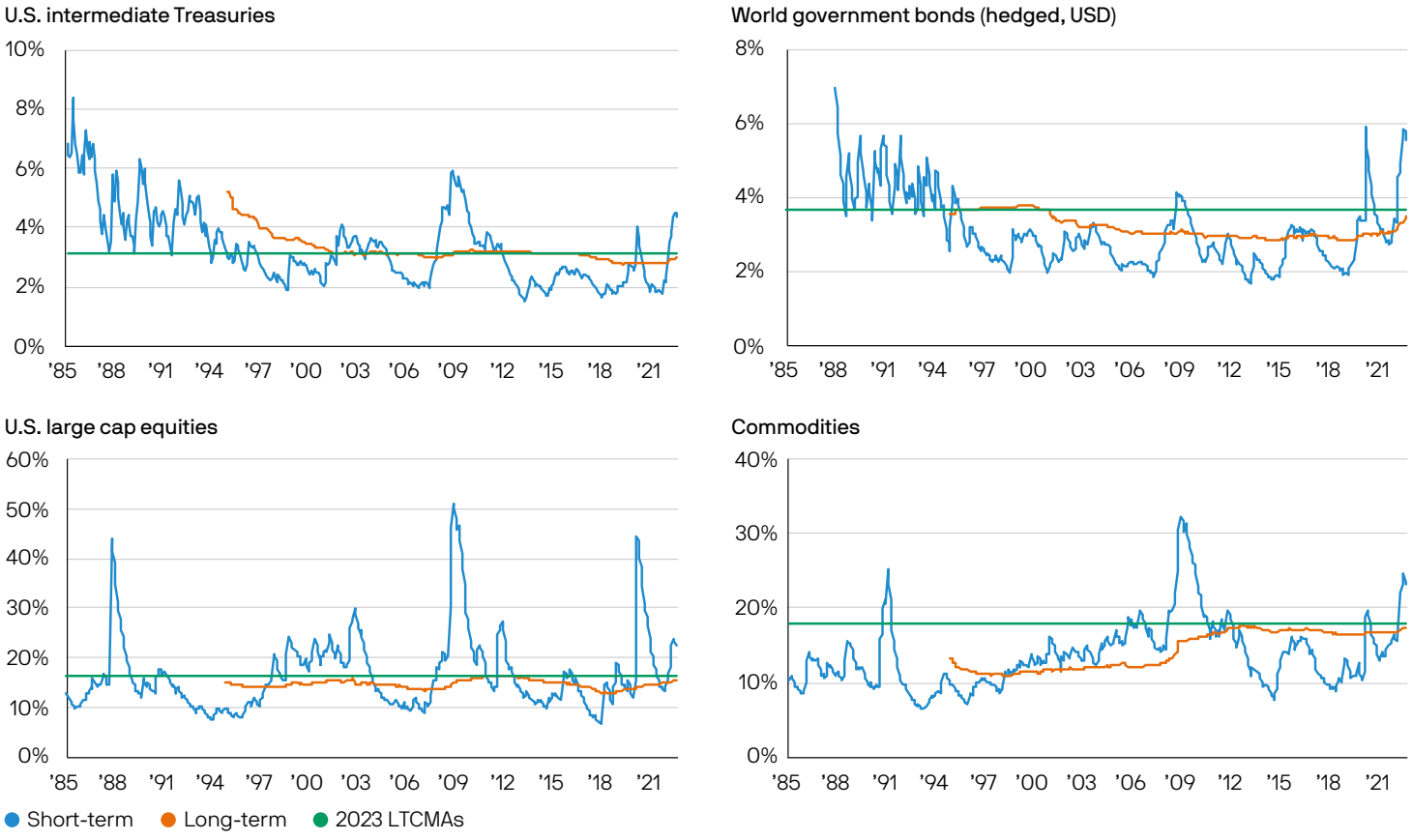
Recent economic and market developments have had different impacts on short-term and long-term volatility and correlations. Since, as noted, we believe that some of these developments are not transient but likely to become structural, how do we address this within the LTCMA forecast framework?

Our LTCMA forecast period has a 10- to 15-year horizon, aiming to capture at least one business cycle. On a year-over-year basis, our long-term volatility and correlation forecasts are typically stable. However, in the short term, to the contrary, forecasts can change quickly, and to be successful over time, investors will have to navigate the short waves and deviations from long-term levels.

Many asset classes have recently experienced a rapid rise in short-term volatility, especially fixed income. This upward trend puts risk well above historical long-term levels and above our past LTCMA volatility projections (**Exhibit 2**). Nonetheless, long-term volatility,[4] including our forecasts, continues to change only gradually.

While short-term volatility is trending higher across global markets, projected long-term levels remain stable

Exhibit 2: Short- vs. long-term volatility (%), selected assets (USD)

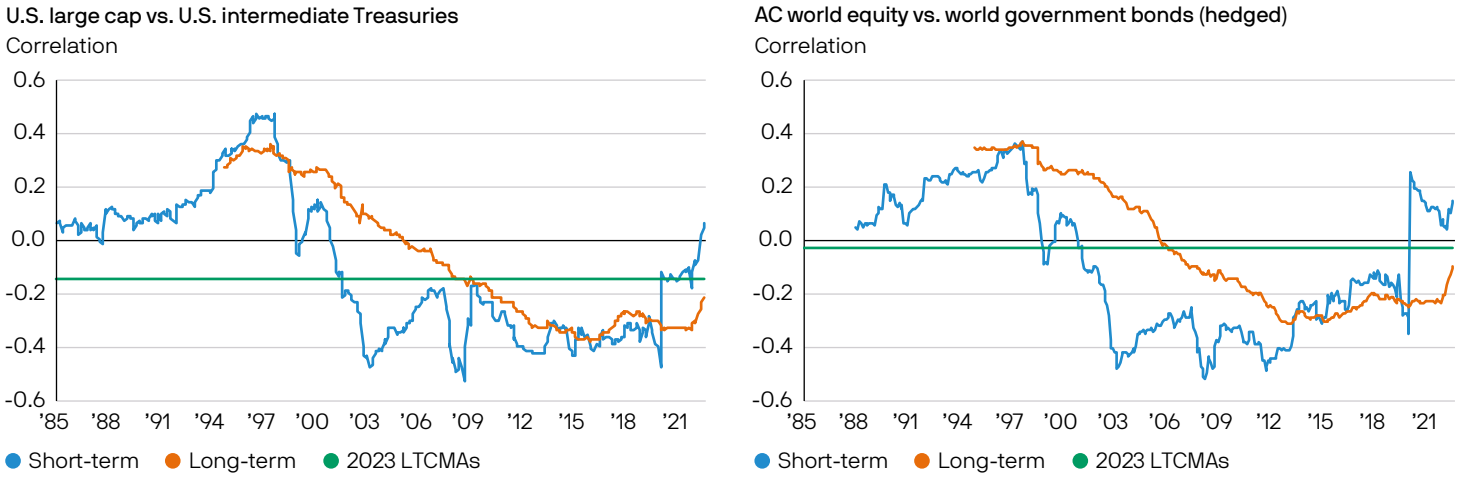


Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022.

[4] Long-term volatility is annualized equal 15-year volatility using monthly return data. Short-term volatility is annualized exponentially weighted moving average (EWMA) volatility with a three-month half-life and a three-year lookback window, using daily return data.

U.S. and global stock-bond correlations are positive in the short term, which has lifted long-term correlation

Exhibit 3: Short- vs. long-term stock-bond correlations, U.S. and global (USD)



Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022.

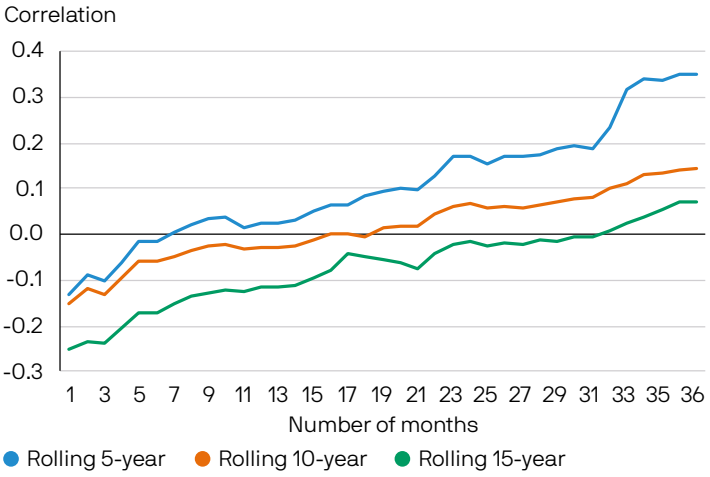
With the pickup in short-term volatilities, we have noted that short-term stock-bond correlations[5] in both U.S. and global markets have been moving rapidly higher, as well (**Exhibit 3**). As of the time of writing, as yield levels have normalized, core fixed income's forward-looking return potential has improved, creating room for yield compression when market distress occurs. So have bonds once again returned to being indispensable hedging assets?

While long-term correlations[6] remain negative between U.S. large cap equities and Treasuries, in line with the past decade, they are trending upward. Long-term U.S. stock-bond correlations could become neutral – or even positive – if the environment at the time of writing were to persist for significantly longer. In our view, core bonds' long-run diversification benefits remain intact. But that rests on the assumption that today's short-term dynamics abate.

How much longer would current conditions need to persist for stock-bond correlation to turn positive over the long term? We studied this by creating example scenarios, adding data from a hypothetical positive stock-bond correlation regime to existing time series, and examined the impact of positive correlation on a rolling 15-year correlation forecast.

Positive stock-bond correlation picks up significantly faster by shorter-term measures than by longer-term measures

Exhibit 4: Impact of regime changes on short- vs. long-term measures of U.S. stock-bond correlation



Source: Bloomberg, J.P. Morgan Asset Management.

As **Exhibit 4** shows, in our hypothetical analysis positive stock-bond correlation picks up significantly faster by shorter-term measures than by longer-term measures such as rolling 10- and 15-year correlations. This sensitivity analysis suggests that at least 24 months of positive stock-bond correlation would likely be needed for this dynamic to turn positive by long-term measurements. Shy of two years, long-term stock-bond correlations likely remain negative.

[5] Short-term correlation is exponentially weighted moving average (EWMA) volatility with a three-month half-life and a three-year lookback window, using weekly return data.
[6] Long-term correlation is equal-weighted 15-year correlation using monthly return data.

Our analysis highlights where the LTCMA 2023 volatility and correlation risk forecasts stand vs. long- and short-run history. We use this information to help calibrate an additional regime in this year's forecasts. The new regime is defined at the start of 2022, with a weight that is both intuitive (i.e., likely frequency of occurrence) and has an appropriate level of impact on the forecasts. Our fixed income forecasts bring our assumptions back to risk levels similar to the pre-global financial crisis period of non-zero cash rates. The long-term efficacy of diversification – using core fixed income to smooth equity volatility – may be weakened, at the margin, but in our view it is not gone.

Key markets: Volatility and correlation forecasts

We introduce an additional regime into our data-weighting methodology this year, with the aim of capturing the current environment of central bank rate hiking, weaker stock-bond correlation, quantitative tightening, inflation and potentially fatter left tails.[7]

The calibrations are:

- Recessionary/stress scenarios, to which we give a 15% weight, applied to periods the NBER classifies as recessions
- New inflationary scenarios, to which we give a 10% weight, applied to data from January 2022–June 2022

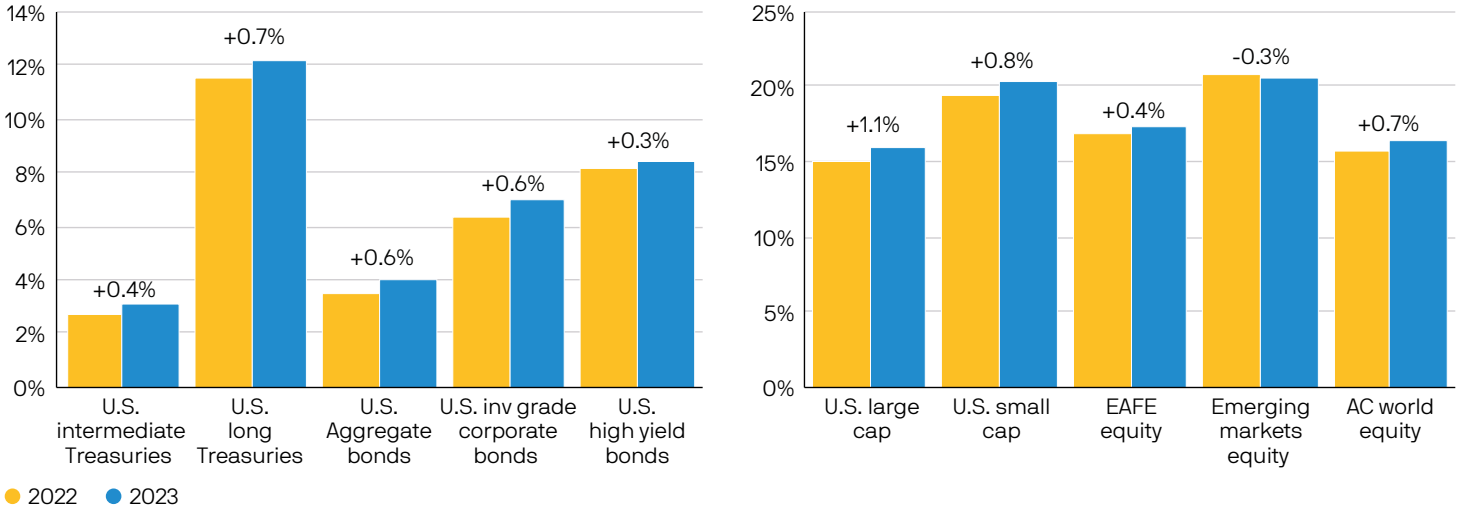
As a result, we forecast higher volatility and weaker U.S. stock-bond correlation. Correlation remains negative but less negative than in the past.

Equities

Our volatility forecast for equities generally moves up, especially for U.S. equities, across both large and small caps (**Exhibit 5**). Our emerging market (EM) equity volatility forecast is more stable year over year, in local currency terms. When we incorporate the effects of foreign exchange, volatility is slightly reduced, because EM FX movements marginally diversify moves in local equity prices.

Higher risk in fixed income and selected equities

Exhibit 5: Volatility forecasts for key asset classes, 2023 LTCMA vs. 2022 LTCMA



Source: J.P. Morgan Asset Management; data as of September 30, 2022.

[7] A tail is the tapering at the far ends of a distribution curve, representing least likely outcomes; in a left- (right-) tail occurrence, an asset or portfolio value moves more than 2 standard deviations below (above) its mean, or average.

Fixed income

Fixed income volatility rises in this edition, driven by the heightened rate risk environment that we incorporate into our forecasts. For the past 15 years, short-end government bond risk was suppressed by quantitative easing, a supportive Fed and low inflation. Now, we are seeing the opposite: quantitative tightening, Fed hiking at the fastest pace since the 1990s, high inflation and higher yield levels (which tend to be accompanied by higher volatility). Our new regime has the most impact on long-duration bonds.

Credit assets' risk profile has declined since late 2000 as the composition of corporate credit indices has shifted toward lower quality.[8] The percentage of lowest rated investment grade bonds, BBB, grew from 38% of the U.S. investment grade index in 2007 to 50% in 2022.[9] At the same time, maturities extended: The index is now composed of notably more 10-year and longer bonds (**Exhibit 6**). For these reasons, we adjust our volatility forecasts to reflect the higher risk of investment grade corporate bonds. We apply a similar rationale and approach to the other asset classes we cover, using their forecasted composite weights.

Alternatives

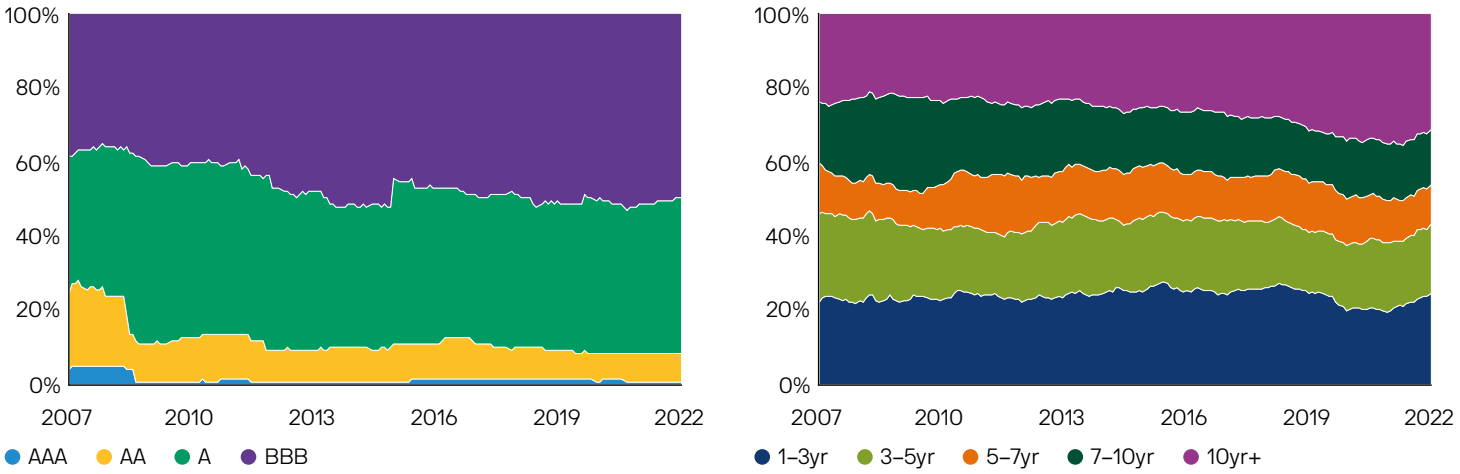
Our volatility forecast rises for financial alternatives. The magnitude of this volatility increase is in line with that of underlying public market beta. Within private equity, our small cap private equity forecast is for higher volatility relative to mid and large cap. Venture capital, a new asset class this year, has historically demonstrated higher volatility than private equity, and our forecast is for its volatility to be the highest within the universe of alternative investments.[10]

In this edition, we introduce global core timberland, an institutionalized asset class that demonstrates structurally low leverage, attractive risk-adjusted returns and a volatility profile similar to core real estate's.[11]

Our real assets forecast is stable. In this year's edition, we see a downward inflection in the relative attractiveness of real assets' returns vs. other alternatives. Despite that relative lessening, our projection shows real assets continuing to offer stable returns and volatility with low correlation to public markets.

Risk rises in investment grade corporate bonds due to lower quality and longer maturities

Exhibit 6: U.S. investment grade corporate bond market composition by rating and maturity (%)



Source: J.P. Morgan Securities, J.P. Morgan Asset Management; data as of September 30, 2022. J.P. Morgan JULI index composition by market value.

[8] For more details on the underlying asset class composition forecasts by maturity and rating, see Michael Feser, Sean Daly et al., "Fixed income assumptions: Bonds are back – after the biggest-ever drawdown," 2023 Long-Term Capital Market Assumptions, J.P. Morgan Asset Management, November 2022.

[9] Composite weight computed using J.P. Morgan JULI indices, as of September 30, 2022.

[10] All of the volatility assumptions are reflective of the risk profile of median managers. Within alternatives, manager selection is critical for more opportunistic asset classes that display wide manager dispersion, such as venture capital and private equity.

[11] The impact of data smoothing plays an important role in measuring the volatility of appraisal-based asset categories. We continue to utilize a return de-smoothing approach, adjusting the volatility by taking into consideration embedded operational volatility. Since timberland is subject to a significant seasonal appraisal bias, we also draw upon the Fisher-Geltner-Webb and Cho-Kawaguchi-Shilling methodologies. However, each methodology comes with benefits and challenges. Fully incorporating factors including liquidity, scale, quality and appraisal in the volatility estimate process would better reflect the true economic volatility and risk-adjusted return characteristics of private market asset classes.

Conclusion: Government bonds remain a portfolio diversifier, but with higher risk

Risk dynamics proved challenging in markets in 2022, as short-term risk deviated significantly from our long-term forecasts. Our latest volatility and correlation projections nod to this structural change. However, our analysis reaffirms that unless today's short-term environment becomes long term – persists well beyond the next 12 months to become a multi-year phenomenon – short-term risks will not become long-term forecasts.

Stepping back for a broad view, much of the change to asset returns and risks is consistent with historical experience. Equity returns of 8%–9%, our 2023 LTCMA forecast, generate Sharpe ratios around 0.35, in line with long-run historical averages. Credit continues to have a higher Sharpe ratio than government bonds, driven by the credit risk premium. And while our fixed income volatility forecast rises, fixed income's Sharpe ratio still improves, along with better forward return potential. These changes simply bring us back to the world of Sharpe ratios prior to the global financial crisis.

Our forecast sees the classic 60/40 stock-bond portfolio once again generating respectable returns – though the picture is not all rosy. Stock-bond correlation should remain volatile, and less negative than before.

We expect core real assets to deliver economic volatility of around 10% over time.[12] Real assets fall in their relative Sharpe ratio ranking yet have other dimensions we believe investors should continue to consider that are not captured in simple mean return and volatility. These opportunities include real assets' high inflation sensitivity and strong potential for cash flow growth. Real assets' stability is especially important during times when short-term risk and correlation are volatile, as they are today.

[12] For a discussion of economic volatility as a middle way between accounting and de-smoothed volatility, see our chapter in the last edition. Grace Koo, Paul Kennedy et al., "Volatility and correlation assumptions: Stable forecast in a dislocated world: Risk outlook little changed, uncertainty rising," 2022 Long-Term Capital Market Assumptions, J.P. Morgan Asset Management, November 2021.

Portfolio implications

Striking a balance: Strategic patience, tactical flexibility

Authors

Jared Gross
Head of Institutional Portfolio Strategy

Grace Koo, Ph.D.
Quantitative Analyst
and Portfolio Manager,
Multi-Asset Solutions

Gareth Haslip, Ph.D. FIA
Global Head of Insurance Strategy
and Analytics

Paul Kennedy, Ph.D., MRICS
Head of Strategy and Portfolio Manager
Real Estate Europe

Xiao Xiao, CFA
Quantitative Analyst,
Multi-Asset Solutions

In brief

- Fundamental changes to the investment environment require a clear-eyed assessment of the longer-term assumptions that anchor the strategic allocation process. The new environment also suggests a more flexible approach to short-term strategy, as recent market shifts offer opportunities to manage risk and capture returns in the near term. Investors need to strike a balance between strategic patience and tactical flexibility.
- The year 2022 marks a regime shift – from a world of low inflation and easy financial conditions to one of high inflation, tightening policy and higher interest rates. The emergence of this new regime presents an opportunity for investors to stress-test their allocation process and implement changes that will support risk-adjusted returns over multiple horizons.
- Among our key conclusions: A baseline portfolio may deliver higher forward returns than at any time in more than a decade. However, the potential shift to a more positively correlated environment limits an investor's capacity to diversify equity risk and may increase volatility as a result. Lower volatility credit sectors may become more compelling as part of a return strategy. Diversified alternatives may offer value as much for their ability to reduce risk as for their ability to deliver returns.

In our Long-Term Capital Market Assumptions (LTCMAs), we seek to strike a balance between capturing short-term changes in valuations and remaining anchored to long-term equilibrium return assumptions. Over time, changes in valuations and returns tend to move in opposite directions: Near-term declines in value generally hold the prospect of higher future returns as valuations normalize across time. The long-term equilibrium is not immutable, however. It will respond slowly to secular changes in fundamental drivers of asset returns – rather than to short-term changes in asset prices.

Investors can therefore benefit from guidance as to where and when higher and lower returns are likely to occur. They can also take comfort in a consistent framework that guides asset allocation over extended time horizons. While specific markets may offer more, or less, attractive returns at various moments, the long-term nature of the assumptions means that the optimal portfolio remains well anchored. Rebalancing to this strategic benchmark during periods of volatility will generally add value insofar as deviations are generally mean-reverting.

Current valuations have shifted dramatically lower since our 2022 LTCMAs, leading to significantly higher forward return assumptions across public markets. However, we are also witnessing elements of a regime shift that may change some of the underlying fundamentals.

Consider:

- The investing environment has undergone a significant transformation over the past 12 months, from a world of low inflation and easy financial conditions to one of high inflation, tightening policy and higher interest rates. Such regime changes can drive fundamental shifts in the relative returns, risks and correlations across asset classes.
- The time frame required for high confidence in forward return assumptions, which in the case of this exercise is 10–15 years, makes it challenging to incorporate market conditions that may not persist over the full cycle. The long-term assumptions themselves may not fully capture the risks and opportunities in the current environment.
- We cannot yet know how long this new equilibrium may last. But it is quite possible that the effects will linger long enough to influence investment decision-making over the next several years. Investors can, and should, respond to the new equilibrium even if its long-term fate remains uncertain.

This new environment requires a clear-eyed assessment of longer-term assumptions around asset allocation, and suggests a more flexible approach to short-term strategy as well. Investors will need to look across multiple time frames, striking a balance between strategic patience and tactical flexibility. As we describe below, there is value in stress-testing a new equilibrium.

2022: Investing through a regime shift

This time last year, we observed that a traditional 60/40 portfolio would deliver subpar long-term returns given elevated valuations across public markets, and we emphasized the risk that stock-bond diversification might prove to be less effective in a period of low rates and rising inflation. Investing in alternative asset classes (especially in sectors with moderate returns and lower absolute volatility) could help shift risk from public markets while preserving overall returns.

This proved to be reasonable advice – particularly the emphasis on core real assets as a means of building in some resiliency to inflation. Investors who followed these suggestions would likely have avoided some of the sharp losses they would otherwise have experienced in 2022. In hindsight, we could have offered a stronger note of caution but, of course, few anticipated the war in Ukraine and the resulting economic fallout.

Beyond geopolitical turmoil, the past year may also signal a significant shift in the internal dynamics of asset allocations: Diversification within public markets disappeared in 2022 as stocks and bonds declined in lockstep, the relative outperformance of private assets led to allocation imbalances, and the forceful policy response to rising inflation upended traditional yield curve and currency dynamics.

If these trends persist, strategies will need to adjust; even if they are temporary, these trends may offer a compelling tactical opportunity. We may sense that it is unwise to do nothing in response to these shifts, but still need guidance about how to respond. We use an allocation model, adjusted for higher correlations and the latest return assumptions, to illustrate the directional tilts that could make sense.

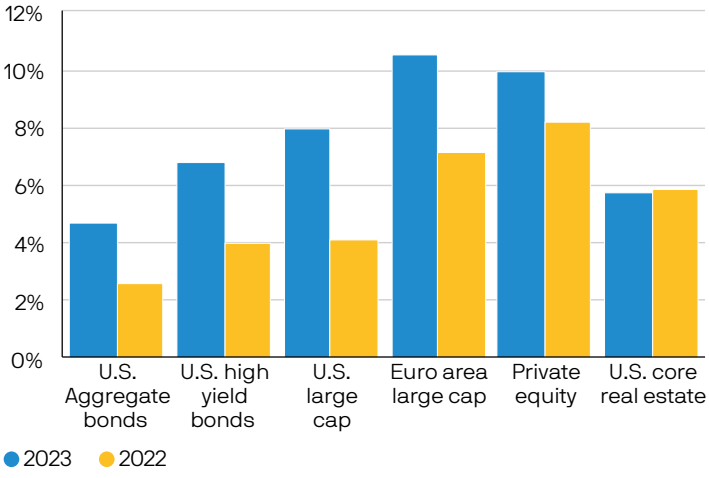
Uncertainty is a given in any asset allocation model

Strategic asset allocation models rely on key inputs derived from capital market forecasts – returns, volatilities and correlations – that are always subject to some uncertainty. But the process works effectively when we have confidence in these underlying inputs, as we explain below:

- Variability of asset class returns is a widely accepted fact of life in the financial markets, but over long horizons we can have greater confidence in our forecasts. Initial conditions, which are directly observable, drive much of the change, along with shifting components of the equilibrium model. The significant repricing of many markets over the past 12 months has led to dramatic improvements in long-term return assumptions. **Exhibit 1** illustrates the striking moves in long-term assumptions.
- Despite significant movement in asset class volatility over short horizons, these movements tend to be mean-reverting over relatively brief periods, which means that longer-term volatilities remain well anchored. As seen in **Exhibit 2**, the currently elevated level of short-term volatility should have a limited impact on the longer-term volatilities that underlie our assumptions for stocks and bonds.

After the 2022 market downturn, return projections rise across key asset classes

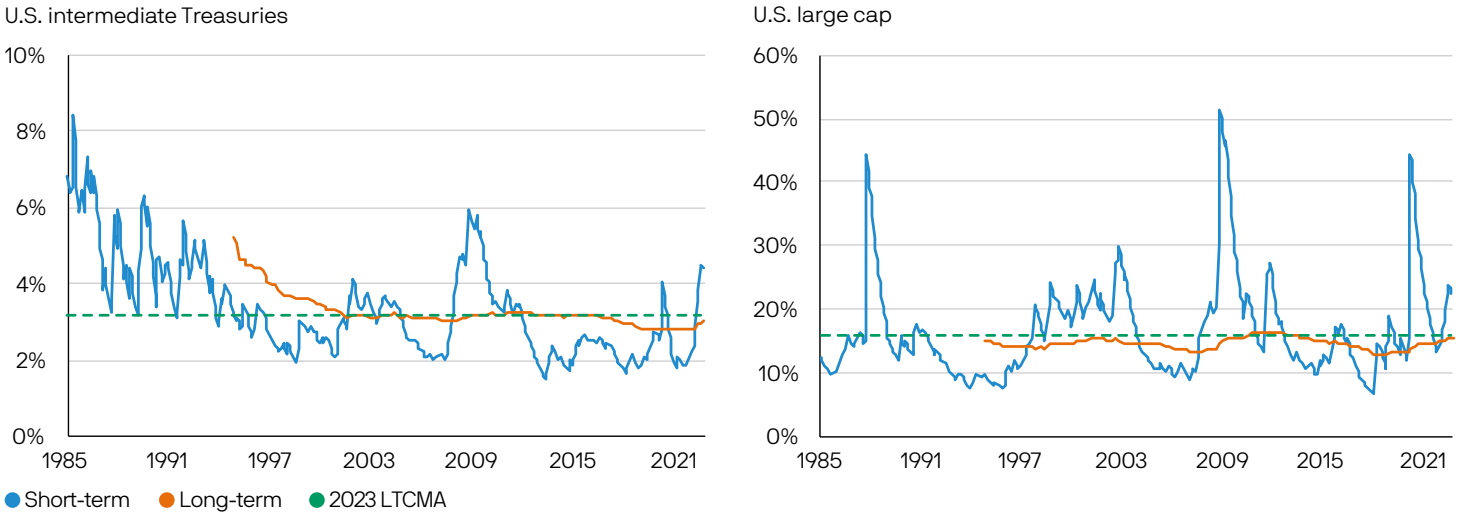
Exhibit 1: Return projections, 2023 vs. 2022



Source: Bloomberg, J.P. Morgan Asset Management.

Short-term volatility has a limited impact on longer-term volatility

Exhibit 2: Short- vs. long-term volatility (%) for U.S. Treasuries and U.S. large cap

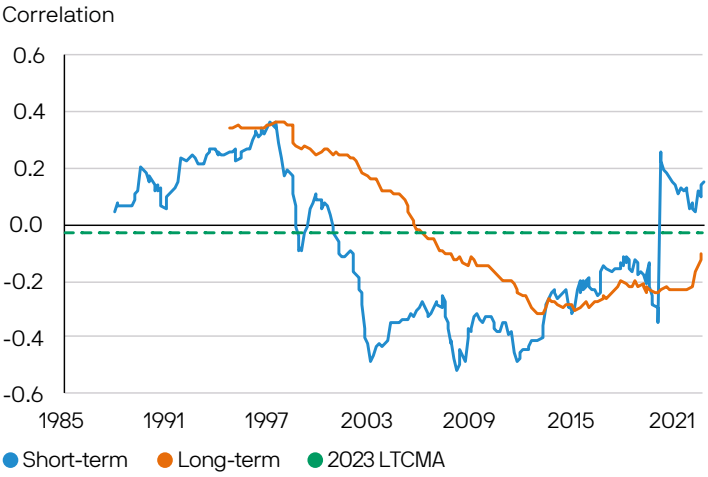


Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022. Short-term volatility is exponentially weighted moving average (EWMA) volatility with a three-month half-life and a three-year lookback window, using daily return data. Long-term volatility is equal-weighted 15-year volatility using monthly return data.

- At the portfolio level, risk is driven by both asset class volatility and cross-asset class correlations. Correlation relationships across asset classes are fixed within asset allocation modeling exercises and are generally derived from recent historical data. Changes to correlation relationships are infrequent, making it difficult to anticipate potential regime changes. **Exhibit 3** makes this challenge plain: The long-term "average" correlation between stocks and bonds is assumed to be negative, while the historical record shows two broad regimes, one of which was consistently positive and the other consistently negative – until the recent move back into positive territory. The argument for retaining a negative correlation over the long term rests on the assumption that the spike in correlation is largely inflation driven, and will decline from currently elevated levels as inflation subsides. Should this process take longer than anticipated, the duration of the positive correlation may extend as well.

There are two broad historical regimes in correlations between stocks and bonds – one consistently positive and the other consistently negative

Exhibit 3: Short- vs. long-term stock-bond correlations between world equities and world government bonds (hedged, USD)



Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022. Short-term correlation is exponentially weighted moving average (EWMA) volatility with a three-month half-life and a three-year lookback window, using weekly return data.

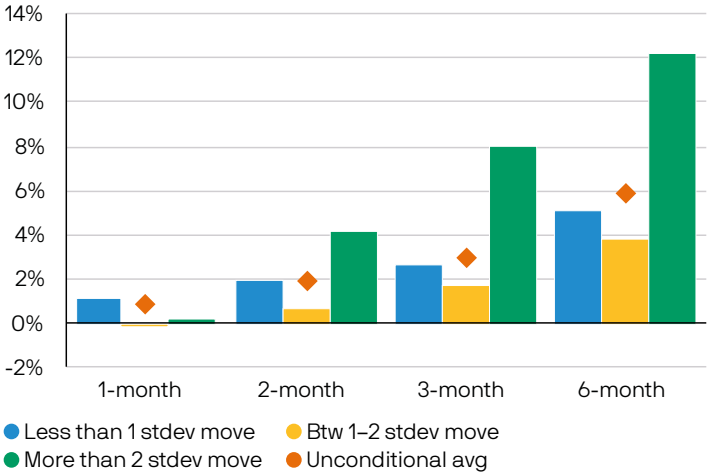
The LTCMA process does not rely on naive mean reversion to a fixed equilibrium but instead tries to capture the future environment implied by our macroeconomic assumptions. Nonetheless, the inherent stability of these critical assumptions helps to anchor asset allocations over time. But it is useful to stress-test these underlying assumptions, particularly during periods of volatility, to provide a better perspective on current conditions.

Shorter horizons and strategic flexibility

How should an investor think about navigating between a stable long-term asset allocation and implementing portfolio tilts that reflect short-term conditions? We noted earlier that changes in short-term valuations often signal directionally opposite movements in future return assumptions. The more that short-term returns deviate from the long-term assumption, the more confident we are in our forecast of short-term outcomes. **Exhibit 4** illustrates the consistently positive performance that often follows a significant market drawdown.

Stronger mean reversion often follows large market moves

Exhibit 4: Short-term rebound in U.S. large cap equity following different levels of drawdown



Source: Bloomberg, J.P. Morgan Asset Management; data as of September 30, 2022. Analysis using S&P 500 return since January 1926–September 2022.

Our confidence in the long-term numbers makes them a useful guide for anchoring a portfolio's strategic allocation. However, they are less useful in answering an important question – whether the correct response to volatility is simply to rebalance back to the long-term strategy, or to go further and tilt the portfolio in different directions. In the next section, we explore this topic in more detail.

Stress-testing strategic allocations under different regimes

Allocating a portfolio so that it responds effectively to short-term signals requires conviction, and an allocation modeling exercise can be structured to offer useful guidance. Adjusting the model in two ways can help illuminate potential solutions: first, by revealing the degree to which "traditional" asset class constraints are preventing the most efficient allocation of capital; and second, by making thoughtful adjustments to the long-term assumptions to better capture current market conditions.

Exhibit 5 illustrates the process. The baseline portfolio is a typical 60/40 allocation using this year's LTCMAs. We show the strategy with and without a 20% weighting to diversified alternatives, which have a positive impact on both return and volatility characteristics.

Relative to last year's analysis, the most significant difference here is simply the much higher return assumptions from public markets. The baseline 60/40 portfolio can now achieve a target return well in excess of 7% even before incorporating alternative asset classes.

The role of diversified alternatives has been even more fully demonstrated over the past year. While alternatives are no longer as critical to reaching forward return targets as they were at the end of 2021, they are now even more important from a diversification standpoint. The rise in stock-bond correlation makes a 60/40 portfolio much riskier, even if its returns are more compelling. As a result, alternative allocations are essential as a means of managing volatility as well as providing a reliable source of high returns.

We evaluate baseline and adjusted portfolios under different guideline and correlation assumptions

Exhibit 5: Portfolios using LTCMA forecasts along with stress-testing scenarios

	Baseline portfolio		Optimized portfolio with LTCMA		Optimized portfolio with new regime correlation		New regime portfolio	
Stock-bond correlation	-0.15				0.12			
	Public only	Public + private	Public only	Public + private	Public only	Public + private	Public only	Public + private
Arithmetic return	8.1%	8.2%	8.0%	8.1%	8.0%	8.1%	8.0%	8.1%
Annualized volatility	10.7%	10.2%	9.8%	9.3%	9.8%	9.6%	10.2%	9.7%
Sharpe ratio	0.53	0.57	0.57	0.61	0.57	0.59	0.55	0.59
CVaR 95	-19.7%	-18.6%	-17.9%	-16.9%	-17.9%	-17.5%	-18.7%	-17.8%
CVaR 99	-26.1%	-24.7%	-23.8%	-22.5%	-23.8%	-23.3%	-24.8%	-23.6%
Asset	**Weight**							
U.S. intermediate Treasuries	12.5%	10.0%	0.0%	0.0%	0.0%	0.0%	6.3%	5.0%
U.S. long Treasuries	10.0%	8.0%	27.2%	21.7%	0.0%	0.0%	12.5%	10.0%
U.S. inv grade corporate bonds	10.0%	8.0%	0.0%	0.0%	30.8%	24.7%	12.5%	10.0%
U.S. high yield bonds	5.0%	4.0%	25.0%	20.0%	22.7%	18.1%	12.5%	10.0%
Emerging markets sovereign debt	2.5%	2.0%	2.2%	1.8%	8.2%	6.5%	6.3%	5.0%
U.S. large cap	35.0%	28.0%	22.8%	18.3%	19.2%	15.3%	25.0%	20.0%
EAFE equity	17.5%	14.0%	10.5%	8.4%	4.4%	3.5%	16.9%	13.5%
Emerging markets equity	7.5%	6.0%	12.3%	9.9%	14.8%	11.8%	8.1%	6.5%
Alternatives	0.0%	20.0%	0.0%	20.0%	0.0%	20.0%	0.0%	20.0%

Source: J.P. Morgan Asset Management; as of September 30, 2022. "Alternatives" represents a diversified basket of alternative assets, including 30% private equity, 25% real estate, 20% infrastructure, 10% hedged funds and 15% direct lending. "New regime" analysis is a hypothetical scenario. The scenario risk matrix is generated using an exponentially weighted three-month half-life approach with data in September 2022.

In **Exhibit 6**, we explain the varying components and investment implications of the three optimized portfolios in our allocation model.

Our optimized portfolios have different constraints and correlations, but all target returns similar to the 60/40 baseline

Exhibit 6: Investment implications of optimized portfolios

	Description	Implications
Optimized portfolio with LTCMAs	Relaxes constraints on individual asset classes, allowing the directional flow of capital into and out of certain market sectors based on their assumed long-term risk and return characteristics	• Prioritizes long-duration fixed income as a means of diversifying risk. • The overall size of the equity portfolio declines somewhat, and this capital is reallocated to the most equity-like credit sectors of fixed income, including high yield and emerging market bonds. • Instead of a structural bias to the U.S. over global, the portfolio invests the maximum allowable weight to global equities, given lower current multiples and a strong U.S. dollar.
Optimized portfolio with new regime correlation	Keeps the relaxed constraints but goes further by also "hardwiring" a higher stock-bond correlation assumption (and therefore a lower level of structural diversification)	• The diversifying role of Treasuries effectively disappears. • Exposure to credit sectors is maximized across investment grade, high yield and emerging markets to reflect their higher forward returns and relatively modest volatility. • The size of the equity allocation declines, but the optimization retains the preference for global equity over U.S. equity.
New regime portfolio	Retains the higher stock-bond correlation from the second optimization model but places reasonable constraints on the underlying distribution of assets	• Modest overweights to credit sectors and international equities based on attractive risk-adjusted return expectations. • A minimum exposure to Treasuries, consistent with liquidity and risk diversification benefits. • A roughly balanced distribution of equities and fixed income, with or without the use of diversified alternatives.

Source: J.P. Morgan Asset Management.

Optimization models, correlation and portfolio construction

What useful takeaways can we extract from this admittedly simple modeling exercise? We see several:

First, the baseline allocation delivers one bit of very good news: At the current market juncture, a traditional portfolio is far more likely to reach its long-term return targets, given the significant repricing of markets that has taken place in 2022. Forward-looking returns on stocks and bonds are expected to be materially higher over the coming 10–15 years. Of course, the repricing has come at the cost of sharply negative returns over the past year.

Second, diversified alternatives continue to supply attractive returns and moderate risk to a portfolio, suggesting that investors should allocate as much to these assets as their liquidity budgets prudently allow. Our model allocates broadly across private equity, global core real estate, infrastructure, diversified hedge funds and direct lending. Depending on an investor's specific return needs and risk appetite, the mix of alternative strategies may change, but the overall value of diversified alternatives is clear.

Third, credit sectors appear to be particularly compelling, given the attractive entry point and relatively low volatility (at least, relative to equities). We recommend a diversified active multi-sector approach that can allocate across various sleeves of the credit markets (including investment grade, high yield and emerging markets). That approach might be found in a single strategy with tactical flexibility or through multiple managers operating in individual sectors.

Fourth, the size of equity exposure and the corresponding need for an uncorrelated hedge asset constitute a critical pivot point in the asset allocation process. Just as a negative stock-bond correlation allows for a large equity allocation to be maintained safely alongside risk-diversifying fixed income, the shift to a more positively correlated environment reduces an investor's capacity to safely hold equity risk. In such a scenario, equity investors looking to maximize the value of their capital allocation in this space may wish to employ active strategies that manage exposures dynamically.

Fifth, the strength of the dollar and the level of current valuations in global public markets make non-U.S. investments more compelling to a U.S. investor (and, conversely, make U.S. investments less compelling to a non-U.S. investor). While some of the currency benefits will accrue to any strategy that moves across borders, global equity and credit may be the biggest beneficiaries: Active management can maximize exposure to countries and firms that are positioned well relative to dollar strength, and avoid those that may suffer.

A diversified portfolio of public and private strategies offers the best path to achieving long-term objectives. The compelling return assumptions for stocks and bonds provide a stronger foundation for asset performance than we have seen in many years. Higher correlations may persist, however, making a strategy built entirely from public assets potentially too risky. Alternative asset classes continue to offer a valuable source of return and risk management, along with a broad range of liquidity options.

Conclusion

Today's investing environment is a reminder of the benefits of the strategic allocation process. On one hand, we derive tremendous value from thoughtfully assessing future expectations, allocating with conviction and rebalancing back to a stable strategic portfolio. This year's LTCMA analysis indicates that a portfolio with a bias to public markets may deliver higher forward returns than at any time in more than a decade. Investors with capital available to deploy – either in the form of cash or from external contributions – have before them an outstanding entry point.

On the other hand, the rapid adjustment of markets offers additional opportunities to manage risk and capture returns in the near term, while forcing us to reconsider some of our long-term assumptions. Near- term tilts to credit sectors and international equity may offer attractive risk-adjusted returns, while lower volatility alternatives and short-duration fixed income help to manage risk and preserve liquidity. The potential for a more positively correlated market environment requires vigilance around the distribution of risk across portfolios.

The emergence of a new macroeconomic regime presents an opportunity for investors to stress-test their allocation process and implement changes that will support risk-adjusted returns over multiple horizons. The long term, after all, is simply a series of shorter periods in which thoughtful strategic adjustments can make a real difference.

III Assumption matrices

		Compound Return 2022 (%)	Annualized Volatility (%)	Arithmetic Return 2023 (%)	Compound Return 2023 (%)	U.S. Inflation	U.S. Cash	U.S. Intermediate Treasuries	U.S. Long Treasuries	TIPS	U.S. Aggregate Bonds	U.S. Securitized	U.S. Short Duration Government/Credit	U.S. Long Duration Government/Credit	U.S. Inv Grade Corporate Bonds	U.S. Long Corporate Bonds	U.S. High Yield Bonds	U.S. Leveraged Loans	World Government Bonds hedged	World Government Bonds	World ex-U.S. Government Bonds hedged	World ex-U.S. Government Bonds	Emerging Markets Sovereign Debt	Emerging Markets Local Currency Debt	Emerging Markets Corporate Bonds	U.S. Muni 1-15 Yr Blend	U.S. Muni High Yield
Fixed income	U.S. Inflation	2.60	2.62	1.77	2.30	1.00																					
	U.S. Cash	2.40	2.40	0.50	1.30	-0.03	1.00																				
	U.S. Intermediate Treasuries	3.60	3.65	3.18	2.10	-0.39	0.26	1.00																			
	U.S. Long Treasuries	4.20	4.91	12.27	1.80	-0.29	0.12	0.83	1.00																		
	TIPS	4.30	4.45	5.57	2.10	-0.10	0.09	0.58	0.58	1.00																	
	U.S. Aggregate Bonds	4.60	4.68	4.09	2.60	-0.39	0.16	0.83	0.82	0.72	1.00																
	U.S. Securitized	4.80	4.84	3.06	3.10	-0.39	0.19	0.79	0.70	0.63	0.92	1.00															
	U.S. Short Duration Government/Credit	3.60	3.61	1.63	2.10	-0.46	0.33	0.81	0.54	0.56	0.82	0.81	1.00														
	U.S. Long Duration Government/Credit	5.20	5.72	10.47	2.30	-0.32	0.08	0.72	0.89	0.67	0.93	0.77	0.63	1.00													
	U.S. Inv Grade Corporate Bonds	5.50	5.73	7.02	2.80	-0.25	0.06	0.45	0.54	0.69	0.81	0.66	0.59	0.81	1.00												
	U.S. Long Corporate Bonds	5.80	6.40	11.37	2.40	-0.27	0.04	0.45	0.62	0.64	0.82	0.66	0.54	0.89	0.96	1.00											
	U.S. High Yield Bonds	6.80	7.14	8.53	3.90	-0.09	-0.07	-0.05	-0.04	0.46	0.36	0.34	0.29	0.31	0.66	0.60	1.00										
	U.S. Leveraged Loans	6.20	6.50	7.98	4.70	0.09	-0.13	-0.41	-0.31	0.19	0.02	-0.01	-0.06	0.01	0.36	0.30	0.77	1.00									
	World Government Bonds hedged	3.70	3.77	3.68	2.00	-0.47	0.17	0.85	0.86	0.55	0.86	0.76	0.71	0.84	0.58	0.62	0.07	-0.22	1.00								
	World Government Bonds	4.40	4.62	6.83	2.30	-0.30	0.15	0.72	0.62	0.65	0.78	0.71	0.71	0.71	0.63	0.63	0.31	-0.06	0.70	1.00							
	World ex-U.S. Government Bonds hedged	3.60	3.67	3.71	2.00	-0.49	0.14	0.71	0.74	0.50	0.78	0.68	0.63	0.77	0.57	0.62	0.14	-0.11	0.96	0.64	1.00						
	World ex-U.S. Government Bonds	4.60	4.94	8.51	2.40	-0.28	0.13	0.61	0.50	0.63	0.71	0.64	0.65	0.64	0.63	0.62	0.39	0.04	0.61	0.98	0.59	1.00					
	Emerging Markets Sovereign Debt	7.10	7.58	10.23	5.20	-0.18	0.04	0.24	0.27	0.59	0.58	0.52	0.42	0.55	0.81	0.75	0.75	0.45	0.37	0.54	0.41	0.58	1.00				
	Emerging Markets Local Currency Debt	7.10	7.80	12.38	5.90	-0.09	0.11	0.18	0.12	0.44	0.44	0.40	0.38	0.39	0.60	0.56	0.64	0.35	0.23	0.59	0.27	0.66	0.79	1.00			
	Emerging Markets Corporate Bonds	7.00	7.40	9.34	4.80	-0.11	0.01	0.14	0.16	0.54	0.50	0.43	0.37	0.46	0.80	0.71	0.74	0.56	0.26	0.42	0.30	0.46	0.90	0.71	1.00		
	U.S. Muni 1-15 Yr Blend	3.70	3.77	3.79	2.10	-0.24	0.10	0.51	0.47	0.54	0.69	0.64	0.53	0.61	0.67	0.62	0.39	0.13	0.56	0.52	0.53	0.50	0.57	0.35	0.46	1.00	
	U.S. Muni High Yield	5.20	5.53	8.32	2.90	0.16	-0.03	0.07	0.16	0.45	0.31	0.27	0.11	0.30	0.51	0.43	0.50	0.48	0.16	0.16	0.17	0.18	0.54	0.28	0.54	0.58	1.00
Equities	U.S. Large Cap	7.90	9.07	16.13	4.10	-0.07	-0.05	-0.15	-0.11	0.26	0.19	0.16	0.09	0.20	0.46	0.44	0.74	0.57	-0.02	0.25	0.06	0.33	0.62	0.61	0.58	0.17	0.29
	U.S. Mid Cap	8.00	9.46	18.04	4.30	-0.07	-0.06	-0.17	-0.13	0.27	0.19	0.17	0.10	0.19	0.48	0.45	0.79	0.62	-0.04	0.23	0.04	0.31	0.61	0.61	0.58	0.20	0.30
	U.S. Small Cap	8.10	9.94	20.37	4.40	-0.10	-0.07	-0.17	-0.16	0.19	0.14	0.12	0.06	0.13	0.40	0.37	0.71	0.54	-0.07	0.18	0.01	0.26	0.52	0.55	0.49	0.16	0.22
	Euro Area Large Cap	10.50	12.56	21.86	7.10	-0.09	0.00	-0.09	-0.13	0.26	0.23	0.22	0.20	0.19	0.48	0.44	0.73	0.53	-0.01	0.37	0.05	0.46	0.66	0.73	0.62	0.21	0.27
	Japanese Equity	10.40	11.46	15.46	6.70	-0.13	-0.07	-0.08	-0.06	0.24	0.23	0.21	0.18	0.23	0.48	0.46	0.68	0.48	0.00	0.28	0.05	0.35	0.55	0.61	0.54	0.18	0.24
	Hong Kong Equity	7.50	9.18	19.40	6.90	-0.02	0.00	-0.15	-0.15	0.20	0.17	0.14	0.13	0.14	0.43	0.39	0.61	0.50	-0.09	0.23	-0.05	0.29	0.54	0.66	0.58	0.16	0.26
	UK Large Cap	9.10	10.42	17.23	5.00	0.01	-0.06	-0.24	-0.25	0.20	0.10	0.09	0.05	0.08	0.39	0.36	0.71	0.61	-0.16	0.24	-0.09	0.34	0.55	0.66	0.56	0.11	0.28
	EAFE Equity	9.80	11.14	17.40	6.50	-0.08	-0.03	-0.12	-0.13	0.28	0.22	0.20	0.17	0.21	0.50	0.47	0.78	0.58	-0.03	0.36	0.04	0.45	0.66	0.74	0.64	0.19	0.28
	Chinese Domestic Equity	11.80	15.37	29.38	8.20	-0.05	0.15	-0.07	-0.06	0.10	0.12	0.10	0.07	0.10	0.27	0.24	0.33	0.27	-0.01	0.11	0.02	0.14	0.29	0.32	0.35	0.09	0.16
	Emerging Markets Equity	10.10	11.96	20.65	6.90	-0.05	0.03	-0.12	-0.12	0.31	0.22	0.19	0.18	0.20	0.49	0.45	0.74	0.57	-0.03	0.36	0.02	0.44	0.65	0.80	0.66	0.17	0.30
	AC Asia ex-Japan Equity	10.00	11.77	20.11	7.00	-0.09	0.02	-0.09	-0.08	0.30	0.24	0.20	0.19	0.22	0.50	0.46	0.72	0.54	-0.01	0.33	0.04	0.41	0.62	0.74	0.64	0.18	0.29
	AC World Equity	8.50	9.74	16.63	5.00	-0.07	-0.03	-0.14	-0.12	0.29	0.22	0.19	0.14	0.21	0.51	0.48	0.79	0.61	-0.03	0.32	0.05	0.41	0.67	0.72	0.64	0.19	0.30
	U.S. Equity Value Factor	10.10	11.38	17.05	5.60	-0.10	-0.09	-0.18	-0.18	0.20	0.15	0.15	0.09	0.13	0.40	0.38	0.74	0.57	-0.06	0.20	0.03	0.29	0.55	0.61	0.54	0.13	0.22
	U.S. Equity Momentum Factor	8.90	10.18	16.94	4.70	-0.05	-0.04	-0.12	-0.05	0.32	0.23	0.19	0.11	0.24	0.51	0.49	0.76	0.60	0.01	0.25	0.08	0.32	0.63	0.58	0.59	0.24	0.36
	U.S. Equity Quality Factor	7.80	8.79	14.76	4.70	-0.07	-0.05	-0.13	-0.09	0.26	0.21	0.17	0.10	0.21	0.47	0.45	0.73	0.55	0.00	0.25	0.08	0.33	0.62	0.62	0.58	0.19	0.28
	U.S. Equity Minimum Volatility Factor	8.20	8.93	12.70	4.60	-0.04	-0.07	-0.13	-0.08	0.25	0.20	0.17	0.07	0.21	0.44	0.44	0.71	0.53	0.01	0.23	0.09	0.31	0.59	0.61	0.53	0.19	0.27
	U.S. Equity Dividend Yield Factor	8.90	10.00	15.69	5.20	-0.05	-0.10	-0.18	-0.16	0.22	0.16	0.15	0.08	0.15	0.41	0.40	0.73	0.57	-0.07	0.21	0.02	0.30	0.56	0.62	0.53	0.16	0.23
	U.S. Convertible Bonds hedged	9.00	9.77	13.07	4.50	-0.13	-0.05	-0.10	-0.04	0.37	0.28	0.21	0.15	0.27	0.58	0.53	0.80	0.66	0.04	0.28	0.12	0.36	0.67	0.58	0.66	0.30	0.38
	Global Convertible Bonds hedged	9.10	9.73	11.78	5.50	-0.17	-0.03	-0.11	-0.05	0.35	0.29	0.23	0.19	0.28	0.61	0.56	0.82	0.67	0.05	0.28	0.13	0.36	0.70	0.61	0.71	0.30	0.38
Alternatives	Private Equity	9.90	11.64	19.96	8.10	0.13	-0.01	-0.46	-0.51	0.10	-0.15	-0.16	-0.11	-0.19	0.29	0.18	0.70	0.67	-0.40	0.00	-0.29	0.12	0.54	0.57	0.57	0.02	0.33
	Venture Capital	8.50	10.73	22.54	-	0.02	-0.06	-0.43	-0.44	0.02	-0.21	-0.20	-0.20	-0.23	0.13	0.05	0.49	0.51	-0.37	-0.13	-0.28	-0.02	0.36	0.36	0.38	-0.04	0.26
	U.S. Core Real Estate	5.70	6.22	10.56	5.80	0.33	-0.12	-0.37	-0.28	0.03	-0.22	-0.16	-0.29	-0.20	0.00	-0.04	0.42	0.50	-0.34	-0.21	-0.31	-0.16	0.17	0.18	0.26	-0.22	0.39
	U.S. Value-Added Real Estate	7.70	9.09	17.58	7.70	0.33	-0.12	-0.37	-0.28	0.03	-0.22	-0.16	-0.29	-0.20	0.00	-0.04	0.42	0.50	-0.34	-0.21	-0.31	-0.16	0.17	0.18	0.26	-0.22	0.39
	European Core Real Estate	6.80	7.52	12.51	6.10	0.25	-0.05	-0.39	-0.39	0.10	-0.15	-0.17	-0.17	-0.15	0.19	0.12	0.50	0.50	-0.38	0.12	-0.33	0.24	0.40	0.48	0.42	0.02	0.26
	Asia Pacific Core Real Estate	8.10	9.08	14.75	7.50	0.23	-0.06	-0.33	-0.30	0.21	-0.01	0.01	-0.09	-0.04	0.31	0.24	0.67	0.65	-0.26	0.10	-0.20	0.19	0.48	0.51	0.54	0.09	0.48
	U.S. REITs	6.80	7.94	15.84	5.70	-0.05	-0.04	-0.01	0.09	0.31	0.28	0.25	0.10	0.32	0.46	0.47	0.64	0.42	0.14	0.28	0.20	0.32	0.56	0.56	0.48	0.22	0.28
	Global Core Infrastructure	6.30	6.84	10.82	6.10	0.22	-0.03	-0.30	-0.32	0.23	-0.05	-0.02	-0.03	-0.11	0.22	0.14	0.57	0.61	-0.25	0.12	-0.19	0.22	0.45	0.49	0.48	0.05	0.32
	Global Core Transport	7.50	8.37	13.84	7.40	0.21	0.12	0.03	0.02	-0.04	-0.10	-0.03	-0.11	-0.11	-0.30	-0.25	-0.16	-0.07	-0.02	-0.07	-0.07	-0.09	-0.19	-0.05	-0.19	-0.20	0.01
	Global Timberland	6.70	7.19	10.26	-	-0.13	0.12	-0.07	-0.19	0.05	0.03	0.01	0.10	-0.01	0.20	0.17	0.25	0.16	-0.06	0.20	0.00	0.26	0.32	0.46	0.27	0.06	-0.01
	Diversified Hedge Funds	5.00	5.22	6.89	3.60	0.04	0.02	-0.31	-0.22	0.23	0.04	-0.03	-0.04	0.07	0.38	0.33	0.63	0.68	-0.18	0.05	-0.09	0.13	0.48	0.42	0.52	0.10	0.41
	Event Driven Hedge Funds	5.40	5.76	8.73	3.20	-0.02	-0.06	-0.26	-0.27	0.24	0.10	0.08	0.08	0.08	0.42	0.37	0.79	0.76	-0.15	0.15	-0.05	0.25	0.55	0.55	0.58	0.13	0.39
	Long Bias Hedge Funds	5.00	5.58	11.08	3.30	-0.07	-0.04	-0.20	-0.20	0.27	0.17	0.13	0.13	0.15	0.47	0.42	0.78	0.67	-0.10	0.23	-0.02	0.33	0.59	0.62	0.61	0.16	0.32
	Relative Value Hedge Funds	4.90	5.09	6.29	3.80	0.05	-0.06	-0.30	-0.26	0.28	0.11	0.09	0.07	0.09	0.44	0.38	0.83	0.86	-0.16	0.09	-0.06	0.19	0.58	0.55	0.62	0.16	0.45
	Macro Hedge Funds	4.10	4.41	8.13	2.70	0.01	0.05	-0.12	-0.11	0.12	-0.07	-0.14	-0.01	-0.02	0.07	0.07	0.10	0.08	-0.11	0.09	-0.08	0.13	0.10	0.18	0.05	-0.09	-0.03
	Direct Lending	7.80	8.65	13.65	6.90	0.23	-0.13	-0.46	-0.47	0.14	-0.15	-0.10	-0.17	-0.19	0.19	0.11	0.69	0.73	-0.36	-0.18	-0.24	-0.07	0.45	0.38	0.50	0.04	0.36
	Commodities	3.10	4.60	17.88	2.60	0.31	-0.03	-0.31	-0.34	0.20	-0.16	-0.17	-0.11	-0.15	0.09	0.05	0.39	0.39	-0.37	0.10	-0.33	0.19	0.27	0.40	0.27	-0.17	0.14
	Gold	3.50	4.82	16.77	3.00	-0.02	0.08	0.30	0.27	0.48	0.33	0.28	0.28	0.30	0.31	0.28	0.13	-0.03	0.23	0.47	0.19	0.47	0.27	0.34	0.24	0.18	0.09

U.S. dollar assumptions

Note: All estimates on this page are in U.S. dollar terms. Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations to all of these asset classes and strategies. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in an particular asset class or strategy or as a promise of future performance. These asset class and strategy assumptions are passive only for liquid assets and industry averages (median managers) for alternatives. The assumptions do not consider the impact of active management. Reference to future returns are not promises or even estimates of actual returns portfolio's may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. Forecasts of financial market trends that are based on current market conditions constitute our judgement and are subject to change without notice. We believe the information provided herein is reliable, but to not warrant its accuracy or completeness. This materials is not intended to provide and should not be relied upon for accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2022. Alternative asset classes (including hedge funds, private equity, real estate, direct lending, transportation, infrastructure and timberland) are unlike other asset categories shown above in that there is no underlying investible index. The return estimates for these alternative asset classes and strategies are estimates of the industry average – median manager, net of manager fees. The dispersion of return among managers of these asset classes and strategies is typically significantly wider than that of traditional asset classes. Correlations of value-added and core real estate in their local currencies are identical since value-added local returns are scaled versions of their corresponding core real estate local returns. This year, we have updated the raw data source for Europe and U.K. Real Estate and this may result in a change in correlation forecasts. For equity and fixed income assumptions we assume current index regional weight in composite indices with multiple countries/regions. All returns are nominal. The return forecasts of composite and hedged assets are computed using unrounded return and rounded to the nearest 10bp at the final stage. In some cases this may lead to apparent differences in hedging impact across assets, but this is purely due to rounding. For the full opportunity set, please contact your J.P. Morgan representative.

U.S. Large Cap	U.S. Mid Cap	U.S. Small Cap	Euro Area Large Cap	Japanese Equity	Hong Kong Equity	UK Large Cap	EAFE Equity	Chinese Domestic Equity	Emerging Markets Equity	AC Asia ex-Japan Equity	AC World Equity	U.S. Equity Value Factor	U.S. Equity Momentum Factor	U.S. Equity Quality Factor	U.S. Equity Minimum Volatility Factor	U.S. Equity Dividend Yield Factor	U.S. Convertible Bonds hedged	Global Convertible Bonds hedged	Private Equity	Venture Capital	U.S. Core Real Estate	U.S. Value-Added Real Estate	European Core Real Estate	Asia Pacific Core Real Estate	U.S. REITs	Global Core Infrastructure	Global Core Transport	Global Timberland	Diversified Hedge Funds	Event Driven Hedge Funds	Long Bias Hedge Funds	Relative Value Hedge Funds	Macro Hedge Funds	Direct Lending	Commodities	Gold
1.00																																				
0.96	1.00																																			
0.91	0.95	1.00																																		
0.85	0.84	0.77	1.00																																	
0.74	0.74	0.69	0.76	1.00																																
0.64	0.64	0.59	0.71	0.61	1.00																															
0.82	0.81	0.73	0.90	0.74	0.75	1.00																														
0.89	0.88	0.81	0.97	0.85	0.76	0.94	1.00																													
0.36	0.35	0.34	0.36	0.33	0.55	0.36	0.39	1.00																												
0.76	0.77	0.71	0.83	0.70	0.85	0.82	0.87	0.53	1.00																											
0.73	0.75	0.70	0.80	0.68	0.89	0.78	0.84	0.58	0.98	1.00																										
0.97	0.95	0.88	0.93	0.81	0.75	0.90	0.97	0.41	0.88	0.85	1.00																									
0.96	0.96	0.92	0.84	0.73	0.63	0.83	0.88	0.33	0.75	0.72	0.94	1.00																								
0.96	0.96	0.90	0.81	0.72	0.63	0.76	0.86	0.38	0.75	0.73	0.94	0.89	1.00																							
0.99	0.96	0.90	0.84	0.72	0.62	0.80	0.87	0.35	0.74	0.71	0.95	0.95	0.96	1.00																						
0.94	0.92	0.86	0.79	0.66	0.58	0.77	0.83	0.28	0.69	0.66	0.90	0.93	0.90	0.95	1.00																					
0.93	0.94	0.88	0.81	0.69	0.63	0.83	0.86	0.28	0.74	0.70	0.91	0.97	0.86	0.93	0.95	1.00																				
0.86	0.89	0.85	0.76	0.71	0.65	0.72	0.82	0.44	0.76	0.76	0.87	0.81	0.90	0.84	0.76	0.77	1.00																			
0.86	0.89	0.83	0.81	0.74	0.69	0.76	0.86	0.47	0.80	0.80	0.90	0.81	0.90	0.85	0.77	0.77	0.98	1.00																		
0.77	0.79	0.74	0.77	0.60	0.69	0.80	0.80	0.48	0.80	0.76	0.82	0.76	0.77	0.76	0.70	0.74	0.77	0.79	1.00																	
0.64	0.66	0.70	0.57	0.53	0.56	0.60	0.60	0.47	0.61	0.61	0.65	0.62	0.65	0.62	0.55	0.58	0.69	0.69	0.78	1.00																
0.41	0.40	0.35	0.31	0.33	0.28	0.42	0.37	0.11	0.33	0.31	0.40	0.41	0.38	0.39	0.44	0.40	0.27	0.27	0.42	0.26	1.00															
0.41	0.40	0.35	0.31	0.33	0.28	0.42	0.37	0.11	0.33	0.31	0.40	0.41	0.38	0.39	0.44	0.40	0.27	0.27	0.42	0.26	1.00	1.00														
0.56	0.56	0.48	0.65	0.51	0.53	0.68	0.66	0.38	0.64	0.59	0.65	0.53	0.58	0.54	0.47	0.50	0.58	0.59	0.72	0.58	0.36	0.36	1.00													
0.63	0.65	0.55	0.64	0.55	0.63	0.71	0.69	0.35	0.70	0.68	0.69	0.62	0.62	0.60	0.61	0.64	0.60	0.61	0.71	0.47	0.69	0.69	0.63	1.00												
0.76	0.77	0.73	0.66	0.54	0.46	0.60	0.69	0.14	0.57	0.55	0.73	0.76	0.73	0.77	0.83	0.79	0.64	0.64	0.51	0.32	0.53	0.53	0.26	0.61	1.00											
0.45	0.45	0.39	0.51	0.39	0.52	0.55	0.52	0.17	0.57	0.52	0.52	0.43	0.45	0.43	0.41	0.44	0.44	0.44	0.62	0.47	0.46	0.46	0.55	0.55	0.34	1.00										
0.01	-0.04	-0.03	0.00	-0.18	-0.01	-0.04	-0.06	-0.09	-0.07	-0.05	-0.04	0.00	-0.01	0.04	0.07	0.00	-0.24	-0.23	-0.11	-0.11	0.31	0.31	-0.16	0.10	0.18	0.12	1.00									
0.37	0.37	0.39	0.47	0.27	0.44	0.40	0.44	0.31	0.43	0.41	0.42	0.38	0.36	0.37	0.39	0.37	0.26	0.31	0.47	0.44	-0.04	-0.04	0.34	0.22	0.26	0.28	0.04	1.00								
0.71	0.74	0.66	0.66	0.61	0.59	0.70	0.72	0.44	0.69	0.67	0.75	0.65	0.77	0.69	0.63	0.62	0.79	0.82	0.78	0.71	0.37	0.37	0.63	0.61	0.45	0.43	-0.14	0.34	1.00							
0.82	0.86	0.81	0.78	0.71	0.66	0.81	0.84	0.41	0.78	0.74	0.87	0.82	0.83	0.80	0.73	0.79	0.85	0.87	0.83	0.68	0.42	0.42	0.61	0.68	0.57	0.48	-0.11	0.36	0.87	1.00						
0.87	0.91	0.86	0.83	0.76	0.74	0.83	0.89	0.47	0.86	0.83	0.93	0.85	0.90	0.86	0.79	0.82	0.90	0.92	0.84	0.74	0.34	0.34	0.65	0.65	0.60	0.50	-0.13	0.40	0.87	0.94	1.00					
0.71	0.76	0.68	0.71	0.65	0.67	0.77	0.77	0.40	0.77	0.73	0.78	0.72	0.73	0.68	0.65	0.71	0.78	0.82	0.80	0.60	0.45	0.45	0.61	0.71	0.51	0.54	-0.13	0.31	0.83	0.92	0.86	1.00				
0.20	0.21	0.12	0.24	0.15	0.21	0.30	0.27	0.07	0.28	0.26	0.26	0.17	0.21	0.21	0.24	0.23	0.22	0.24	0.33	0.26	-0.03	-0.03	0.19	0.14	0.15	0.03	-0.18	0.33	0.47	0.28	0.32	0.28	1.00			
0.60	0.67	0.60	0.53	0.42	0.48	0.61	0.58	0.26	0.59	0.53	0.62	0.63	0.62	0.60	0.59	0.64	0.62	0.63	0.76	0.57	0.46	0.46	0.53	0.66	0.42	0.49	-0.04	0.15	0.64	0.74	0.68	0.78	0.11	1.00		
0.39	0.41	0.33	0.43	0.32	0.39	0.58	0.48	0.10	0.52	0.43	0.47	0.39	0.38	0.36	0.36	0.44	0.37	0.36	0.60	0.41	0.37	0.37	0.57	0.56	0.26	0.46	-0.10	0.24	0.48	0.51	0.49	0.54	0.49	0.53	1.00	
0.03	0.05	0.00	0.07	0.02	0.16	0.10	0.10	0.16	0.21	0.18	0.10	-0.01	0.08	0.05	0.07	0.04	0.14	0.14	0.08	-0.02	-0.08	-0.08	0.07	0.21	0.09	0.13	0.05	0.14	0.13	0.08	0.15	0.10	0.37	0.03	0.35	1.00

		Compound Return 2023 (%)	Arithmetic Return 2023 (%)	Annualized Volatility (%)	Compound Return 2022 (%)	Euro Inflation	Euro Cash	U.S. Aggregate Bonds hedged	Euro Aggregate Bonds	U.S. Inv Grade Corporate Bonds hedged	Euro Inv Grade Corp Bonds	U.S. High Yield Bonds hedged	Euro High Yield Bonds	U.S. Leveraged Loans hedged	Euro Government Bonds	Euro Govt Inflation-Linked Bonds	World Government Bonds hedged	World Government Bonds	World ex-Euro Government Bonds hedged	World ex-Euro Government Bonds	Global Multiverse Bonds hedged	Emerging Markets Sovereign Debt hedged	Emerging Markets Local Currency Debt	Emerging Markets Corporate Bonds hedged	European Large Cap
Fixed income	Euro Inflation	1.80	1.81	1.06	1.50	1.00																			
	Euro Cash	1.30	1.30	0.61	0.10	-0.17	1.00																		
	U.S. Aggregate Bonds hedged	3.50	3.58	4.12	1.40	-0.41	0.31	1.00																	
	Euro Aggregate Bonds	3.00	3.10	4.48	1.20	-0.46	0.30	0.75	1.00																
	U.S. Inv Grade Corporate Bonds hedged	4.30	4.55	7.19	1.50	-0.35	0.15	0.83	0.67	1.00															
	Euro Inv Grade Corp Bonds	3.60	3.73	5.10	1.50	-0.38	0.12	0.62	0.78	0.83	1.00														
	U.S. High Yield Bonds hedged	5.70	6.05	8.65	2.70	-0.11	0.02	0.35	0.27	0.63	0.64	1.00													
	Euro High Yield Bonds	5.70	6.14	9.70	2.90	-0.14	-0.01	0.25	0.32	0.54	0.69	0.87	1.00												
	U.S. Leveraged Loans hedged	5.10	5.40	7.99	3.50	-0.02	-0.07	0.05	0.10	0.35	0.48	0.78	0.86	1.00											
	Euro Government Bonds	2.80	2.92	4.88	1.10	-0.42	0.30	0.70	0.98	0.57	0.66	0.14	0.19	-0.03	1.00										
	Euro Govt Inflation-Linked Bonds	2.60	2.74	5.32	0.80	-0.18	0.14	0.43	0.67	0.50	0.64	0.39	0.40	0.25	0.65	1.00									
	World Government Bonds hedged	2.60	2.67	3.70	0.80	-0.45	0.33	0.86	0.86	0.60	0.53	0.07	0.02	-0.18	0.89	0.48	1.00								
	World Government Bonds	2.30	2.53	6.85	1.00	-0.23	0.20	0.39	0.52	0.23	0.23	-0.19	-0.14	-0.18	0.55	0.19	0.60	1.00							
	World ex-Euro Government Bonds hedged	2.50	2.57	3.72	0.70	-0.38	0.24	0.86	0.67	0.57	0.38	0.01	-0.12	-0.28	0.70	0.31	0.94	0.55	1.00						
	World ex-Euro Government Bonds	2.10	2.52	9.26	1.00	-0.18	0.15	0.26	0.33	0.08	0.07	-0.29	-0.23	-0.23	0.36	0.03	0.45	0.96	0.44	1.00					
	Global Multiverse Bonds hedged	3.10	3.16	3.55	1.20	-0.47	0.32	0.95	0.89	0.83	0.75	0.40	0.34	0.13	0.84	0.58	0.90	0.45	0.82	0.28	1.00				
	Emerging Markets Sovereign Debt hedged	6.00	6.50	10.31	4.00	-0.24	0.07	0.59	0.52	0.78	0.73	0.75	0.61	0.44	0.41	0.50	0.38	-0.05	0.33	-0.20	0.64	1.00			
	Emerging Markets Local Currency Debt	5.00	5.39	9.14	4.60	-0.10	0.14	0.32	0.40	0.43	0.52	0.45	0.46	0.38	0.34	0.39	0.25	0.27	0.13	0.17	0.42	0.56	1.00		
	Emerging Markets Corporate Bonds hedged	5.80	6.20	9.22	3.60	-0.23	0.04	0.53	0.46	0.77	0.75	0.76	0.68	0.57	0.33	0.43	0.28	-0.05	0.22	-0.19	0.57	0.90	0.56	1.00	
Equities	European Large Cap	7.70	8.69	14.76	5.10	-0.08	-0.15	0.10	0.16	0.37	0.50	0.70	0.76	0.65	0.06	0.35	-0.10	-0.22	-0.20	-0.29	0.18	0.52	0.48	0.55	1.00
	European Small Cap	9.20	10.62	17.88	6.50	-0.14	-0.13	0.14	0.19	0.43	0.55	0.74	0.80	0.69	0.06	0.33	-0.07	-0.21	-0.16	-0.29	0.22	0.54	0.41	0.59	0.92
	U.S. Large Cap	5.80	6.80	14.73	2.80	-0.03	-0.17	0.04	0.17	0.27	0.44	0.56	0.61	0.57	0.09	0.28	-0.06	0.06	-0.17	-0.01	0.14	0.38	0.49	0.39	0.81
	U.S. Large Cap hedged	6.80	8.00	16.26	2.80	-0.03	-0.15	0.18	0.17	0.44	0.52	0.73	0.66	0.56	0.08	0.33	-0.02	-0.33	-0.09	-0.44	0.23	0.62	0.37	0.59	0.83
	Euro Area Large Cap	8.40	9.69	16.98	5.80	-0.11	-0.12	0.14	0.19	0.39	0.50	0.70	0.73	0.60	0.09	0.35	-0.06	-0.29	-0.16	-0.37	0.22	0.56	0.45	0.58	0.97
	Euro Area Small Cap	9.30	10.77	18.23	6.20	-0.13	-0.11	0.15	0.19	0.41	0.51	0.73	0.78	0.65	0.08	0.36	-0.06	-0.28	-0.16	-0.36	0.23	0.54	0.40	0.57	0.92
	UK Large Cap	7.00	7.98	14.66	3.70	0.05	-0.20	-0.06	0.03	0.24	0.39	0.60	0.70	0.66	-0.07	0.23	-0.25	-0.16	-0.34	-0.20	0.02	0.36	0.47	0.44	0.91
	UK Large Cap hedged	6.40	7.22	13.31	2.60	-0.05	-0.10	0.08	0.09	0.32	0.38	0.59	0.59	0.52	0.01	0.32	-0.11	-0.33	-0.19	-0.40	0.15	0.47	0.41	0.48	0.86
	Japanese Equity	8.30	9.20	14.14	5.40	-0.12	-0.12	0.07	0.17	0.31	0.41	0.49	0.53	0.48	0.09	0.24	-0.05	0.11	-0.15	0.07	0.14	0.31	0.49	0.36	0.67
	Japanese Equity hedged	8.70	10.06	17.46	5.00	0.01	-0.17	-0.10	-0.03	0.17	0.28	0.51	0.53	0.49	-0.10	0.20	-0.27	-0.46	-0.35	-0.52	-0.04	0.33	0.29	0.38	0.73
	Chinese Domestic Equity	9.70	13.10	28.37	6.90	-0.07	0.00	0.03	0.07	0.16	0.18	0.22	0.26	0.24	0.05	0.01	-0.05	-0.02	-0.11	-0.05	0.05	0.15	0.22	0.24	0.27
	Emerging Markets Equity	8.00	9.24	16.58	5.60	-0.07	-0.06	0.12	0.15	0.40	0.49	0.68	0.70	0.64	0.05	0.31	-0.09	-0.18	-0.18	-0.26	0.19	0.53	0.63	0.60	0.77
	AC Asia ex-Japan Equity	7.90	9.14	16.60	5.70	-0.11	-0.07	0.14	0.17	0.40	0.49	0.63	0.66	0.59	0.07	0.29	-0.05	-0.12	-0.15	-0.19	0.20	0.48	0.59	0.57	0.73
	AC World Equity	6.40	7.29	13.93	3.70	-0.06	-0.15	0.09	0.18	0.37	0.52	0.67	0.73	0.66	0.08	0.34	-0.08	-0.05	-0.19	-0.13	0.18	0.48	0.55	0.51	0.92
	AC World ex-EMU Equity	6.30	7.19	13.87	3.50	-0.06	-0.15	0.08	0.18	0.36	0.51	0.66	0.71	0.66	0.08	0.33	-0.08	-0.02	-0.19	-0.09	0.17	0.46	0.56	0.49	0.89
	Developed World Equity	6.30	7.22	14.13	3.50	-0.06	-0.16	0.08	0.18	0.35	0.50	0.65	0.71	0.64	0.08	0.33	-0.08	-0.04	-0.18	-0.11	0.17	0.46	0.52	0.48	0.91
	Global Convertible Bonds hedged	8.00	8.64	11.88	4.30	-0.24	-0.03	0.30	0.30	0.61	0.65	0.80	0.76	0.67	0.19	0.42	0.06	-0.26	-0.03	-0.39	0.36	0.69	0.38	0.71	0.78
	Global Credit Sensitive Convertible hedged	6.10	6.40	8.04	3.40	-0.17	-0.10	0.24	0.36	0.42	0.54	0.45	0.51	0.42	0.27	0.27	0.18	-0.01	0.10	-0.13	0.33	0.42	0.22	0.44	0.49
Alternatives	Private Equity	7.80	9.36	18.69	6.80	0.11	-0.17	-0.21	-0.12	0.18	0.31	0.58	0.58	0.64	-0.23	0.16	-0.39	-0.19	-0.46	-0.21	-0.12	0.38	0.45	0.46	0.72
	Venture Capital	6.40	8.60	22.18	-	0.03	-0.22	-0.25	-0.16	0.01	0.13	0.36	0.33	0.44	-0.22	0.03	-0.34	-0.11	-0.38	-0.11	-0.18	0.22	0.31	0.27	0.50
	U.S. Core Real Estate	3.60	4.34	12.48	4.50	0.31	-0.38	-0.19	-0.20	-0.03	0.07	0.34	0.35	0.44	-0.25	0.00	-0.28	0.00	-0.26	0.05	-0.19	0.10	0.29	0.22	0.38
	European Core Real Estate	4.70	5.19	10.15	4.80	0.16	-0.31	-0.31	-0.28	-0.02	0.05	0.34	0.33	0.45	-0.33	-0.04	-0.43	-0.13	-0.42	-0.11	-0.28	0.18	0.23	0.24	0.47
	European Value-Added Real Estate	6.70	7.98	16.75	6.80	0.18	-0.30	-0.36	-0.35	-0.05	0.02	0.35	0.33	0.46	-0.40	-0.09	-0.50	-0.19	-0.49	-0.17	-0.34	0.15	0.20	0.23	0.48
	Asia Pacific Core Real Estate	6.00	6.87	13.70	6.20	0.16	-0.32	-0.05	-0.07	0.24	0.31	0.55	0.56	0.62	-0.17	0.12	-0.26	-0.03	-0.27	-0.03	-0.02	0.35	0.43	0.45	0.61
	Global REITs	4.90	5.74	13.43	4.60	-0.08	-0.15	0.20	0.26	0.41	0.51	0.62	0.64	0.57	0.19	0.46	0.08	0.06	-0.02	-0.02	0.29	0.47	0.57	0.46	0.78
	Global Core Infrastructure	4.20	4.98	12.91	4.80	0.22	-0.20	-0.12	-0.08	0.06	0.13	0.38	0.39	0.53	-0.12	0.13	-0.21	0.07	-0.25	0.06	-0.08	0.25	0.37	0.31	0.31
	Global Core Transport	5.40	6.32	14.09	6.10	0.20	-0.11	-0.11	-0.11	-0.36	-0.33	-0.29	-0.26	-0.16	-0.03	-0.15	0.05	0.42	0.08	0.49	-0.13	-0.33	0.12	-0.31	-0.10
	Global Timberland	4.60	5.35	12.66	-	0.08	0.05	-0.06	0.03	-0.10	-0.04	-0.11	-0.09	-0.06	0.04	0.03	0.04	0.45	0.01	0.48	0.00	-0.09	0.36	-0.10	0.12
	Diversified Hedge Funds hedged	3.80	4.02	6.77	2.40	-0.06	-0.12	0.06	0.08	0.37	0.44	0.65	0.68	0.68	-0.03	0.27	-0.16	-0.31	-0.22	-0.39	0.11	0.48	0.28	0.52	0.73
	Event Driven Hedge Funds hedged	4.20	4.56	8.75	2.00	-0.03	-0.09	0.11	0.11	0.39	0.50	0.80	0.79	0.76	-0.01	0.30	-0.14	-0.36	-0.22	-0.46	0.17	0.56	0.36	0.60	0.80
	Long Bias Hedge Funds hedged	3.80	4.38	11.07	2.10	-0.10	-0.08	0.16	0.12	0.46	0.51	0.78	0.74	0.67	0.01	0.30	-0.10	-0.40	-0.17	-0.50	0.20	0.60	0.35	0.63	0.80
	Relative Value Hedge Funds hedged	3.70	3.89	6.33	2.60	0.01	-0.01	0.13	0.14	0.42	0.53	0.84	0.85	0.87	0.01	0.34	-0.14	-0.30	-0.23	-0.38	0.19	0.57	0.44	0.64	0.75
	Macro Hedge Funds hedged	2.90	3.22	8.16	1.50	-0.01	0.09	-0.04	0.00	0.08	0.09	0.08	0.12	0.09	-0.04	0.30	-0.08	-0.13	-0.10	-0.15	0.00	0.06	0.05	0.02	0.23
	Direct Lending	5.70	6.77	15.21	5.60	0.10	-0.10	-0.13	-0.02	-0.08	0.02	0.12	0.13	0.25	-0.04	0.01	-0.11	0.43	-0.16	0.47	-0.07	-0.02	0.41	0.04	0.22
	Commodities	1.00	2.28	16.36	1.30	0.31	-0.21	-0.32	-0.30	-0.11	-0.04	0.23	0.23	0.35	-0.36	0.12	-0.45	-0.18	-0.45	-0.14	-0.30	0.04	0.18	0.09	0.29
	Gold	1.40	2.65	16.15	1.70	0.03	0.08	0.18	0.10	0.11	0.05	-0.07	-0.10	-0.07	0.10	0.14	0.18	0.36	0.21	0.36	0.16	0.02	0.21	0.04	-0.17

Euro assumptions

Note: All estimates on this page are in euro terms. Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations to all of these asset classes and strategies. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in an particular asset class or strategy or as a promise of future performance. These asset class and strategy assumptions are passive only for liquid assets and industry averages (median managers) for alternatives. The assumptions do not consider the impact of active management. Reference to future returns are not promises or even estimates of actual returns portfolio's may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. Forecasts of financial market trends that are based on current market conditions constitute our judgement and are subject to change without notice. We believe the information provided herein is reliable, but to not warrant its accuracy or completeness. This materials is not intended to provide and should not be relied upon for accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2022. Alternative asset classes (including hedge funds, private equity, real estate, direct lending, transportation, infrastructure and timberland) are unlike other asset categories shown above in that there is no underlying investible index. The return estimates for these alternative asset classes and strategies are estimates of the industry average – median manager, net of manager fees. The dispersion of return among managers of these asset classes and strategies is typically significantly wider than that of traditional asset classes. Correlations of value-added and core real estate in their local currencies are identical since value-added local returns are scaled versions of their corresponding core real estate local returns. This year, we have updated the raw data source for Europe and U.K. Real Estate and this may result in a change in correlation forecasts. For equity and fixed income assumptions we assume current index regional weight in composite indices with multiple countries/regions. All returns are nominal. The return forecasts of composite and hedged assets are computed using unrounded return and rounded to the nearest 10bp at the final stage. In some cases this may lead to apparent differences in hedging impact across assets, but this is purely due to rounding. For the full opportunity set, please contact your J.P. Morgan representative.

European Small Cap	U.S. Large Cap	U.S. Large Cap hedged	Euro Area Large Cap	Euro Area Small Cap	UK Large Cap	UK Large Cap hedged	Japanese Equity	Japanese Equity hedged	Chinese Domestic Equity	Emerging Markets Equity	AC Asia ex-Japan Equity	AC World Equity	AC World ex-EMU Equity	Developed World Equity	Global Convertible Bonds hedged	Global Credit Sensitive Convertible hedged	Private Equity	Venture Capital	U.S. Core Real Estate	European Core Real Estate	European Value-Added Real Estate	Asia Pacific Core Real Estate	Global REITs	Global Core Infrastructure	Global Core Transport	Global Timberland	Diversified Hedge Funds hedged	Event Driven Hedge Funds hedged	Long Bias Hedge Funds hedged	Relative Value Hedge Funds hedged	Macro Hedge Funds hedged	Direct Lending	Commodities	Gold
1.00																																		
0.77	1.00																																	
0.81	0.82	1.00																																
0.90	0.75	0.84	1.00																															
0.97	0.70	0.80	0.93	1.00																														
0.83	0.77	0.69	0.82	0.79	1.00																													
0.76	0.63	0.74	0.84	0.81	0.83	1.00																												
0.64	0.70	0.53	0.61	0.60	0.66	0.50	1.00																											
0.68	0.61	0.68	0.72	0.68	0.66	0.62	0.77	1.00																										
0.27	0.29	0.22	0.24	0.23	0.28	0.16	0.26	0.27	1.00																									
0.75	0.64	0.68	0.73	0.74	0.73	0.68	0.57	0.59	0.47	1.00																								
0.70	0.63	0.63	0.69	0.69	0.69	0.62	0.57	0.57	0.54	0.96	1.00																							
0.88	0.96	0.86	0.86	0.83	0.86	0.75	0.76	0.71	0.34	0.80	0.78	1.00																						
0.85	0.96	0.84	0.82	0.80	0.85	0.72	0.77	0.70	0.35	0.79	0.77	1.00	1.00																					
0.87	0.97	0.86	0.85	0.82	0.86	0.74	0.76	0.71	0.31	0.75	0.72	1.00	0.99	1.00																				
0.83	0.67	0.85	0.78	0.81	0.63	0.67	0.55	0.65	0.34	0.74	0.71	0.79	0.77	0.77	1.00																			
0.52	0.42	0.52	0.48	0.50	0.39	0.36	0.34	0.33	0.14	0.38	0.35	0.48	0.46	0.47	0.59	1.00																		
0.71	0.75	0.64	0.66	0.65	0.74	0.59	0.54	0.57	0.44	0.72	0.69	0.79	0.79	0.78	0.63	0.32	1.00																	
0.51	0.64	0.48	0.46	0.43	0.55	0.38	0.51	0.50	0.46	0.53	0.55	0.62	0.64	0.62	0.51	0.20	0.77	1.00																
0.36	0.48	0.31	0.29	0.28	0.45	0.20	0.40	0.33	0.11	0.33	0.32	0.45	0.46	0.45	0.16	0.16	0.46	0.32	1.00															
0.46	0.54	0.38	0.38	0.38	0.55	0.34	0.46	0.45	0.36	0.44	0.42	0.54	0.55	0.54	0.37	0.19	0.64	0.58	0.49	1.00														
0.47	0.54	0.39	0.39	0.39	0.57	0.35	0.47	0.49	0.37	0.46	0.43	0.55	0.56	0.55	0.38	0.18	0.67	0.60	0.49	0.98	1.00													
0.59	0.60	0.50	0.52	0.55	0.65	0.48	0.52	0.42	0.30	0.62	0.61	0.65	0.66	0.64	0.47	0.36	0.66	0.44	0.75	0.57	0.57	1.00												
0.73	0.80	0.71	0.71	0.69	0.72	0.66	0.62	0.54	0.19	0.66	0.65	0.84	0.84	0.84	0.64	0.36	0.62	0.41	0.56	0.36	0.34	0.68	1.00											
0.29	0.43	0.23	0.24	0.19	0.40	0.11	0.36	0.29	0.11	0.36	0.34	0.41	0.43	0.41	0.18	-0.15	0.53	0.47	0.57	0.44	0.44	0.47	0.41	1.00										
-0.23	0.18	-0.18	-0.15	-0.25	-0.05	-0.24	0.06	-0.13	-0.03	-0.17	-0.10	0.02	0.05	0.05	-0.40	-0.19	-0.02	0.08	0.42	0.02	-0.01	0.14	0.13	0.34	1.00									
0.02	0.36	-0.02	0.07	-0.03	0.17	0.05	0.29	0.03	0.23	0.09	0.14	0.26	0.28	0.28	-0.13	-0.12	0.33	0.42	0.18	0.28	0.25	0.14	0.25	0.32	0.53	1.00								
0.80	0.61	0.71	0.70	0.76	0.67	0.60	0.51	0.64	0.36	0.71	0.66	0.73	0.72	0.71	0.82	0.54	0.69	0.59	0.28	0.52	0.54	0.53	0.54	0.25	-0.30	-0.02	1.00							
0.86	0.66	0.82	0.78	0.84	0.72	0.70	0.54	0.67	0.30	0.75	0.68	0.78	0.77	0.77	0.86	0.60	0.71	0.53	0.31	0.44	0.47	0.55	0.62	0.25	-0.29	-0.06	0.87	1.00						
0.86	0.67	0.87	0.80	0.84	0.69	0.70	0.54	0.70	0.33	0.79	0.74	0.80	0.78	0.77	0.92	0.56	0.67	0.55	0.22	0.42	0.45	0.49	0.61	0.20	-0.35	-0.09	0.89	0.94	1.00					
0.80	0.59	0.69	0.72	0.78	0.72	0.66	0.53	0.62	0.31	0.76	0.70	0.73	0.72	0.70	0.80	0.52	0.70	0.48	0.36	0.49	0.51	0.62	0.60	0.37	-0.27	-0.05	0.83	0.92	0.85	1.00				
0.22	0.09	0.17	0.19	0.26	0.24	0.32	0.06	0.12	0.01	0.25	0.21	0.19	0.18	0.17	0.23	0.09	0.25	0.16	-0.11	0.02	0.03	0.05	0.18	-0.15	-0.26	0.06	0.46	0.25	0.31	0.26	1.00			
0.16	0.52	0.04	0.12	0.07	0.33	0.07	0.43	0.15	0.20	0.22	0.25	0.41	0.45	0.43	0.02	-0.04	0.51	0.48	0.48	0.51	0.49	0.45	0.37	0.55	0.57	0.66	0.11	0.11	0.01	0.18	-0.08	1.00		
0.26	0.26	0.19	0.19	0.24	0.47	0.34	0.19	0.18	0.01	0.36	0.29	0.32	0.33	0.30	0.16	0.08	0.52	0.36	0.42	0.47	0.49	0.51	0.27	0.36	-0.05	0.10	0.37	0.35	0.29	0.42	0.42	0.35	1.00	
-0.14	-0.08	-0.20	-0.24	-0.19	-0.08	-0.15	-0.11	-0.33	0.11	0.00	-0.01	-0.09	-0.06	-0.09	-0.10	-0.08	0.01	0.01	0.06	-0.01	-0.05	0.18	-0.01	0.14	0.28	0.27	-0.01	-0.11	-0.10	-0.04	0.26	0.31	0.28	1.00

		Compound Return 2022 (%)	Annualized Volatility (%)	Arithmetic Return 2023 (%)	Compound Return 2023 (%)	UK Inflation	UK Cash	U.S. Aggregate Bonds hedged	Euro Aggregate Bonds hedged	U.S. Inv Grade Corporate Bonds hedged	Euro Inv Grade Corp Bonds hedged	UK Inv Grade Corporate Bonds	U.S. High Yield Bonds hedged	Euro High Yield Bonds hedged	Global Credit hedged	U.S. Leveraged Loans hedged	Euro Government Bonds hedged	UK Gilts	UK Inflation-Linked Bonds	World Government Bonds hedged	World Government Bonds	World ex-UK Government Bonds hedged	World ex-UK Government Bonds	Emerging Markets Sovereign Debt hedged	Emerging Markets Local Currency Debt	Emerging Markets Corporate Bonds hedged	UK All Cap	UK Large Cap
Fixed income	UK Inflation	2.40	2.42	1.96	2.20	1.00																						
	UK Cash	2.20	2.20	0.69	1.50	-0.26	1.00																					
	U.S. Aggregate Bonds hedged	4.40	4.48	4.11	2.80	-0.29	0.30	1.00																				
	Euro Aggregate Bonds hedged	4.00	4.09	4.43	2.60	-0.39	0.25	0.73	1.00																			
	U.S. Inv Grade Corporate Bonds hedged	5.30	5.54	7.07	3.00	-0.26	0.14	0.83	0.66	1.00																		
	Euro Inv Grade Corp Bonds hedged	4.60	4.72	4.99	2.90	-0.27	0.10	0.60	0.77	0.83	1.00																	
	UK Inv Grade Corporate Bonds	5.70	5.99	7.83	2.30	-0.07	-0.01	0.61	0.62	0.80	0.83	1.00																
	U.S. High Yield Bonds hedged	6.60	6.95	8.66	4.10	-0.09	-0.01	0.35	0.27	0.64	0.64	0.56	1.00															
	Euro High Yield Bonds hedged	6.70	7.11	9.35	4.30	-0.09	-0.04	0.26	0.31	0.56	0.70	0.58	0.89	1.00														
	Global Credit hedged	5.10	5.24	5.44	2.90	-0.27	0.14	0.83	0.75	0.98	0.89	0.85	0.64	0.57	1.00													
	U.S. Leveraged Loans hedged	6.00	6.30	8.02	4.90	0.04	-0.11	0.02	0.06	0.34	0.47	0.42	0.76	0.85	0.34	1.00												
	Euro Government Bonds hedged	3.80	3.91	4.88	2.50	-0.39	0.26	0.69	0.97	0.55	0.63	0.51	0.13	0.16	0.63	-0.07	1.00											
	UK Gilts	4.20	4.48	7.65	0.90	-0.22	0.24	0.72	0.67	0.51	0.40	0.60	0.03	-0.02	0.56	-0.17	0.69	1.00										
	UK Inflation-Linked Bonds	3.80	4.35	10.73	-0.50	-0.18	0.09	0.58	0.54	0.53	0.48	0.62	0.33	0.25	0.58	0.18	0.51	0.74	1.00									
	World Government Bonds hedged	3.50	3.57	3.69	2.20	-0.33	0.32	0.86	0.86	0.60	0.50	0.50	0.07	0.01	0.65	-0.22	0.88	0.85	0.61	1.00								
	World Government Bonds	2.50	2.87	8.75	1.40	-0.18	0.27	0.48	0.43	0.21	0.07	0.15	-0.25	-0.33	0.24	-0.46	0.49	0.62	0.39	0.66	1.00							
	World ex-UK Government Bonds hedged	3.50	3.56	3.52	2.40	-0.32	0.32	0.86	0.86	0.60	0.51	0.49	0.08	0.02	0.66	-0.22	0.89	0.82	0.59	1.00	0.64	1.00						
	World ex-UK Government Bonds	2.40	2.80	9.13	1.40	-0.20	0.27	0.45	0.41	0.19	0.05	0.12	-0.28	-0.34	0.21	-0.47	0.47	0.59	0.37	0.63	0.99	0.61	1.00					
	Emerging Markets Sovereign Debt hedged	6.90	7.39	10.30	5.50	-0.20	0.09	0.59	0.52	0.79	0.76	0.67	0.76	0.65	0.82	0.43	0.41	0.30	0.45	0.38	0.06	0.39	0.03	1.00				
	Emerging Markets Local Currency Debt	5.30	5.87	11.06	5.00	-0.23	0.28	0.45	0.42	0.42	0.38	0.36	0.30	0.27	0.44	0.10	0.40	0.32	0.33	0.39	0.44	0.39	0.43	0.53	1.00			
	Emerging Markets Corporate Bonds hedged	6.80	7.20	9.32	5.00	-0.12	0.03	0.51	0.45	0.77	0.76	0.67	0.76	0.70	0.79	0.55	0.32	0.20	0.37	0.28	-0.05	0.29	-0.07	0.90	0.43	1.00		
Equities	UK All Cap	7.60	8.40	13.22	4.60	0.04	-0.11	0.11	0.11	0.37	0.44	0.44	0.66	0.67	0.38	0.55	0.01	-0.04	0.17	-0.11	-0.19	-0.10	-0.19	0.54	0.44	0.54	1.00	
	UK Large Cap	7.30	8.11	13.29	4.10	0.06	-0.12	0.06	0.07	0.31	0.38	0.40	0.61	0.62	0.32	0.51	-0.02	-0.08	0.15	-0.14	-0.18	-0.13	-0.18	0.49	0.45	0.49	0.99	1.00
	UK Small Cap	9.40	10.68	16.96	7.20	-0.01	-0.09	0.17	0.18	0.45	0.54	0.49	0.71	0.71	0.47	0.59	0.06	0.02	0.20	-0.04	-0.25	-0.04	-0.27	0.59	0.29	0.60	0.85	0.78
	U.S. Large Cap	6.10	7.07	14.49	3.20	-0.01	-0.08	0.18	0.21	0.35	0.42	0.43	0.55	0.50	0.38	0.39	0.15	0.16	0.32	0.07	0.09	0.07	0.07	0.48	0.50	0.43	0.76	0.74
	U.S. Large Cap hedged	7.70	8.88	16.18	4.30	-0.03	-0.11	0.18	0.18	0.45	0.53	0.48	0.73	0.69	0.46	0.56	0.08	0.00	0.22	-0.03	-0.29	-0.02	-0.31	0.62	0.31	0.58	0.80	0.75
	Euro Area Large Cap	8.70	10.21	18.42	6.20	-0.08	0.00	0.24	0.21	0.43	0.45	0.45	0.64	0.63	0.45	0.43	0.13	0.05	0.24	0.04	-0.04	0.05	-0.04	0.60	0.55	0.55	0.88	0.86
	Euro Area Large Cap hedged	9.40	10.68	16.98	7.20	-0.05	-0.09	0.13	0.18	0.39	0.50	0.46	0.70	0.74	0.42	0.60	0.08	-0.06	0.14	-0.07	-0.34	-0.07	-0.34	0.56	0.32	0.57	0.88	0.84
	Euro Area Small Cap	9.50	11.21	19.70	6.60	-0.05	-0.03	0.23	0.18	0.44	0.46	0.46	0.68	0.67	0.45	0.49	0.09	0.03	0.22	0.02	-0.05	0.02	-0.06	0.60	0.49	0.58	0.87	0.82
	Euro Area Small Cap hedged	10.20	11.67	18.29	7.60	-0.03	-0.11	0.13	0.16	0.41	0.51	0.47	0.73	0.78	0.42	0.65	0.05	-0.07	0.14	-0.09	-0.33	-0.08	-0.35	0.54	0.28	0.57	0.85	0.80
	Japanese Equity	8.50	9.31	13.36	5.80	-0.16	-0.02	0.21	0.22	0.36	0.38	0.36	0.45	0.40	0.37	0.28	0.16	0.09	0.23	0.09	0.10	0.09	0.10	0.39	0.47	0.37	0.62	0.60
	Japanese Equity hedged	9.60	10.95	17.50	6.50	0.03	-0.16	-0.10	-0.04	0.18	0.28	0.25	0.51	0.53	0.18	0.49	-0.10	-0.24	-0.03	-0.28	-0.51	-0.27	-0.52	0.32	0.14	0.37	0.65	0.62
	AC Asia ex-Japan Equity	8.20	9.51	17.13	6.10	-0.05	0.01	0.24	0.18	0.44	0.44	0.40	0.59	0.55	0.45	0.42	0.10	0.06	0.19	0.05	-0.01	0.05	-0.01	0.55	0.58	0.57	0.70	0.68
	Chinese Domestic Equity	10.00	13.31	28.01	7.30	-0.05	0.06	0.10	0.09	0.20	0.17	0.11	0.20	0.18	0.19	0.15	0.08	0.00	0.02	0.03	-0.06	0.03	-0.06	0.19	0.17	0.26	0.22	0.21
	Emerging Markets Equity	8.30	9.68	17.56	6.00	-0.01	0.00	0.21	0.16	0.44	0.44	0.41	0.64	0.59	0.44	0.47	0.08	0.03	0.22	0.01	-0.03	0.01	-0.03	0.61	0.62	0.62	0.75	0.73
	AC World Equity	6.70	7.59	13.91	4.10	-0.03	-0.06	0.22	0.22	0.44	0.48	0.48	0.65	0.61	0.45	0.46	0.13	0.12	0.31	0.05	0.03	0.05	0.02	0.59	0.57	0.55	0.87	0.85
	AC World ex-UK Equity	6.70	7.61	14.11	4.10	-0.03	-0.05	0.22	0.22	0.44	0.48	0.48	0.65	0.60	0.45	0.45	0.14	0.13	0.32	0.06	0.04	0.06	0.03	0.59	0.58	0.54	0.86	0.83
	Developed World Equity	6.50	7.40	13.99	3.90	-0.03	-0.06	0.21	0.22	0.42	0.47	0.48	0.63	0.59	0.44	0.45	0.14	0.13	0.32	0.05	0.04	0.05	0.02	0.57	0.55	0.52	0.86	0.84
	Global Convertible Bonds hedged	8.90	9.53	11.84	5.70	-0.17	-0.02	0.28	0.28	0.60	0.64	0.55	0.81	0.77	0.60	0.66	0.16	0.06	0.26	0.04	-0.26	0.04	-0.28	0.70	0.29	0.70	0.74	0.67
	Global Credit Sensitive Convertible hedged	7.00	7.33	8.42	4.80	-0.08	-0.09	0.20	0.35	0.38	0.53	0.50	0.39	0.46	0.43	0.38	0.26	0.09	0.21	0.15	-0.14	0.15	-0.15	0.38	0.12	0.39	0.38	0.34
Alternatives	Private Equity	8.10	9.47	17.48	7.20	0.11	-0.12	-0.11	-0.03	0.24	0.35	0.32	0.49	0.46	0.26	0.48	-0.13	-0.18	0.18	-0.26	-0.18	-0.27	-0.19	0.42	0.32	0.43	0.69	0.68
	Venture Capital	6.70	8.62	20.70	-	0.01	-0.14	-0.17	-0.08	0.03	0.13	0.17	0.25	0.19	0.07	0.28	-0.12	-0.09	0.17	-0.21	-0.17	-0.23	-0.18	0.20	0.12	0.19	0.44	0.41
	U.S. Core Real Estate	3.90	4.40	10.22	4.90	0.45	-0.40	-0.22	-0.19	-0.09	0.05	0.13	0.30	0.29	-0.05	0.41	-0.24	-0.22	0.08	-0.28	-0.42	-0.26	-0.43	0.07	-0.16	0.18	0.22	0.21
	European Core Real Estate	5.00	5.60	11.27	5.20	0.14	-0.16	-0.09	-0.09	0.04	0.02	0.11	0.03	0.00	0.04	0.01	-0.10	-0.04	0.04	-0.10	0.15	-0.12	0.15	0.10	0.17	0.07	0.31	0.32
	European Core Real Estate hedged	5.60	6.08	10.13	6.20	0.24	-0.33	-0.33	-0.30	-0.03	0.05	0.08	0.34	0.30	-0.04	0.46	-0.35	-0.32	-0.11	-0.45	-0.54	-0.45	-0.55	0.17	-0.22	0.23	0.36	0.35
	UK Core Real Estate	5.50	6.28	12.97	6.10	0.21	-0.35	-0.29	-0.22	0.03	0.14	0.04	0.49	0.49	0.01	0.55	-0.30	-0.39	-0.10	-0.43	-0.56	-0.42	-0.56	0.18	-0.29	0.29	0.34	0.33
	European Value-Added Real Estate	6.90	8.31	17.64	7.20	0.23	-0.28	-0.32	-0.31	-0.05	0.00	0.05	0.23	0.18	-0.06	0.30	-0.36	-0.30	-0.09	-0.42	-0.30	-0.43	-0.31	0.13	-0.06	0.17	0.41	0.41
	European Value-Added Real Estate hedged	7.60	8.87	16.76	8.20	0.24	-0.32	-0.39	-0.36	-0.07	0.02	0.03	0.35	0.30	-0.09	0.47	-0.42	-0.39	-0.15	-0.52	-0.60	-0.53	-0.60	0.14	-0.25	0.22	0.37	0.35
	Global REITs	5.10	6.02	14.04	5.00	0.03	-0.09	0.28	0.27	0.45	0.47	0.55	0.61	0.56	0.47	0.42	0.21	0.25	0.40	0.16	0.10	0.16	0.09	0.55	0.54	0.49	0.74	0.72
	Global Core Infrastructure	4.50	5.05	10.76	5.20	0.17	-0.09	0.07	0.09	0.09	0.11	0.18	0.16	0.13	0.13	0.25	0.08	0.12	0.41	0.06	0.04	0.05	0.02	0.22	0.16	0.19	0.06	0.06
	Global Core Transport	5.60	6.53	14.13	6.50	0.11	0.05	0.05	0.03	-0.34	-0.36	-0.17	-0.49	-0.48	-0.28	-0.43	0.13	0.33	0.22	0.27	0.46	0.26	0.45	-0.40	0.09	-0.43	-0.32	-0.28
	Global Timberland	4.90	5.47	11.04	-	-0.07	0.19	0.15	0.18	-0.02	-0.06	0.03	-0.34	-0.34	0.01	-0.41	0.23	0.37	0.27	0.32	0.65	0.29	0.64	-0.13	0.40	-0.22	-0.05	-0.01
	Diversified Hedge Funds hedged	4.80	5.02	6.78	3.80	0.08	-0.12	0.04	0.05	0.35	0.43	0.42	0.63	0.67	0.35	0.68	-0.05	-0.12	0.15	-0.18	-0.43	-0.18	-0.44	0.46	0.11	0.51	0.66	0.61
	Event Driven Hedge Funds hedged	5.20	5.56	8.72	3.40	0.00	-0.09	0.09	0.11	0.40	0.51	0.44	0.78	0.79	0.41	0.74	-0.01	-0.13	0.16	-0.16	-0.44	-0.15	-0.46	0.54	0.23	0.58	0.75	0.70
	Long Bias Hedge Funds hedged	4.80	5.37	11.03	3.50	-0.06	-0.06	0.16	0.12	0.46	0.51	0.44	0.77	0.75	0.45	0.66	0.00	-0.09	0.14	-0.11	-0.41	-0.10	-0.42	0.59	0.26	0.61	0.77	0.71
	Relative Value Hedge Funds hedged	4.70	4.89	6.27	4.00	0.00	-0.06	0.11	0.12	0.42	0.53	0.46	0.82	0.85	0.43	0.85	-0.01	-0.16	0.18	-0.16	-0.47	-0.15	-0.48	0.57	0.24	0.63	0.70	0.67
	Macro Hedge Funds hedged	3.90	4.21	8.08	2.90	0.08	0.07	-0.07	-0.04	0.05	0.06	0.09	0.08	0.11	0.02	0.07	-0.07	-0.04	0.00	-0.10	-0.06	-0.10	-0.05	0.07	0.09	0.03	0.29	0.31
	Direct Lending	6.00	7.14	15.78	6.00	-0.03	0.02	0.06	0.14	-0.05	-0.04	0.02	-0.17	-0.20	-0.02	-0.14	0.17	0.28	0.29	0.18	0.50	0.16	0.49	-0.11	0.29	-0.13	-0.01	0.02
	Commodities	1.20	2.47	16.27	1.70	0.28	-0.15	-0.21	-0.27	-0.06	-0.06	-0.04	0.20	0.13	-0.09	0.22	-0.31	-0.29	-0.03	-0.34	-0.07	-0.33	-0.06	0.11	0.20	0.12	0.38	0.43
	Gold	1.70	3.12	17.30	2.10	-0.06	0.15	0.30	0.15	0.15	0.01	0.09	-0.10	-0.17	0.14	-0.23	0.16	0.35	0.27	0.30	0.46	0.30	0.45	0.07	0.33	0.01	-0.09	-0.07

Sterling assumptions

Note: All estimates on this page are in sterling terms. Given the complex risk-reward trade-offs involved, we advise clients to rely on judgment as well as quantitative optimization approaches in setting strategic allocations to all of these asset classes and strategies. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in an particular asset class or strategy or as a promise of future performance. These asset class and strategy assumptions are passive only for liquid assets and industry averages (median managers) for alternatives. The assumptions do not consider the impact of active management. Reference to future returns are not promises or even estimates of actual returns portfolio's may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. Forecasts of financial market trends that are based on current market conditions constitute our judgement and are subject to change without notice. We believe the information provided herein is reliable, but to not warrant its accuracy or completeness. This materials is not intended to provide and should not be relied upon for accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2022. Alternative asset classes (including hedge funds, private equity, real estate, direct lending, transportation, infrastructure and timberland) are unlike other asset categories shown above in that there is no underlying investible index. The return estimates for these alternative asset classes and strategies are estimates of the industry average – median manager, net of manager fees. The dispersion of return among managers of these asset classes and strategies is typically significantly wider than that of traditional asset classes. Correlations of value-added and core real estate in their local currencies are identical since value-added local returns are scaled versions of their corresponding core real estate local returns. This year, we have updated the raw data source for Europe and U.K. Real Estate and this may result in a change in correlation forecasts. For equity and fixed income assumptions we assume current index regional weight in composite indices with multiple countries/regions. All returns are nominal. The return forecasts of composite and hedged assets are computed using unrounded return and rounded to the nearest 10bp at the final stage. In some cases this may lead to apparent differences in hedging impact across assets, but this is purely due to rounding. For the full opportunity set, please contact your J.P. Morgan representative.

	UK Small Cap	U.S. Large Cap	U.S. Large Cap hedged	Euro Area Large Cap	Euro Area Large Cap hedged	Euro Area Small Cap	Euro Area Small Cap hedged	Japanese Equity	Japanese Equity hedged	AC Asia ex-Japan Equity	Chinese Domestic Equity	Emerging Markets Equity	AC World Equity	AC World ex-UK Equity	Developed World Equity	Global Convertible Bonds hedged	Global Credit Sensitive Convertible hedged	Private Equity	Venture Capital	U.S. Core Real Estate	European Core Real Estate	European Core Real Estate hedged	UK Core Real Estate	European Value-Added Real Estate	European Value-Added Real Estate hedged	Global REITs	Global Core Infrastructure	Global Core Transport	Global Timberland	Diversified Hedge Funds hedged	Event Driven Hedge Funds hedged	Long Bias Hedge Funds hedged	Relative Value Hedge Funds hedged	Macro Hedge Funds hedged	Direct Lending	Commodities	Gold
UK Small Cap	1.00																																			
U.S. Large Cap	0.68	1.00																																		
U.S. Large Cap hedged	0.79	0.84	1.00																																	
Euro Area Large Cap	0.78	0.77	0.78	1.00																																
Euro Area Large Cap hedged	0.82	0.71	0.84	0.89	1.00																															
Euro Area Small Cap	0.85	0.73	0.76	0.94	0.84	1.00																														
Euro Area Small Cap hedged	0.90	0.66	0.81	0.84	0.93	0.91	1.00																													
Japanese Equity	0.54	0.66	0.54	0.63	0.57	0.61	0.56	1.00																												
Japanese Equity hedged	0.63	0.53	0.67	0.60	0.72	0.58	0.68	0.72	1.00																											
AC Asia ex-Japan Equity	0.62	0.63	0.62	0.72	0.63	0.71	0.62	0.54	0.48	1.00																										
Chinese Domestic Equity	0.22	0.23	0.22	0.23	0.21	0.22	0.20	0.20	0.23	0.51	1.00																									
Emerging Markets Equity	0.65	0.65	0.66	0.76	0.66	0.77	0.67	0.55	0.50	0.96	0.44	1.00																								
AC World Equity	0.77	0.95	0.87	0.89	0.80	0.86	0.77	0.73	0.62	0.78	0.29	0.81	1.00																							
AC World ex-UK Equity	0.76	0.96	0.86	0.88	0.79	0.85	0.76	0.73	0.61	0.78	0.29	0.81	1.00	1.00																						
Developed World Equity	0.77	0.97	0.87	0.88	0.80	0.84	0.77	0.74	0.62	0.73	0.26	0.76	1.00	1.00	1.00																					
Global Convertible Bonds hedged	0.82	0.67	0.85	0.74	0.79	0.77	0.81	0.54	0.65	0.69	0.34	0.71	0.78	0.77	0.76	1.00																				
Global Credit Sensitive Convertible hedged	0.43	0.36	0.49	0.38	0.45	0.37	0.45	0.28	0.29	0.25	0.10	0.26	0.39	0.38	0.39	0.53	1.00																			
Private Equity	0.63	0.71	0.65	0.65	0.62	0.62	0.59	0.42	0.46	0.61	0.33	0.65	0.74	0.74	0.74	0.62	0.45	1.00																		
Venture Capital	0.45	0.53	0.45	0.37	0.39	0.34	0.35	0.37	0.41	0.43	0.35	0.41	0.51	0.51	0.51	0.48	0.28	0.69	1.00																	
U.S. Core Real Estate	0.22	0.23	0.31	0.08	0.26	0.11	0.25	0.08	0.29	0.06	-0.07	0.10	0.19	0.18	0.19	0.14	0.23	0.20	0.07	1.00																
European Core Real Estate	0.22	0.34	0.18	0.28	0.12	0.27	0.11	0.29	0.13	0.17	0.13	0.22	0.35	0.35	0.36	0.18	0.32	0.40	0.32	-0.05	1.00															
European Core Real Estate hedged	0.40	0.29	0.40	0.17	0.40	0.19	0.39	0.18	0.47	0.20	0.23	0.24	0.29	0.28	0.29	0.37	0.20	0.40	0.37	0.44	0.46	1.00														
UK Core Real Estate	0.38	0.21	0.42	0.19	0.35	0.26	0.39	-0.03	0.36	0.14	0.07	0.21	0.23	0.21	0.22	0.40	0.13	0.29	0.13	0.50	0.02	0.48	1.00													
European Value-Added Real Estate	0.38	0.37	0.36	0.27	0.32	0.28	0.31	0.29	0.40	0.22	0.22	0.29	0.38	0.37	0.38	0.35	0.30	0.51	0.44	0.24	0.82	0.85	0.34	1.00												
European Value-Added Real Estate hedged	0.41	0.28	0.41	0.17	0.41	0.20	0.40	0.19	0.50	0.20	0.24	0.25	0.29	0.28	0.29	0.39	0.20	0.43	0.39	0.44	0.42	0.99	0.52	0.85	1.00											
Global REITs	0.64	0.80	0.71	0.73	0.65	0.72	0.64	0.59	0.46	0.66	0.15	0.68	0.84	0.84	0.83	0.62	0.26	0.53	0.26	0.39	0.11	0.16	0.27	0.13	0.14	1.00										
Global Core Infrastructure	0.02	0.16	0.07	0.05	0.00	-0.02	-0.06	0.04	0.03	0.00	-0.24	0.08	0.12	0.12	0.12	0.01	-0.06	0.24	0.19	0.21	0.04	0.00	-0.02	0.02	0.00	0.14	1.00									
Global Core Transport	-0.45	0.02	-0.34	-0.24	-0.34	-0.34	-0.43	-0.09	-0.36	-0.29	-0.19	-0.34	-0.15	-0.13	-0.11	-0.54	-0.15	-0.25	-0.12	0.09	-0.06	-0.36	-0.41	-0.30	-0.40	-0.03	0.21	1.00								
Global Timberland	-0.19	0.21	-0.22	0.04	-0.18	-0.06	-0.25	0.21	-0.25	0.00	0.05	-0.04	0.13	0.14	0.15	-0.27	-0.06	0.14	0.21	-0.32	0.38	-0.26	-0.54	0.02	-0.30	0.07	0.17	0.55	1.00							
Diversified Hedge Funds hedged	0.74	0.52	0.71	0.58	0.70	0.64	0.76	0.41	0.64	0.55	0.32	0.59	0.62	0.61	0.61	0.81	0.51	0.65	0.53	0.26	0.27	0.52	0.42	0.50	0.55	0.44	0.03	-0.49	-0.26	1.00						
Event Driven Hedge Funds hedged	0.80	0.61	0.82	0.68	0.78	0.74	0.84	0.48	0.66	0.60	0.26	0.65	0.71	0.70	0.70	0.85	0.59	0.68	0.47	0.30	0.18	0.45	0.47	0.41	0.48	0.54	0.03	-0.48	-0.29	0.87	1.00					
Long Bias Hedge Funds hedged	0.82	0.65	0.87	0.73	0.80	0.77	0.84	0.51	0.70	0.69	0.32	0.73	0.76	0.76	0.74	0.92	0.53	0.65	0.51	0.20	0.19	0.44	0.40	0.41	0.46	0.57	0.00	-0.53	-0.29	0.88	0.94	1.00				
Relative Value Hedge Funds hedged	0.73	0.50	0.70	0.61	0.73	0.66	0.78	0.43	0.62	0.59	0.26	0.65	0.62	0.61	0.60	0.80	0.50	0.63	0.38	0.34	0.17	0.50	0.49	0.42	0.52	0.51	0.12	-0.50	-0.33	0.84	0.92	0.86	1.00			
Macro Hedge Funds hedged	0.18	0.14	0.18	0.22	0.19	0.26	0.24	0.10	0.12	0.23	0.03	0.26	0.23	0.22	0.21	0.21	0.10	0.34	0.23	-0.11	0.15	0.01	0.01	0.10	0.01	0.19	-0.10	-0.19	0.14	0.45	0.26	0.30	0.27	1.00		
Direct Lending	-0.11	0.32	-0.17	-0.04	-0.15	-0.10	-0.20	0.24	-0.16	-0.05	-0.05	-0.06	0.18	0.19	0.21	-0.18	0.01	0.21	0.21	-0.06	0.33	-0.02	-0.26	0.15	-0.05	0.14	0.20	0.56	0.69	-0.17	-0.18	-0.25	-0.15	-0.02	1.00	
Commodities	0.18	0.24	0.19	0.23	0.14	0.28	0.20	0.13	0.11	0.27	-0.04	0.37	0.30	0.30	0.29	0.15	0.02	0.44	0.20	0.20	0.31	0.23	0.24	0.35	0.25	0.27	0.14	-0.19	0.02	0.29	0.29	0.26	0.34	0.46	0.16	1.00
Gold	-0.16	-0.02	-0.20	-0.09	-0.27	-0.05	-0.22	-0.06	-0.38	0.06	0.09	0.08	0.00	0.00	-0.02	-0.11	-0.13	-0.05	-0.10	-0.25	0.05	-0.34	-0.36	-0.21	-0.37	0.04	0.09	0.31	0.39	-0.11	-0.17	-0.13	-0.14	0.30	0.34	0.29

IV Appendix

Appendix

Acknowledgments

Leadership team

John Bilton, CFA
Head of Global Multi-Asset Strategy,
Multi-Asset Solutions

Michael Feser, CFA
Portfolio Manager,
Multi-Asset Solutions

Jared Gross
Head of Institutional Portfolio Strategy

Gareth Haslip, Ph.D. FIA
Global Head of Insurance Strategy
and Analytics

Michael Hood
Global Strategist,
Multi-Asset Solutions

Monica Issar
Global Head of Wealth Management
Multi-Asset and Portfolio Solutions

Dr. David Kelly, CFA
Chief Global Strategist,
Head of Global Market
Insights Strategy

Grace Koo, Ph.D.
Quantitative Analyst
and Portfolio Manager,
Multi-Asset Solutions

Usman Naeem
Portfolio Manager,
Global Fixed Income,
Currency & Commodities

Pulkit Sharma, CFA, CAIA
Head of Alternatives
Investment Strategy & Solutions

Rajesh Tanna
Portfolio Manager,
International Equities

Anthony Werley
Chief Investment Officer,
Endowments & Foundations Group

Working group

Sasha Abrahams
Research Analyst
Sustainable Investing

Michael Akinyele
Global Strategist,
Multi-Asset Solutions

Michael Albrecht, CFA
Global Strategist,
Multi-Asset Solutions

Stephanie Aliaga
Macro Research Analyst, Global Market
Insights Strategy

Dan Aust
Head of Insights Programs, EMEA

Shay Chen, CFA, CAIA
Alternatives Strategist,
Alternative Investment Strategy
& Solutions

Clara Cheong
Global Market Strategist,
Global Market Insights Strategy

Philippa Clough
Portfolio Manager,
International Equities Group

Kerry Craig, CFA
Global Market Strategist,
Global Market Insights Strategy

Jackie Culley
Associate,
Insights Editorial Team

Sean Daly, CFA
Portfolio Manager, Global Fixed Income,
Currency & Commodities

Jason Davis, CFA
Portfolio Manager,
Global Fixed Income,
Currency & Commodities

Jason DeSena, CFA
Alternatives Strategist,
Alternatives Investment Strategy &
Solutions

Jeff Eshleman
Global Markets Research
Private Bank CIO Team

Tilmann Galler, CFA
Global Market Strategist,
Global Market Insights Strategy

Javier Guerrero
Analyst, Endowments & Foundations
Chief Investment Office

Danielle Hines, CFA
Associate Director of US Equity Research

Tai Hui
Chief Market Strategist, Asia
Global Market Insights Strategy

Vincent Juvyns
Global Market Strategist,
Global Market Insights Strategy

Paul Kennedy, Ph.D., MRICS
Head of Strategy and Portfolio Manager
Real Estate Europe

Ayesha Khalid
Global Strategist,
Multi-Asset Solutions

Working group continued

David Lebovitz
Global Market Strategist,
Global Market Insights Strategy

Tim Lintern, CFA
Global Strategist,
Multi-Asset Solutions

Winnie Yingyi Liu, CFA
Portfolio Manager
International Equities

Thushka Maharaj, D.Phil, CFA
Global Strategist
Multi-Asset Solutions

Michael McQuiston, CFA
Equity Research
US Equities

Garrett Norman
Investment Specialist,
Asset Management Solutions

Preeti Parashar
Global Strategist,
Multi-Asset Solutions

Stephen Parker
Head of Advisory Solutions,
Private Bank

Catherine Peterson
Global Head of Insights
& Product Marketing

Nandini Ramakrishnan
Macro Strategist,
Emerging Markets and
Asia Pacific Equities

Joel Ryzowy
Portfolio Manager
Advisory and Core Beta Solutions

Gabriela Santos
Global Market Strategist,
Global Market Insights Strategy

Olivia Schubert
Research Analyst, Global Market Insights
Strategy

Christopher M. Sediqzad, CFA
Research Analyst,
Multi-Asset Solutions
Manager Research

Shivani Sharma
Quantitative Research,
International Equities Group

Sylvia Sheng, Ph.D.
Global Strategist,
Multi-Asset Solutions

Joe Staines
Portfolio Manager
Quantitative Solutions

Jordan Stewart
Portfolio Manager
Multi-Asset Solutions

Paul Summer
Global Alternatives Marketing and
Communications Strategy

Jacob Tadros, CFA
Portfolio Manager
Multi-Asset Solutions

William Tietjen
Associate, Endowments & Foundations
Chief Investment Office

Maria Paola Toschi
Global Strategist
Global Market Insights Strategy

Daniel Weisman
Alternative Investments
J.P. Morgan Private Bank

Suzanne Wuebben
Head of Portfolio Analytics
Wealth Management CIO

Xiao Xiao, CFA
Quantitative Analyst,
Multi-Asset Solutions

Natalia Zvereva, CAIA
Quantitative Analyst
Multi-Asset Solutions

Executive sponsors

George Gatch
Chief Executive Officer,
Asset Management

Jed Laskowitz
Global Head of Asset
Management Solutions

Further acknowledgments

The **Long-Term Capital Market Assumptions Team and Working Group** are grateful to many investment experts throughout the J.P. Morgan network whose input has been incorporated into the 2023 edition, including: John Ancona, Boris Arabadjiev, Anuj Arora, Peter Aspbury, Philip Barr, Sara Bellenda, Steven Berger, Giovanni Carriere, Weiren Chang, Jordan Crossman, Giri Devulapally, Dave Esrig, Andre Farias, Gregory Fedorenko, Mark Ferguson, Sam Fulmer, David Gleeson, Ryan Glenn, Andy Hoyt, Shumin Huang, Kim Hutchinson, Jeff Hutz, Stephen Jury, Courtney Mee, Nicolas Meer, Andreas Michalitsianos, Katarina Roele, Roland Rott, Dave Rumker, Alex Sammarco, Dave Silberman, David Small, Lee Spelman, Vidit Tewari, Kenneth Tsang, Karen Ward, Maciej Wasilewicz, Neil Weller, Jennifer Wu and Paul Zummo.

We also want to express our utmost appreciation and gratitude to Global Insights and the Investment Writing team, Loch Adamson, Jill Hamburg-Coplan, Barbara Rudolph and Melissa Wiegand; and Global Creative Services for design, Mark Virgo and Jay Lonie.

Appendix

Glossary

Alternatives Nontraditional assets, including private equity, private credit, real assets (real estate, infrastructure, transport, timberland) and hedge funds.

Backwardation In commodities markets, when spot pricing is higher than futures market pricing.

Demographic dividend A younger, faster-growing population can boost GDP growth more than an older, slower-growing population. Countries with a younger demographic profile have the opportunity to boost development; see their working-age population benefit from health, education and employment; and have fewer children per household – generally leading to larger investments per child, more freedom for women to join the workforce and more household savings, according to the United Nations (U.N.) Population Fund.

Dependency ratio The number of adults in a society age 65-plus and children (birth to 14) divided by the working-age population, according to the U.N.

Exit multiple A measure of a company's valuation, generally calculated as enterprise value over Ebitda, or earnings before interest, taxes, depreciation and amortization, at the time of sale – for example, by a private equity general partner monetizing an investment.

Fat tail A non-normal return distribution in which there is a higher than normal probability of an extreme negative or positive outcome (e.g., high or low return). A tail is the tapering at the far ends of a distribution curve, representing least likely outcomes; a fat tail in our forecasting refers to wider distribution of risks around a central projection.

Implied volatility A metric that measures market expectations of changes in a security's price.

Multiples on invested capital (MOIC) An investment return metric that states an investment's current value as a multiple of the amount of the initial investment, regardless of the length of the investment period.

Net operating income (NOI) A calculation used in valuing real assets, consisting of pre-tax revenues minus normal operating expenses.

Net-zero The target of negating the amount of greenhouse gases (GHGs) produced by human activity, to be achieved by reducing emissions and absorbing carbon dioxide from the atmosphere. The state in which the GHGs going into the atmosphere are balanced by their removal. For carbon dioxide, the state at which global warming stops. The Paris Agreement holds that to prevent the worst climate damages, global net human-caused carbon dioxide (CO_2) emissions must reach net-zero around 2050.

Rate case A formal proceeding at which a public utility's changing costs for the operation and maintenance of its system are considered, as well as how the costs are to be allocated among customers.

Sharpe ratio A measure of an investment's return relative to the price risks involved. It is calculated by subtracting a risk-free rate of return (generally on cash) from the investment's expected or realized return and dividing the result by the investment's expected or realized price fluctuation.

Total factor productivity (TFP) Productivity growth that is not explained by capital stock accumulation or the labor force (increased hours worked) but rather captures the efficiency or intensity with which inputs are utilized. A residual that likely reflects technological change.

LV–JPM53800 | 11/22 | 095k220111174257