FOR INSTITUTIONAL/WHOLESALE/PROFESSIONAL CLIENTS AND QUALIFIED INVESTORS ONLY – NOT FOR RETAIL USE OR DISTRIBUTION

PORTFOLIO INSIGHTS

2022 | 26TH ANNUAL EDITION

Long-Term Capital Market Assumptions

Time-tested projections to build stronger portfolios

J.P.Morgan
Asset Management

FOREWORD

GEORGE GATCH

"THERE IS NO EDUCATION LIKE ADVERSITY," said Benjamin Disraeli, the 19th-century British statesman and prime minister. As the pandemic-battered global economy proved far more resilient than many had expected, investors must now navigate economies and markets that are in many ways transformed.

Amid today's demanding investing environment, we present the 2022 edition of J.P. Morgan Asset Management's Long-Term Capital Market Assumptions (LTCMAs). In our 26th year of producing capital market estimates, we incorporate more than 200 asset and strategy classes;[1] 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 stronger portfolios and establish reasonable expectations for risks and returns over a 10- to 15-year time frame. Moreover, we seek, each year, to recalibrate our long-run approximations as we incorporate the new information presented by markets, policymakers and economic data.

We formulate our LTCMAs as part of a deeply researched proprietary process that 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 explores how the legacy of the pandemic – limited economic scarring but enduring policy choices – will affect the next cycle. Over our investment horizon, we see modestly higher nominal global growth and more two-sided risks to inflation. Ultimately, our message is optimistic: Despite low return expectations in public markets, investors can find ample risk premia to harvest if they are prepared to look beyond traditional asset classes.

Whatever approach investors take, a considered, long-term strategic perspective is essential. So, too, are careful manager selection and attentiveness to the power of active asset allocation. We look forward to working with you to make the best use of our assumptions in setting your own strategic perspective and pursuing your investment goals. On behalf of J.P. Morgan Asset Management, 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 presented at the back of this book; all others available via our website or from your J.P. Morgan representative.

TABLE OF CONTENTS

3 FOREWORD

6 EXECUTIVE SUMMARY
Fading scars, enduring policies

17 MACROECONOMIC ASSUMPTIONS
The new old normal: Moderate growth but a little more inflation

I. THEMATIC ARTICLES

24 ESG IN MARKETS
Doing good and doing well: ESG trade-offs in investing

33 CHINA'S MARKET OUTLOOK
Chinese assets: The biggest risk for investors would be to ignore them

45 CRYPTOCURRENCIES
Cryptocurrencies: Bubble, boom or blockchain revolution?

54 ALTS: IN PURSUIT OF ALPHA, INCOME AND DIVERSIFICATION
Alternative investments: The essential buyer's guide

63 TAX AS AN INVESTMENT ISSUE
Weighing the impact of tax loss harvesting on long-term saving goals

II. ASSUMPTIONS

76 FIXED INCOME ASSUMPTIONS
Higher inflation expectations change the pathways for interest rates

84 EQUITY ASSUMPTIONS
Better through-cycle returns, challenging starting point

91 CURRENCY EXCHANGE RATE ASSUMPTIONS
Is the U.S. dollar unassailable as the premier reserve currency?

97 ALTERNATIVE ASSETS ASSUMPTIONS
Reaching investment objectives when traditional assets may not be enough

112 VOLATILITY AND CORRELATION ASSUMPTIONS
Stable forecast in a dislocated world: Risk outlook little changed, uncertainty rising

117 PORTFOLIO IMPLICATIONS
Portfolio construction: Moving toward a new architecture

123 GLOSSARY

III. ASSUMPTIONS MATRICES

126 U.S. DOLLAR
2022 Estimates and correlations

128 EURO
2022 Estimates and correlations

130 STERLING
2022 Estimates and correlations

IV. APPENDIX

134 ACKNOWLEDGMENTS

Fading scars, enduring policies

John Bilton, CFA, *Head of Global Multi-Asset Strategy*
Karen Ward, *Chief Market Strategist, EMEA , Global Market Insights Strategy*
Monica Issar, *Global Head of Wealth Management Multi-Asset and Portfolio Solutions*

IN BRIEF

- Almost two years after the pandemic struck, the global economic recovery has strong momentum, kicked off by huge fiscal and monetary stimulus and now sustained by a robust capex cycle and solid household balance sheets. The economy has suffered limited scarring, but policy choices have an enduring impact. In any case, our message is optimistic: Despite low return expectations in public markets, we see plentiful opportunities for investors.
- Our nominal growth forecasts rise a little this year in developed markets, and we anticipate more two-sided risks to inflation. While a sustained rise in inflation does pose a risk, it is neither the only plausible outcome, nor is it an imminent endgame to the dislocations apparent in the current cycle.
- We expect policy rates to rise slowly, lagging nominal growth and leaving returns for cash and most developed market government bonds negative in real terms. Bonds are serial losers in many states of the world, and bondholders not only face a deprivation of coupon income but also suffer under financial repression. In fixed income, credit remains our preferred asset.
- Equity returns are stable, even after a year of strong returns since our last publication. Adjusting for today's sector mix implies better margins and more supported valuations than history alone suggests. Nevertheless, the best performance is still to be found in alternative assets, where solid alpha trends and the ability to harvest illiquidity risk premia support returns relative to public asset markets. Comparatively, real assets in particular may emerge as serial winners in a wide range of economic scenarios.
- Returns are constrained. But for investors willing to expand opportunity sets, harness novel sources of risk premia and employ some degree of active investment decision-making, there are sources of alpha and the capacity to generate robust and efficient portfolios.

INTRODUCING THE 2022 LONG-TERM CAPITAL MARKET ASSUMPTIONS

Our 2022 Long-Term Capital Market Assumptions (LTCMAs) represent the 26th edition of our 10- to 15-year risk and return forecasts. We anticipate slightly stronger nominal growth in developed markets, on average, across our investment horizon. After a tumultuous two years navigating a global pandemic, that was hardly a given. But the global economy has accelerated rapidly away from a coronavirus-induced slump, helped at first by overwhelming policy support and later by a surge in capital spending and the unleashing of pent-up consumer demand. Today, we are at – or at least close to – escape velocity,[1] with the potential growth of the global economy mercifully undiminished by the experience of COVID-19.

The policy interventions at the height of the crisis have a long-lasting impact. In the short run, they create a strong, if distorted, cycle, with solid support for risk assets. In the longer run, those distortions must eventually be resolved, but the mechanism by which this happens is, in our view, neither imminent nor fully clear. To be sure, expected returns remain low by historical standards. A 60/40 portfolio[2] will return just 4.30%, we project. But the good news is, investors can find ample risk premia to harvest if they are prepared to look beyond traditional asset markets and past the familiar market risk-return trade-off.

ECONOMIC SCARS FROM THE PANDEMIC ARE QUICKLY FADING

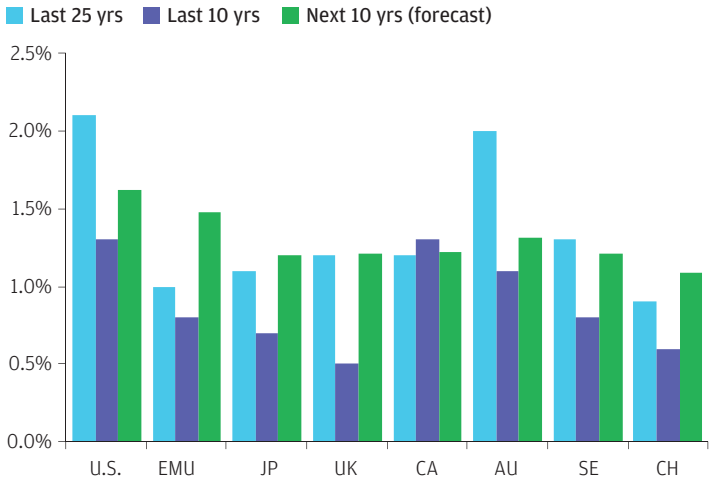
This year, we revise up our nominal growth forecasts 10 basis points (bps) for developed markets, to 3.30%, comprising a real GDP forecast of 1.50% and an inflation assumption of 1.80% (**EXHIBIT 1A**). We are increasingly convinced that the pandemic will leave behind relatively few economic scars. Less than one year ago – in the depths of the pandemic – forecasters were grappling with the risk that COVID-19 would leave in its wake high and lingering unemployment, widespread bankruptcies and a lasting erosion in the willingness of households and businesses to spend.

The pandemic may not be over, but we see little evidence of such economic damage. The recovery in business investment and continued improvement in labor productivity suggest the underlying dynamics of real economic growth are reassuringly robust.

Critically, our estimate of potential growth is little changed compared with pre-pandemic levels (**EXHIBIT 1B**). This is noteworthy because over the last four quarters we've seen an extraordinary cyclical recovery and strong returns from risk assets. Despite banking these outsize growth and returns, our long-term growth forecasts remain relatively stable compared with last year, implying that, allowing for cyclical factors, there is a solid underlying growth trend.

Greater investment could spur upside to productivity over the coming cycle compared with the last one

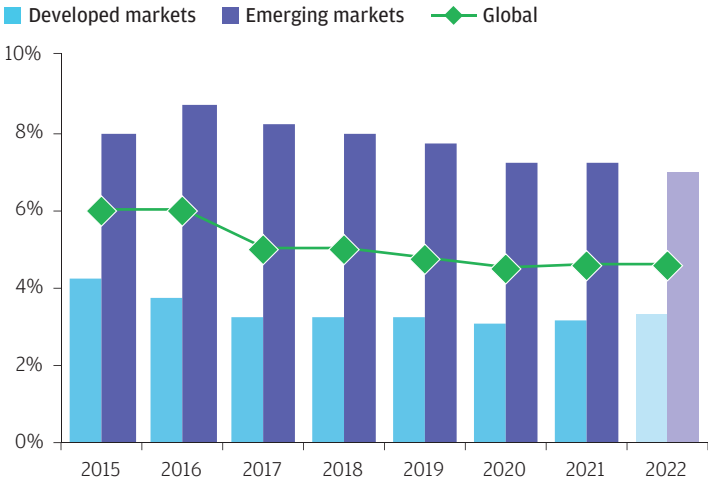
EXHIBIT 1A: PRODUCTIVITY IN DEVELOPED MARKETS: 25 YRS, LAST 10 YRS AND LTCMA 2022 FORECAST



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

Our estimates for nominal growth are slightly better in developed economies and slightly lower in emerging economies; the overall trend remains stable

EXHIBIT 1B: NOMINAL GROWTH RELATIVELY STABLE COMPARED WITH PRE-PANDEMIC



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

[1] Escape velocity is a sustainable level of economic activity where stimulus can be cut back.

[2] A 60/40 portfolio consisting of 60% MSCI ACWI, 40% Bloomberg US Aggregate.

This year, our nominal growth expectations get a boost in our LTCMAs in light of the higher inflation that central banks are now targeting. Indeed, after being worried about disinflation for many years, this year we have raised our long-term inflation projections, as risks around central banks' inflation targets are now more balanced. Modestly higher inflation in turn creates a tailwind for risk assets, even as it spells out a warning for bondholders.

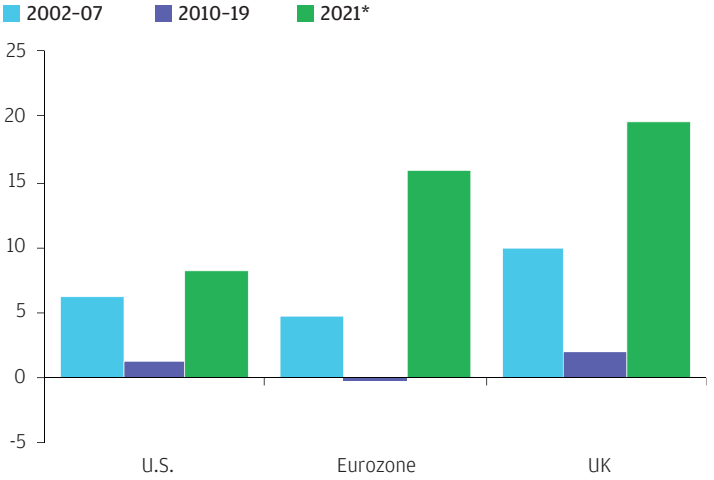
The effect of pandemic policy choices will linger, but in short, we are broadly optimistic. Equally, we must acknowledge that the very same bold fiscal and monetary policy that propelled us out of the pandemic gloom represents a seismic and lasting evolution of economic policy. Gone is a decade of sluggish capex, periodic austerity and weak productivity, offset by loose monetary policy. In its place, we find an emphasis on nominal growth and a greater willingness to tolerate larger balance sheets and higher national debt than we've seen since 1945.

But we should be in no doubt that without the swift and wide-reaching action from policymakers we would be left with a dismal economic foundation for our asset projections.

Instead, emboldened by their pandemic policy success, governments are now focused on medium-term ambitions (**EXHIBIT 2**). Multi-year spending plans have already been laid out with an emphasis on rebuilding crumbling infrastructure, addressing social inequality and tackling climate change.

Investment across developed markets was scarce in the last cycle but so far in this one is surpassing the early 2000s levels

EXHIBIT 2: NOMINAL GOVERNMENT INVESTMENT ACROSS KEY REGIONS (%, AVERAGE ANNUAL GROWTH RATE)



Source: BEA, European Commission, Haver, ONS, J.P. Morgan Asset Management; data as of September 30, 2021.

* The 2021 growth rate figures are shown relative to 2019.

DISLOCATIONS WON'T NECESSARILY CLOSE SWIFTLY

While the lack of economic scarring, strong fiscal stimulus and negative real rates combined to kick-start the economy, they also stoked fears of an inflationary endgame. The prevailing cycle may well be operating in a dislocated state. Continued accommodative policy would seem to be in tension with an outlook for robust growth. Yet this mix could persist for some time. Policymakers seem willing to bear the risk of capital misallocation in the long run in pursuit of nominal growth today.

Longer-term uncertainties do bear scrutiny but equally should not suppress a willingness to deploy capital in what is now a favorable environment for risk assets. The nature and pathway by which dislocations close are not predetermined. In most plausible cases, though, it is bondholders who suffer, real asset owners who tend to win and equity holders who should be nimble and opportunistic. Despite the risks created by the current policy and growth mix (**EXHIBIT 3**), a pro-risk tilt is probably appropriate for many investors.

Investors cannot ignore the more interventionist approach by governments. Incorporating environmental, social and governance (ESG) ambitions into investment decisions is increasingly critical. Will this approach hamper financial returns? Our analysis suggests not, as long as investors don't reduce their opportunity set by focusing solely on assets for which scores are easily available or score highly. Sustainable investing might once have been about "doing good"; it is now as much about "doing well."

Governments may well look to raise taxes to fund their spending ambitions. Many governments will find that their capacity to raise income taxes is severely limited. Few lawmakers believe their taxpaying public has shoulders big enough to bear the increases, but also, aging populations are shrinking the pool of workers with an income to tax in the first place. Instead, governments are looking more closely at corporate, wealth and capital gains taxes to raise revenues – so investors should take note, given the rapid wealth gains of recent years (see "Tax as an Investment Issue: Weighing the impact of tax loss harvesting on long-term saving goals"). In any case, broad-scale austerity is a thing of the past, and raising revenues becomes a governmental priority.

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 3: OUR CORE CASE SEES POSITIVE NOMINAL GROWTH, WITH POLICY REMAINING RELATIVELY EASY FOR SOME TIME, BUT THERE ARE RISKS TO THIS LONG-RUN VIEW

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 but negative for stocks, credit
Geopolitical tension spilling into conflict	Downside	Pockets of known tension in Middle East and Asia-Pacific regions become more sustained conflicts; may also include persistent and meaningful uplift in cyber-conflict that threatens infrastructure	Tension unlikely to persist throughout forecast horizon but could have lasting trade implications; positive for USD; adds to volatility in many asset classes
Disruptive transition away from fossil fuels	Downside initially	Starving fossil fuel makers of investment leads to price hikes and price volatility in conventional energy, precipitating energy supply shortages; potential that some regions abandon or delay energy transition, possibly creating eventual structural advantage to countries that make transition	Near term, pushes down average real GDP and pushes average inflation higher; further out, regions able to transition to renewables may see lower inflation and better growth; initially positive for commodities, negative for bonds and stocks; further out, potentially positive for DM vs. EM growth
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 while limiting 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 while limiting 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 (for example, from a crypto or 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 COVID-19 or entirely new pathogen emerges, necessitating rolling lockdowns and creating disruption to supply chains globally	Negative for growth but likely results in further stimulus, leading to cyclical volatility and risking further expansion of deficits; positive for bonds in short run, but risks an even longer period of financial repression; increases volatility in equities and credit; generally positive at margin for real assets and commodities relative to financial assets
Faster than anticipated monetary tightening in response to inflation	Downside initially	Central banks become more proactive in tackling inflation risks and in a synchronized fashion tighten monetary policy	Negative for growth in short run and eventually for inflation pricing, too (though note that inflation expectations can be sticky); sharp tightening possibly risks recession and taking average nominal growth over our forecast horizon down; initially, very negative for financial assets – bonds from higher yields, stocks from multiple contraction; further out, bonds more attractive as coupons higher and stocks reset to lower valuations
Extended valuations	Downside and upside	Valuations across most major asset markets are considered rich - stock multiples elevated, bond yields low and credit spreads tight; this presents risks in both directions, depending on prevailing policy	Highly dependent on monetary policy trajectory – if tightened too fast, high valuations have further to fall; if left loose, current valuations may prove more persistent, eliminating valuation drag from forecasts

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

BONDS LOOKING LIKE SERIAL LOSERS

There is a cost, and it will be borne by bondholders. Our central scenario of respectable post-pandemic nominal growth, and governments with the funds they require for their medium-term ambitions, might seem too good to be true. Have governments discovered a free lunch?

Hardly. The apparent free lunch has been served by the central banks. Their asset purchases insulated governments from the higher interest rates that would surely have ensued were the market left to its own devices.

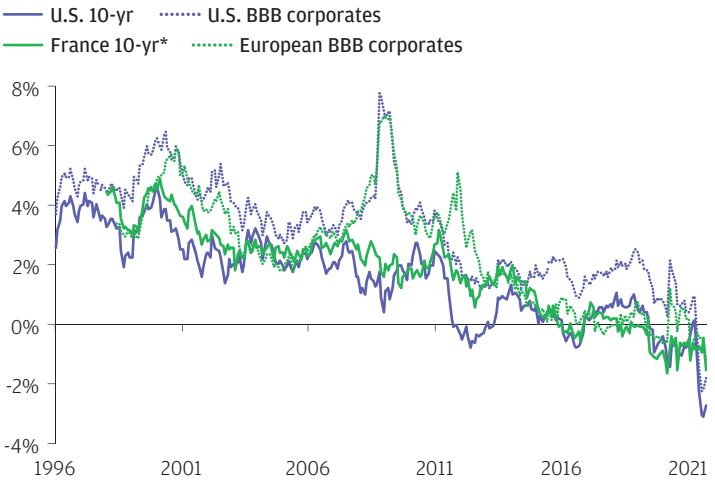
Central bank support will still be needed as governments pursue their medium-term ambitions. Our process of forecasting bond returns accounts for this reality. Understanding what the macro economy would suggest for the path of bond yields is now only part of the story. Considering what central banks will allow bond yields to do is equally important. Our forecasts also factor in the role of other large non-price sensitive buyers, such as liability hedgers and pension funds.

While the outlook for government bonds remains dire, our forecasts for nominal bond returns improve from 2021. Higher starting yields and simply moving forward one year – such that our calculations drop one year of zero or negative policy rates and include a year of at least modestly higher rates at the end of the forecast horizon – improve bond returns. Together, these factors push our 10-year U.S. Treasury returns forecast 80bps higher, to 2.40%, while USD cash returns forecasts are up by 20bps, to 1.30%. Nevertheless, given our U.S. inflation estimate of 2.30%, this still implies negative real returns for cash and virtually zero real return for Treasuries, on average, across our forecast horizon. Outside the U.S., the picture looks bleak, with nominal government bond returns of just 1.30% for 10-year EUR and 1.70% for 10-year GBP, which imply significantly negative real returns.

In short, government bonds look like the serial losers across our forecast horizon in return terms, even though we acknowledge they may still have a role as diversifiers. An extended period of financial repression in the current cycle acutely hurts bondholders. Should prevailing dislocations close through a burst of inflation, bonds will surely suffer, and should the dislocation close with better productivity, real rates will need to rise. This may offer the promise of a higher coupon eventually, but it could well be many years away (**EXHIBIT 4**).

Real borrowing costs for U.S. and European corporates and governments are now negative in real terms and likely to remain so for some time

EXHIBIT 4: REAL YIELDS HAVE TRENDED DOWNWARD OVER THE LAST QUARTER CENTURY



Source: Barclays, Bloomberg BLS, Datastream, J.P. Morgan Asset Management; data as of July 2021. U.S. 10-yr and France 10-yr are yield to maturity; BBBs are yield to worst.

* France 10-yr used in LTCMAs as proxy for eurozone sovereign yield.

Return forecasts for government bonds rise due to higher starting yields and the fact that we are a year closer to our assumed start of normalization

EXHIBIT 5: PROJECTED CYCLE-NEUTRAL YIELDS AND FIXED INCOME RETURN PROJECTIONS

	USD		GBP		EUR		JPY	
	Cycle-neutral yield (%)	Return	Cycle-neutral yield (%)	Return	Cycle-neutral yield (%)	Return	Cycle-neutral yield (%)	Return
Inflation	2.3%	–	2.2%	–	1.5%	–	0.7%	–
Cash	2.0%	1.3%	2.1%	1.5%	1.1%	0.1%	0.3%	0.0%
10-year bond	3.0%	2.4%	2.5%	1.7%	2.0%	1.3%	0.9%	0.6%
Long bond index	3.4%	1.7%	2.7%	0.4%	2.3%	0.1%	0.9%	0.7%
Investment grade credit	4.6%	2.8%	4.2%	2.3%	3.0%	1.5%	1.2%	0.7%
High yield	7.4%	3.9%	–	–	5.7%	2.9%	–	–
Emerging market debt	6.7%	5.2%	–	–	–	–	–	–

Source: J.P. Morgan Asset Management; data as of October 2021.
Long bond index: EUR 15y+ index, JPY JGB bond index, GBP 15y+ index, USD 20y+ index. EMD: Emerging market hard currency debt.
Cycle-neutral: the average rate (or yield) we expect after normalization.

Understanding that the bond market will remain highly managed influences how we view expected returns across extended fixed income sectors (**EXHIBIT 5**). In essence, running an economy hot for an extended period will depress defaults, favoring lower quality fixed income. However, this outcome is already at least partly reflected in tighter spreads. As a result, our U.S. high yield (HY) return forecast drops from 4.80% to 3.90%. Higher starting riskless yields offset tighter spreads in U.S. investment grade (IG), leading to a 30bps improvement in returns, to 2.80%. But again, this needs to be seen in the context of expectations that U.S. inflation will average just 2.30%.

EQUITY RETURNS STABLE BUT CYCLICAL

Our equity forecasts expand on this thought process. An extended period of negative real rates has altered how we think about equilibrium valuations and margins (**EXHIBIT 6A**). Mean-reversion assumptions for valuations and margins are commonplace, but these must be viewed in the context of the sector composition and capital structure of indices today. Simply adjusting historical U.S. P/E ratios for today's sector mix adds 1.5 points to historical average valuations (See Equity Assumptions, Exhibit 2). Accounting for lower corporate capital intensity adds further to equilibrium.

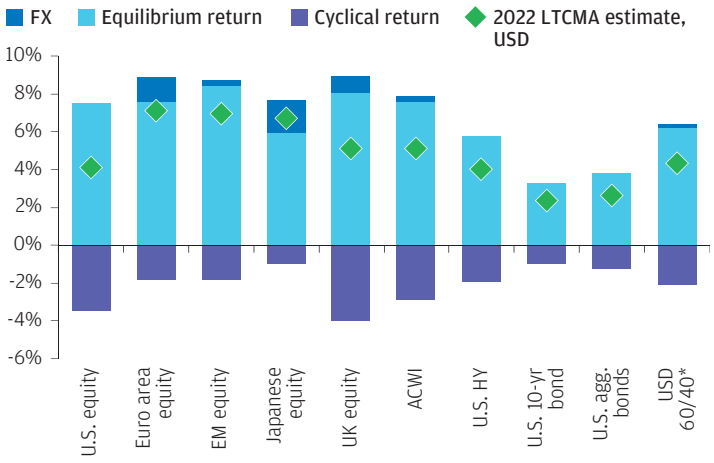
The revealed preference of corporate executives to defend stock valuations is also key. As we explored in "The Evolution of Market Structure: Managing illiquidity risk across public and private markets,"[3] the role of equity as an acquisition currency has driven the trend toward higher valuations. This is supported by a shift in how firms tend to use the equity market: 50 years ago, the stock market was where firms raised capital to finance new ventures; today, increasingly, it is where firms return capital to shareholders, in turn underpinning their valuations. Without accounting for the secular shift in index composition and corporate capital structures, the valuation drag would imply exceptionally low, even negative total equity returns over a decade or more, which we believe is neither realistic, nor particularly well supported by historical precedent (**EXHIBIT 6B**).

Drawing on this more sophisticated approach to projecting valuations and margins, we forecast an unchanged 4.10% annual return for U.S. large cap equities over our investment horizon, while the favorable margin and valuation impact improves our eurozone equity forecast 60bps, to 5.80%.[4] We make a small cut of 10bps in Japan, to 5.00%, and a large downward adjustment of 260bps, to 4.10%, for UK stocks, where today's sector mix points to substantial margin headwinds and likely multiple contraction. Emerging markets see a more modest 20bps dip, to 6.60%. These changes combine to pull our estimate of global equity returns down 10bps, to 5.00% in USD terms.

Once currencies are translated into USD, tailwinds still favor regions outside the U.S. But given the favorable index composition and resilience of earnings, in risk-adjusted terms U.S. equities continue to hold their own. At the margin, the gap between emerging market (EM) and developed market (DM) return forecasts narrows by 20bps in USD terms, driven primarily by our trimming of MSCI China equity return forecasts from 6.60% to 6.30%.

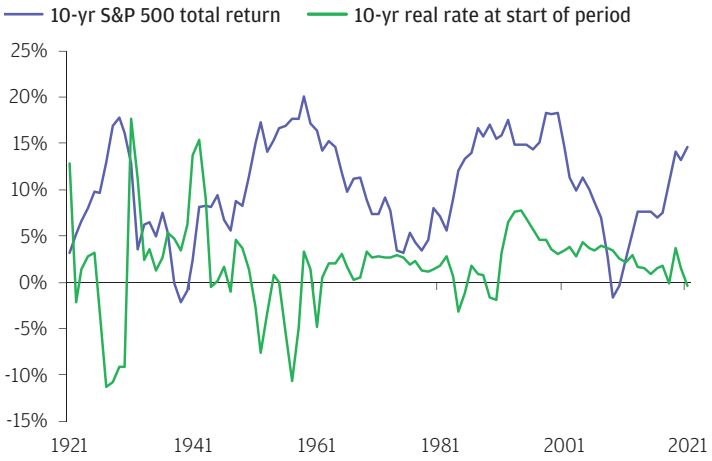
Ten-year annualized total returns were 2.3% higher when starting in a negative real rate environment

EXHIBIT 6A: CYCLICAL VS. STRUCTURAL RETURN DRIVERS FOR KEY EQUITY AND OTHER ASSETS



Source: Bloomberg, Datastream, Haver, J.P. Morgan Asset Management; data as of October 2021.

EXHIBIT 6B: 10-YR TOTAL EQUITY RETURNS WERE ONLY NEGATIVE TWICE IN THE LAST 100 YEARS, AND NEVER WHEN STARTING REAL RATES WERE NEGATIVE



Source: Bloomberg, Datastream, Yale University, Robert J. Shiller, J.P. Morgan Asset Management; data as of September 2021.

[3] John Bilton, Patrik Schöwitz, Anthony Werley et al., "The Evolution of Market Structure: Managing illiquidity risk across public and private markets," 2019 Long-Term Capital Market Assumptions, J.P. Morgan Asset Management, October 2018.

[4] Compared with last year's assumptions, it's notable that equity valuations are lower, despite a strong year of performance. This speaks to the strength of the earnings recovery. However, this has pushed up margins, which are now a key detractor in our equity forecasting.

Equities performed strongly early in the post-COVID-19 recovery. Amid easy policy, strong investment spending and elevated savings, we see further upside in stocks. Dislocations apparent in this cycle are more damaging to bondholders than stockholders, and they could endure for some time. To be sure, equity owners may need to be nimble and adjust positioning proactively with the cycle. But longer-term inflation risks are no reason to avoid stocks today.

LOOKING BEYOND PUBLIC MARKETS AND GEOGRAPHIC BORDERS

While much has changed over the past two years, one principle remains very much in force: Investors need to look further afield to generate asset returns – both geographically and beyond public markets. They must also search harder for yield, evaluating and accepting tradeoffs in terms of volatility and illiquidity.

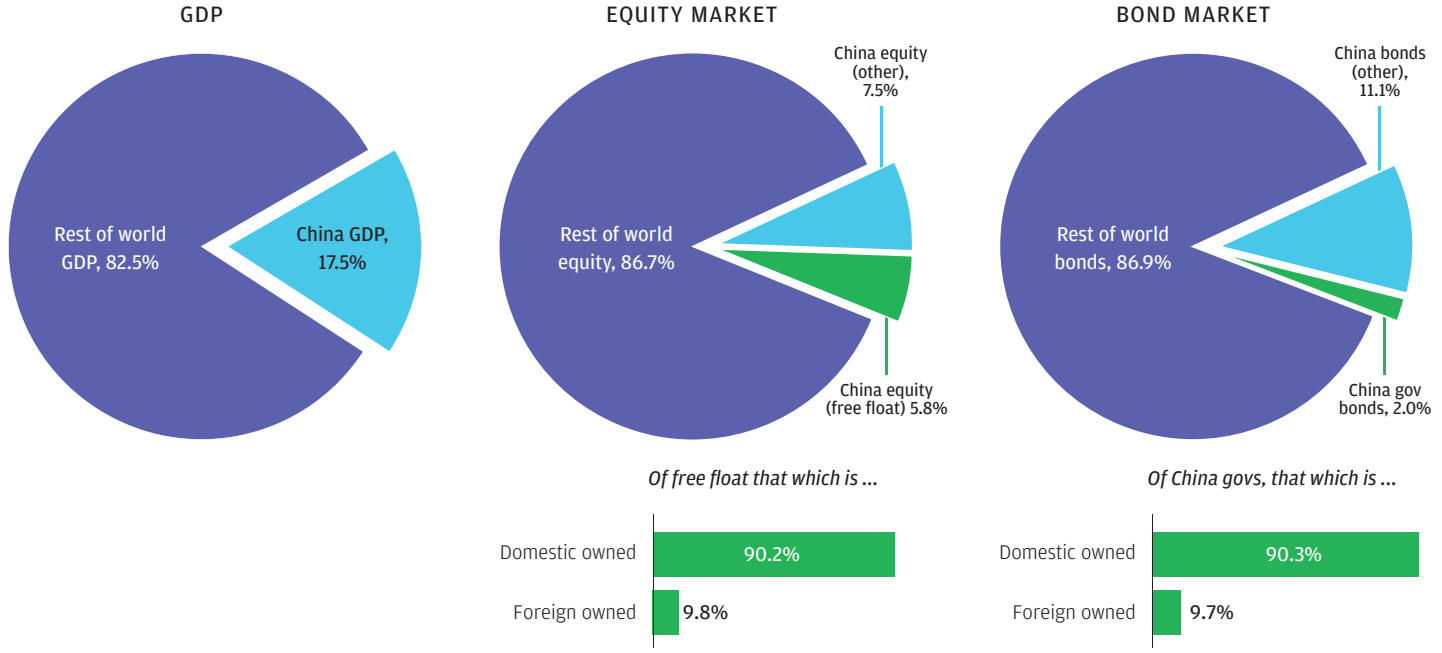
As China's economy and capital markets mature, investors will increasingly look to the opportunities they present. To identify those opportunities, investors will need to understand Beijing's long-term strategic ambitions as much as the economics of any investment case – as this past year's developments have demonstrated (see "Chinese assets: The biggest risk for investors would be to ignore them"). Chinese asset markets are already huge, but the assets are mostly domestically held (**EXHIBIT 7**). Many investors are structurally underweight China. As a stand-alone investment, bringing Chinese asset exposure up to market weight can enhance portfolio outcomes while allowing for greater balance in emerging market ex-China exposures.

Looking beyond public markets is also increasingly essential. As they did last year, our return forecasts (**EXHIBIT 8**) for alternative assets compare favorably with public market returns. The benefits of alternative assets – improving alpha trends, the ability to harvest risk premia from illiquidity, and the opportunity to select managers that can deliver returns well above what is available from market risk premia alone – will continue to attract capital over the coming decade.

Financial alternatives offer a marked uplift compared with public markets, with cap-weighted private equity up 30bps from last year, at 8.10%, and private debt offering 6.90%, a favorable uplift when compared with public credit returns. While financial alternatives generally do have an equity beta, the additional returns available from manager selection can deliver a meaningful boost to portfolios.

China represents almost a fifth of world GDP and has huge asset markets, but non-Chinese investment is still a small share

EXHIBIT 7: FOREIGN OWNERSHIP OF SELECTED CHINESE ASSETS



Source: Bloomberg, CEIC, Haver, ICMA, PBoC; data as of December 2020.

In general, forecast returns for alternatives and private assets have held up well this year

EXHIBIT 8: SELECTED ALTERNATIVE STRATEGIES RETURN ASSUMPTIONS (LEVERED,* NET OF FEES, %)

FINANCIAL ALTERNATIVES	2022	2021
PRIVATE EQUITY (USD)**	**8.10**	**7.80**
Private equity - small cap	7.40	7.30
Private equity - mid cap	7.60	7.40
Private equity - large/mega cap	8.40	8.00
PRIVATE DEBT (USD)		
Direct lending†	6.90	6.80
HEDGE FUNDS (USD)		
Equity long bias	3.30	3.40
Event-driven	3.20	3.10
Relative value	3.80	3.60
Macro	2.70	2.20
Diversified††	3.60	3.30
Conservative††	3.30	3.10
REAL ASSETS	**2022**	**2021**
REAL ESTATE - DIRECT (LOCAL CURRENCY)		
U.S. core‡	5.80	5.90
U.S. value-added	7.70	8.10
European core‡‡◊	4.80	5.00
European value-added◊	6.80	7.70
Asia-Pacific core‡‡	6.50	6.60
REITS (LOCAL CURRENCY)		
U.S. REITs	5.70	6.50
European REITs◊◊	5.10	5.90
Asia-Pacific REITs^	5.00	6.40
Global REITs^^	5.40	6.40
GLOBAL INFRASTRUCTURE (USD)		
Core	6.10	6.10
GLOBAL TRANSPORT (USD)		
Core	7.40	7.60
COMMODITIES (USD)	**2.60**	**2.30**
Gold	3.00	2.90

* 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 direct lending.

†† 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.

‡ U.S. core real estate in our assumptions comprises 90% prime high quality real estate assets and 10% value-added development assets. This exposure is consistent with the composition of the benchmark NFI-ODCE Index.

‡‡ Our 2022 assumptions are not directly comparable to our 2021 assumptions due to a change in methodology: For our 2022 estimates, to improve consistency across regions, we match the composition of European and Asia-Pacific core real estate to that of the U.S. (90% prime core and 10% value-added risk exposure). Previously, our European and Asia-Pacific core real estate assumptions included only prime core exposure.

◊ This year, we combine previously separate assumptions, for European ex-UK and the UK, into our European assumptions for both core and value-added real estate.

◊◊ As with core real estate, in 2022 we have combined two previously separate assumptions, European ex-UK and UK REITs, into a single European REITs assumption.

^ Asia-Pacific REITs follow a developed market construct and cover a slightly different geographic exposure from that of Asia-Pacific core real estate.

^^ The global composite is built assuming the following weights: roughly 60% U.S., 20% Europe and 20% Asia-Pacific.

MISPRICED LIQUIDITY RISK MAKES REAL ASSETS THE SERIAL WINNERS

Real assets continue to stand out as an opportunity set that is both attractively valued – not having participated fully in the post-pandemic risk rally – and also likely to be resilient in multiple future states. In the near term, strong income streams in real estate, infrastructure and transportation assets are welcome when bond yields are compromised. Returns in U.S. core real estate of 5.80% are only 10bps down on last year, while core infrastructure is steady at 6.10% and core transportation just 20bps lower at 7.40%. Returns in all categories are substantially higher than in comparable public credit or equity assets. Above all, real assets offer not only strong income but resilience to inflation and gearing to growth.

Despite liquidity issues in a number of alternative markets, the stability of returns across various future states now seems compelling for asset allocators. Moreover, in our view, investors regularly overestimate the liquidity they might need through the cycle and, as a result, underutilize illiquid assets.

This may be especially true across real assets, where liquidity concerns and the muscle memory of the performance of real estate in the global financial crisis can lead to underallocation. However, in the same way government bonds look to be serial losers in many possible scenarios over our investment horizon, we believe real assets may prove to be serial winners. Strong cash flows, attractive valuations, decent income and gearing to nominal growth should offset concerns about illiquidity for many investors, in our view.

U.S. DOLLAR REMAINS RICH IN MANY CROSSES

We once again see the U.S. dollar as rich compared with most other currencies, with the notable exceptions of the Brazilian real and Mexican peso. Over time, a rich dollar implies that nondollar owners of U.S. assets will face a currency headwind. And vice versa: U.S. buyers of international assets may enjoy a currency tailwind to returns.

In our LTCMA forecasts, we simply model currencies as either under- or overvalued compared with their long-run fair value and assume a steady, linear pull to this equilibrium (**EXHIBIT 9**). In keeping with other public asset markets, we do not project alpha trends for currencies. However, we note that despite our linear assumption of reversion to fair value, in reality the path of currency prices can vary meaningfully from one year to the next.

Certainly some investors may view this as a potential source of alpha and for those willing to take active currency risk it may also be diversifying at portfolio level. But for the purpose of our asset return forecasts, our currency assumptions merely incorporate the impact of a linear move to fair value over our forecast horizon.

We once again see the U.S. dollar as rich compared with most other currencies

EXHIBIT 9: PROJECTED EQUILIBRIUM USD EXCHANGE RATES*

	FORECAST LEVEL			
	2022	2021	Chg	Chg %
Australian dollar	0.74	0.71	0.03	4.23%
Brazilian real	5.96	4.97	0.99	19.92%
Canadian dollar	1.19	1.21	-0.02	-1.65%
Swiss franc	0.76	0.80	-0.04	-5.00%
Chinese renminbi	5.29	5.85	-0.56	-9.57%
Euro	1.36	1.39	-0.03	-2.16%
British pound	1.51	1.43	0.08	5.59%
Japanese yen	90.13	88.63	1.50	1.69%
Mexican peso	26.18	22.04	4.14	18.78%
Swedish krona	7.37	7.43	-0.06	-0.81%

Source: J.P. Morgan Asset Management; data as of September 30, 2020 and September 30, 2021.

* The absolute and percentage changes referenced in this table are the year-over-year changes to our forecasted exchange rates, not the forecasted annual appreciations.

In this year's LTCMAs, we also take a closer look at cryptocurrencies. Despite media hype and sharp price rises, crypto is not yet established as a portfolio asset. Unstable correlations to other assets mean crypto today is better thought of as a call option on a future disruptive technology than as a substitute for currencies or gold – with exposure sized accordingly.

STRONG RETURNS REQUIRE MORE THAN JUST MARKET RISK

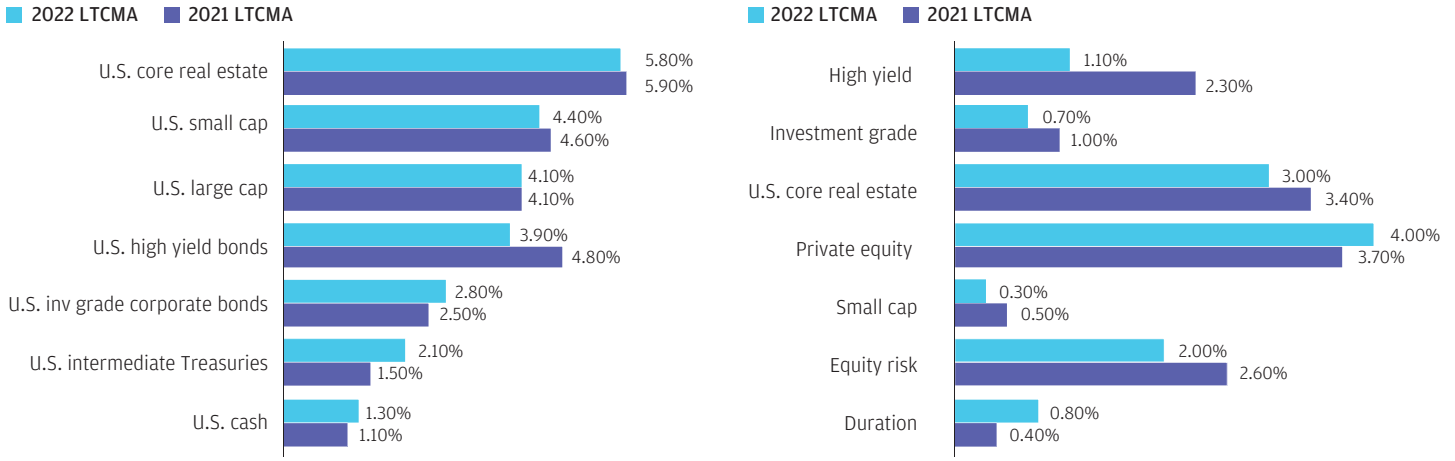
We do see potential to achieve the kind of returns historically demanded by savers.[5] Our forecasts tell us that investors can still achieve "acceptable" returns. But the portfolio required to generate these returns is dramatically different from what it has been in the past. In our LTCMA projections published after the global financial crisis, a 60/40 portfolio of global equities and U.S. aggregate bonds delivered a 7.5% return with expected volatility of 8.3%.

Today, the same 60/40 portfolio is set to return just 4.3% with volatility of 9.7%. Nevertheless, using our projections (**EXHIBIT 10**), we believe a return of north of 7% is still achievable even if the portfolio will look rather different: a lot more high yield debt, international stocks and alternatives, and a lot fewer government bonds. While the destination is the same, the journey is tougher, and expected volatility will inevitably be higher. Lengthening time horizons and careful liquidity planning are nonnegotiable elements of investing today. Ultimately, to push fully toward historical return levels, active allocation, manager selection and security selection will need to form some part of every investor's toolbox.

[5] John Bilton, Jared Gross, Zachary Page, Tim Lintern, "How investors can reach their 7% return target," J.P. Morgan Asset Management, July 2021.

Equity returns are quite stable compared with last year, and bond returns are a little better. But it is alternative assets that still offer the most attractive returns

EXHIBIT 10: LEFT, RETURN; RIGHT, RETURN PICKUP (PREMIUM) FOR KEY USD ASSETS



Source: J.P. Morgan Asset Management; data as of September 30, 2021. Note: Return pickup (premium) for asset classes as follows: HY vs. IG; IG vs. UST; Core RE vs. IG; PE vs. U.S. large cap; small cap vs. U.S. large cap; U.S. large cap vs. UST; UST vs. cash.

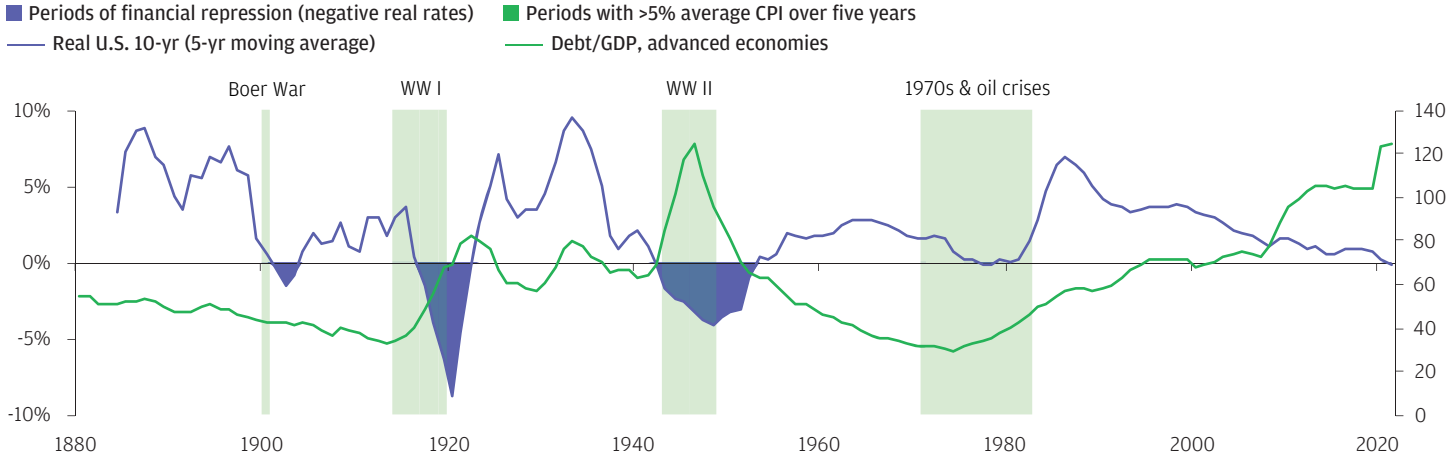
We acknowledge that the endgame is uncertain, but a bad outcome is not inevitable. Our LTCMAs represent our central expectation of what will happen over our 10- to 15-year forecast horizon, while also noting that medium-term risks have risen.

Today, many market participants focus chiefly on the risk that arises from a prolonged period of monetary and fiscal synchronization, and the implications for inflation and capital misallocation. Without doubt, the expansion of national debt, extensive fiscal stimulus, government intervention in capital markets and tolerance for negative real interest rates all have potentially harmful consequences. A disorderly and persistent jump in inflation, which forces rates higher and valuations lower, is a plausible way asset markets might reset.

But it is not the only pathway, nor is it necessarily imminent. Another potential outcome – decidedly more benign – is the effective deployment of capex and fiscal stimulus to build long-term productive capacity. In this scenario, supply grows alongside demand, keeping inflation in check and allowing for a gradual withdrawal of easy monetary policy. Government debt becomes less of a burden as the economy grows (**EXHIBIT 11**). Asset market valuations drift down, not because prices are falling but because corporate earnings are rising.

The period of financial repression after World War II helped shrink government debt but was over well before the inflation of the 1970s picked up

EXHIBIT 11: FINANCIAL REPRESSION AND IMBALANCES THAT LEAD TO SUSTAINED INFLATION MAY TAKE AN EXTENDED TIME TO BUILD



Source: Bloomberg; Datastream; IMF, Historical Public Debt Database; IMF, World Economic Outlook database; Maddison Database Project; IMF staff calculations; Yale University, Robert J. Shiller; J.P. Morgan Asset Management; data as of September 2021.

The reality is likely to emerge somewhere between these two extremes: A persistent inflation scare is possible, but equally, productivity is trending positively. Either way, investors should avoid the tendency to focus exclusively on a negative outcome. They should concentrate instead on building portfolios that capture today's above-trend growth and are nimble enough to adapt as the environment evolves. Above all, investors will want to avoid assets that are serial losers across multiple potential future states of the world, and strengthen exposure to assets that are serial winners – even if this means exploring new markets and carving returns out of a wider range of risk premia (**EXHIBITS 12A** and **12B**).

Stock-bond frontiers are similar to last year, bond returns a little better and equity little changed. Alternative assets still sit well above the stock-bond line, as they monetize risk premia such as illiquidity risk rather than market risk alone

EXHIBIT 12A: USD STOCK-BOND FRONTIERS

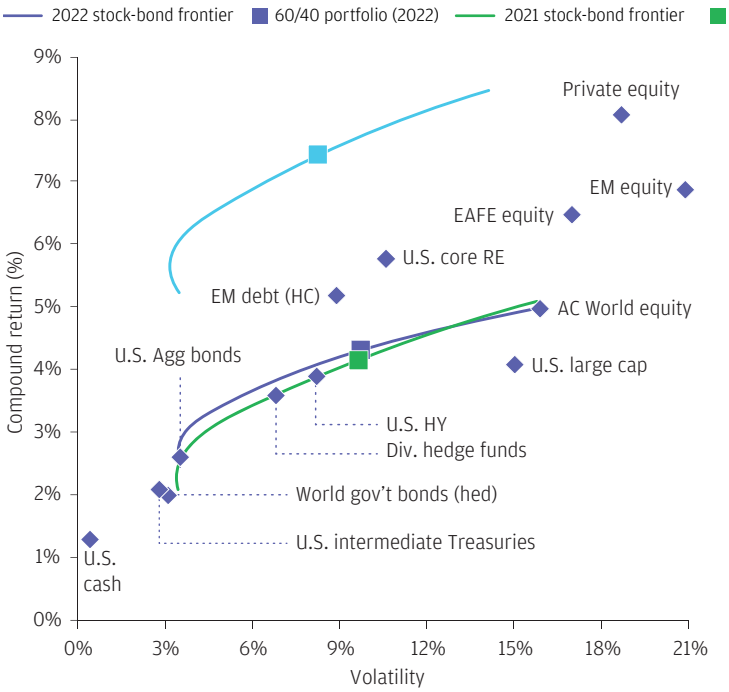
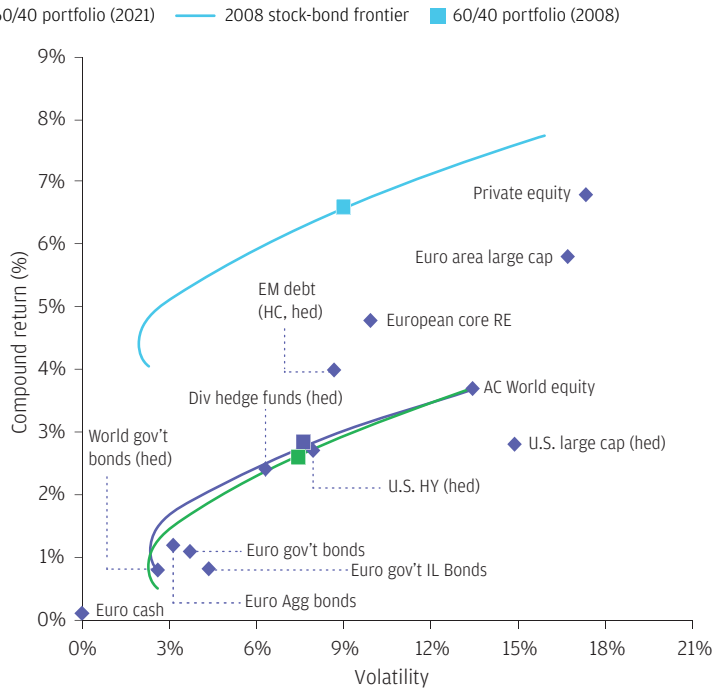


EXHIBIT 12B: EUR STOCK-BOND FRONTIERS



Source: J.P. Morgan Asset Management; data as of September 30, 2021.

The new old normal: Moderate growth but a little more inflation

Michael Hood, *Global Strategist, Multi-Asset Solutions*
Dr. David Kelly, CFA, *Chief Global Strategist, Head of Global Market Insights*

IN BRIEF

- For the first time in many years, we raise our long-term inflation projections across a range of economies, detecting a different inflationary dynamic: Post-recession, output gaps are closing quickly; meanwhile, stimulative fiscal and monetary policies are working in partnership.
- Our global growth forecast sees upside risks from technology and greater labor force participation, yet countering headwinds abound: stalled globalization; a less immigration-friendly atmosphere; the long-expected, gradual slowing of Chinese growth; and continuing weak demographics globally.
- We shave our global real growth forecast slightly, to 2.2%, for our set of economies. Developed market (DM) nominal growth edges up, reflecting a small downgrade to real GDP and the uplift in our inflation forecast.
- Emerging market growth edges down in both real and nominal terms, reflecting cuts to the China and India real GDP forecasts.
- We raise our trend growth expectations in several DM economies, despite a year of powerful growth since the 2021 edition.

The financial crisis of the late 2000s cast a decade-long shadow over the global economy. An extended period of household and public sector deleveraging leaned against growth, which was already under pressure from weakening demographics. Meanwhile, large-scale spare capacity helped keep inflation persistently low, and even highly accommodative monetary policies failed to generate much lift.

Still, the economic cycle survived for more than 10 years – and might have lasted longer had the coronavirus pandemic not struck. The long-term implications of this latest shock will reveal themselves only over time, but some changes seem apparent a year into the new expansion.

Most obviously, we detect a somewhat different inflationary dynamic: Economies have closed output gaps much more quickly this time, with fiscal and monetary policies now working in partnership. For the first time in many years, we have raised our long-term inflation projections, and now see less risk of persistent deflationary pressures. The growth picture seems less clear. We can imagine upside risks from technological change and efforts to boost labor force participation. But the global economy may also encounter new headwinds, such as stalled globalization and, importantly for the U.S., restrictions on immigration. Moreover, population growth continues slowing inexorably, as does growth in China.

GLOBAL GROWTH: UPSIDE RISK, BUT DEMOGRAPHICS STILL WEIGH ON PROJECTIONS

We continue to project modest real GDP growth by historical standards for our sample of countries and, in aggregate, shave our trend forecasts slightly. We have lifted our growth forecasts for several economies, countered by downgrades to a few heavyweights: the U.S., China and India. We thus expect 2.2% real GDP growth for our set of economies over the next 10 to 15 years, vs. 2.9% from 2010 to 2020 and 2.7% from 2000 to 2020 (**EXHIBIT 1**).

Our 2022 assumptions anticipate slower real GDP growth globally, mostly because last year's cyclical bonuses have been removed, and somewhat higher inflation

EXHIBIT 1: 2022 LONG-TERM CAPITAL MARKET MACROECONOMIC ASSUMPTIONS (%, ANNUAL AVERAGE)

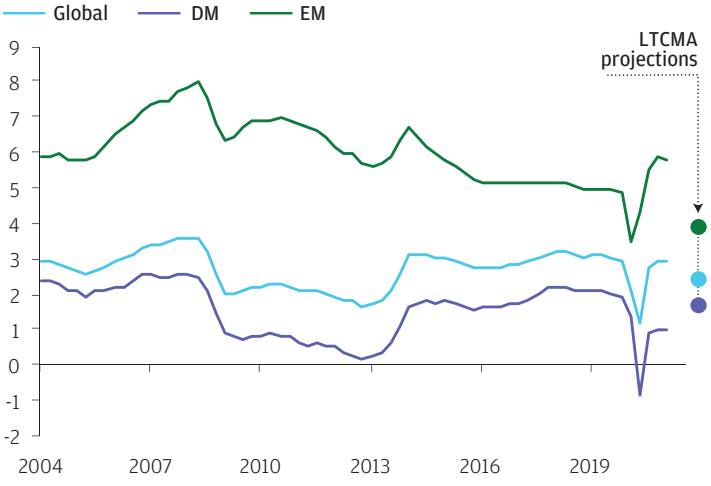
	REAL GDP				INFLATION		
	2022	2021	Change (trend only)	Change (cyclical + trend)	2022	2021	Change
DEVELOPED MARKETS	**1.5**	1.6	**0.0**	**-0.1**	**1.8**	1.6	**0.2**
United States	1.7	1.8	-0.1	-0.1	2.3	2.0	0.3
Euro area	1.2	1.3	0.1	-0.1	1.5	1.3	0.2
Japan	0.7	1.0	0.0	-0.3	0.7	0.7	0.0
United Kingdom	1.4	1.6	0.2	-0.2	2.2	2.0	0.2
Canada	1.6	1.7	0.1	-0.1	1.9	1.8	0.1
Australia	2.2	2.4	0.0	-0.2	2.2	2.3	-0.1
Sweden	1.8	2.0	0.1	-0.2	1.8	1.6	0.2
Switzerland	1.4	1.5	0.2	-0.1	0.6	0.5	0.1
EMERGING MARKETS	**3.7**	3.9	**-0.2**	**-0.2**	**3.3**	3.3	**0.0**
China	4.2	4.4	-0.2	-0.2	2.5	2.5	0.0
India	6.0	6.9	-0.5	-0.9	4.5	5.0	-0.5
Russia	0.8	1.1	-0.1	-0.3	5.0	5.3	-0.3
Brazil	2.0	2.4	-0.3	-0.4	4.3	4.3	0.0
Korea	2.0	2.1	0.1	-0.1	2.0	1.8	0.2
Taiwan	1.7	1.6	0.1	0.1	1.1	1.0	0.1
Mexico	2.2	2.5	0.0	-0.3	3.7	3.7	0.0
South Africa	2.2	2.5	0.0	-0.3	5.3	5.3	0.0
Turkey	3.1	3.1	0.1	0.0	12.0	8.5	3.5
GLOBAL	**2.2**	2.4	**-0.1**	**-0.2**	**2.4**	2.2	**0.2**

Source: J.P. Morgan Asset Management; estimates as of September 30, 2021. 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 2022 forecasting returns to trend rates alone. In comparing 2021 with 2022 trend rates here, we do not use last year's rate-plus-cyclical-bonus figure but only the trend rate.

We believe aggregate developed market (DM) growth, which we forecast at 1.5%, will run fairly close to its historical track record. But China's ongoing deceleration pulls down the emerging market (EM) aggregate: We pencil in 3.7%, compared with 6.0% during the 20 years ended in 2020 (**EXHIBIT 2**).

We expect DM real GDP growth fairly close to its historical norm, but EM growth is lower than in the past 20 years

EXHIBIT 2: REAL GDP GROWTH HISTORY AND PROJECTIONS (% Y/Y, 5-YEAR AVERAGE)



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

In late 2020, the world was just beginning its rebound from the steep economic contraction wrought by the coronavirus pandemic. Reflecting depressed starting points, we added cyclical bonuses to our estimated trend growth rates in the last edition of our Long-Term Capital Market Assumptions (LTCMAs). For this edition, with recoveries now well advanced and output gaps largely closed, we remove those bonuses from our growth projections.

The last edition also considered several possible long-term implications of the pandemic, including a reversal of globalization and the de-densification of living and working arrangements. A year on, we see limited evidence that these changes will have material effects on potential growth.

Accelerating total factor productivity; faster growth in labor supply

What might prove longer lasting is some influence from two other recent developments. First, the pandemic shock appears to have catalyzed business adoption of new technologies. Total factor productivity (TFP) growth – over the long run, mostly a proxy for technological change – grew disappointingly slowly during the prior expansion. Just before the recession, though, it showed tentative signs of a pickup.

We think a renewed focus on incorporating digitization, communication tools and other advances into the capital stock and work practices may be accelerating TFP.

Second, monetary policymakers' attempts to run economies hot in the years before the pandemic seemed to bear fruit in increased labor market participation. As central banks, led by the Federal Reserve, incorporate full employment goals more explicitly into their frameworks, and as fiscal policy takes a more activist turn, we may see faster growth in the labor supply than demographics would suggest. Technology may help on this front, too, as flexible work arrangements facilitate greater employment of women in particular.

We have nudged up our assumption for DM TFP growth by 0.1 percentage point (ppt), to 0.7%, largely in a nod to the somewhat speculative technology adoption story. The move also reflects optimism about the euro area, which looks set to avoid the damaging fiscal contraction initiated there in the early 2010s in response to creditworthiness concerns. The European Union's Next Generation fund is now set to invest in digitization, clean energy and other (possibly productivity-enhancing) projects.

As usual, we forecast a slightly faster pace of TFP growth in emerging markets: 0.8%, which slips down 0.1ppt from last year, mostly because of China. Our TFP projections for Korea and Taiwan rise, in accord with the DM numbers.

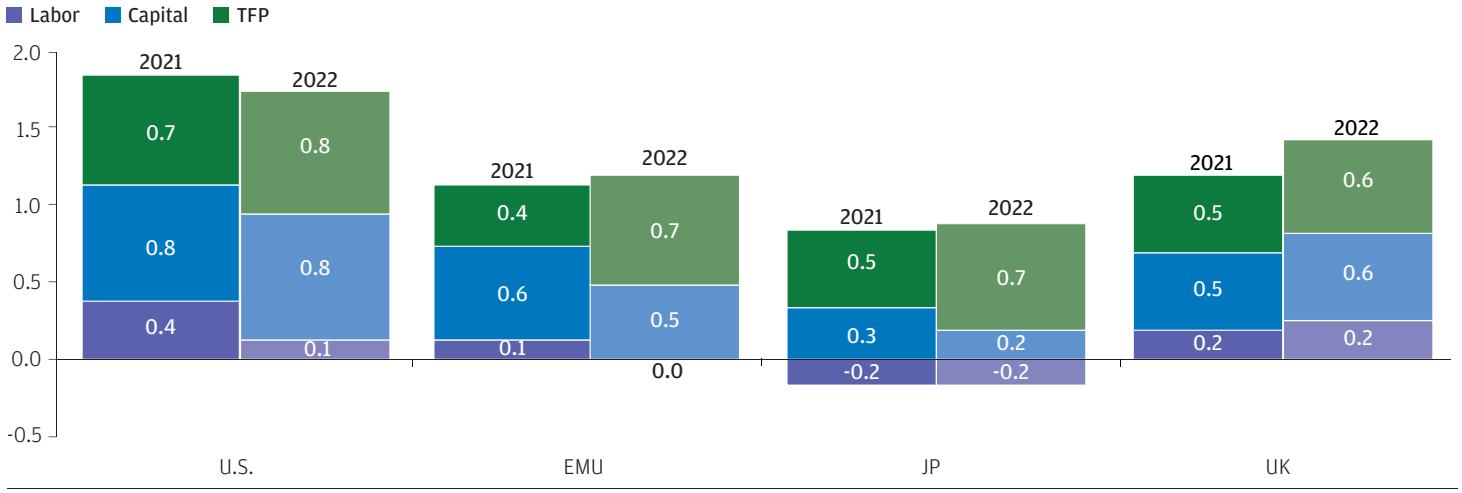
The reality of weak demographics

The reality of weak demographics continues to weigh on the prospects for DM and EM economies' growth. Our framework regards the labor force, the capital stock and TFP as the ingredients in the recipe for long-term growth. Shrinkage in the DM prime-age population during our forecast period thus represents a significant constraint. Greater participation by senior citizens, and possibly women and the previously marginalized, should provide some offset, but we still expect the DM workforce to grow only 0.1% annually, down from 0.3% in last year's forecasts. EM demographics do not look much better, due largely to aging societies in China, Korea and Taiwan. Ongoing urbanization in China will help, but we still see EM employment growing at a modest 0.6% pace.

Finally, the modest net modifications in the labor force and TFP lead to broad stability in our capital stock forecasts. Broadly, we relate the growth of the capital stock to the expansion of the workforce and TFP, observing that economies generally grow in a balanced way, with the capital stock holding fairly steady relative to GDP.

Better productivity growth offsets weaker demographics in trend real GDP forecast

EXHIBIT 3: CONTRIBUTIONS TO DM REAL GDP GROWTH



Source: J.P. Morgan Asset Management; estimates as of September 30, 2021. Contributions do not include the cyclical bonuses incorporated into 2021 LTCMA real GDP forecasts.

U.S. trend growth forecast declines slightly; some other DM forecasts rise

Accelerating TFP growth proved insufficient to head off a small decline in our U.S. trend growth forecast, now at 1.7%, compared with 1.8% last year (**EXHIBIT 3**). Relatively favorable demographics have given the U.S. a significant advantage vs. other DM economies, but a more restrictive immigration atmosphere should damage that source of strength. We correspondingly reduce our U.S. labor force growth forecast, to 0.3% from 0.6%, reflecting both weaker immigration and a higher starting point for labor force participation a year into the recovery.

By contrast, our economic trend growth numbers have moved up 0.1ppt–0.2ppt in several other DM economies, reflecting a combination of the TFP and labor force stories. We have raised our UK trend growth forecast by 0.2ppt, to 1.4%, expecting that disruptions related to the Brexit process will ease early in our forecast period and noting that immigration from outside the European Union is compensating for fewer EU arrivals. We hold our Australia projection steady at 2.2% for another year – our highest DM forecast.

In emerging markets, we lower our China trend growth forecast, to 4.2% from 4.4%. We have long suggested that China's growth rate will glide lower as the economy continues to converge toward DM status, leaving less room for catch-up; this year's change represents such an adjustment. Although our India growth forecast still tops the emerging markets, we cut it for a second straight year, to 6.0% from 6.5%, in light of disappointing progress on structural reforms and a likely persistent overhang from a weakened financial sector. Russia's dependence on the energy sector motivated a downgrade. Concerns about policy instability in Brazil led to a 0.3ppt cut, to 2.0%. By contrast, the Korea and Taiwan forecasts edged up, thanks to our optimism on TFP.

GLOBAL INFLATION LIKELY TO STICK

In broad terms, global inflation has been falling since the 1970s. In the developed world, powerful long-term economic forces have suppressed inflation, and these forces have been supplemented in emerging markets by more responsible central bank policies. Global inflation has also generally fallen during recessions, and inflation pressures receded further after the global financial crisis (GFC). However, after the COVID-19 recession, we expect aggressive fiscal policy and a faster recovery to carve out a somewhat stronger path for inflation globally over the next 10 to 15 years.

Globally aggregated measures of inflation have generally declined. However, any such measure tends to be distorted by a few nations with very high inflation. Perhaps a cleaner measure is that of the 22 countries for which we provide forecasts, decade-over-decade inflation declined in the 1990s in 18 economies, dropped in the 2000s in 20 economies and fell in the 2010s in 16 economies.

Forces suppressing inflation

A number of long-term forces have contributed to lower inflation (**EXHIBIT 4**). First, information technology has tended to increase the competitiveness of all markets by empowering both consumer and wholesale buyers. Second, while income inequality across nations has lessened in recent decades, it has increased within nations. This has tended to reduce the demand for goods and services and increase the demand for financial assets, boosting asset prices while restraining consumer inflation. Third, increased globalization has allowed consumers, generally in rich countries, to take advantage of lower labor costs in poorer nations. To some extent, this is illustrated by the rise in the value of global exports and imports – from 27% of global GDP in 1970 to 61% by 2008.[1]

Some slow-moving forces seem likely to create more upward pressure in the future

EXHIBIT 4: LONG-TERM INFLUENCES ON U.S. INFLATION

	IMPACT ON U.S. INFLATION	
Economic forces	Last global expansion (2008–19)	Next 10–15 years
Income distribution	-	+
Globalization	-	?
Dollar	-	+
Fiscal policy	-	+
Online markets & information availability	- -	- -
Energy spikes	+	0
Union membership	-	-
ESG	0	+

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

Also reducing global inflation: Oil prices, a trigger of higher inflation in the 1970s and periodically since then, have recently traded in a narrower range, partly because of the advent of shale oil, supplies of which can respond quickly to changes in demand. Declining union power has also tended to reduce inflation. More recently, although monetary policy has been loose for some time, it has proved ineffective at boosting inflation after the GFC, in part because it worked at cross-purposes from austere fiscal policies.

Finally, information technology and productivity-enhancing investments in artificial intelligence and robotics put downward pressure on inflation in the long run.

Forces supporting inflation

Since the pandemic recession, many headwinds to inflation have diminished while new tailwinds have materialized.

Political populism and the need to combat the pandemic's economic impacts have encouraged many governments to adopt far more aggressive fiscal stimulus. This is likely to prove more potent than the monetary stimulus of the last decade, in part because much of it is directed toward helping lower and middle income consumers, who have a greater marginal propensity to spend. Globalization has also stalled, due to greater protectionism and an increasing share of services, which are less tradable, in global GDP. Between 2008 and 2019, the value of exports and imports fell from 61% to 58% of global GDP.

Politics may also contribute to higher wage growth, reflected in higher minimum wages and more generous unemployment benefits. A focus on battling climate change could have the same effect if it includes carbon taxes rather than only green technology, especially considering the global economy's likely continued reliance on fossil fuels for at least the next decade.

On balance, our long-term inflation outlook is a little higher this year, as some of the inflation manifesting itself in the late stages of the COVID-19 pandemic is proving a little stickier than the central banks expected.

[1] World Bank and OECD national accounts data files, 2020.

REGIONAL INFLATION HIGHLIGHTS: WARMER OUTLOOK IN DM ECONOMIES

Twice in this still-young century, the global economy has experienced deep recessions and recoveries that unfolded in synchronous fashion. Because of a common business cycle, there is less divergence in the global inflation outlook than has often been the case.

THE U.S.: The U.S. still continues to broadly lead the developed world in expected inflation, and we increase our 2022 long-run U.S. inflation forecast, from 2.0% to 2.3%. This reflects an expectation that aggressive fiscal policy and easy monetary policy in an economy with stronger wage growth and inflation expectations will enable the Federal Reserve to meet its long-run goal of 2% consumption deflator inflation while modestly exceeding this target in the short run.[2]

THE EUROZONE AND UK: In the eurozone, we expect somewhat higher long-run inflation and forecast 1.5%, compared with 1.3% last year. This reflects some coordinated fiscal stimulus, although not on the same scale as in the U.S., plus some costs for environmental, social and governance (ESG) policies that are likely to be more impactful in the eurozone. We boost our UK inflation estimate, from 2.0% to 2.2%, assuming a little more economic dynamism and more aggressive fiscal policy than in continental Europe.

JAPAN: We continue to expect inflation in Japan to severely undershoot the Bank of Japan's 2% goal, forecasting an unchanged 0.7% rate. Japan's aging population will likely limit economic growth, while its already massive government debt should curtail its ability to implement significant fiscal stimulus.

Emerging market inflation

Central bank credibility is even more important for emerging markets to achieve desired inflation outcomes.

CHINA: We expect 2.5% inflation in the long run, unchanged from last year's edition. Plenty of forces could push Chinese inflation higher, but the government is acutely aware of the need to prevent financial or economic bubbles, and it appears willing to adopt more restrictive monetary and fiscal policies than in the U.S. or Europe to keep inflation under control.

INDIA, MEXICO AND BRAZIL: We have cut our forecast of Indian inflation, from 5.0% to 4.5%. This partly reflects a slower economic growth path going forward than we expected a year ago. We continue to believe that inflation will exceed central bank targets in Mexico and Brazil, and leave our forecasts unchanged, at 3.7% and 4.3%, respectively.

RUSSIA AND TURKEY: We believe central bank credibility may be moving in opposite directions in these economies. Consequently, we reduce our forecast for Russian inflation, to 5.0%, and increase Turkey's, to 12.0%.

[2] The LTCMAs project CPI inflation; our 2.3% CPI forecast over the next 10 to 15 years likely equates to roughly a 2.1% consumption deflator inflation rate.

Thematic articles

Doing good and doing well: ESG trade-offs in investing

Caspar Siegert, Ph.D., *Research Analyst, Sustainable Investing*
Karen Ward, *Chief Market Strategist, EMEA, Global Market Insights Strategy*
Nicolas Aguirre, CFA, *Head of Portfolio Construction & Risk, Endowments & Foundations Group*
Philippa Clough, CFA, *Portfolio Manager, International Equities Group*
Kerry Craig, CFA, *Global Market Strategist, Global Market Insights Strategy*
Tim Lintern, CFA, *Global Strategist, Multi-Asset Solutions*
Patrik Schöwitz, CFA, *Global Strategist, Multi-Asset Solutions*
Shivani Sharma, *Quantitative Research, International Equities Group*

IN BRIEF

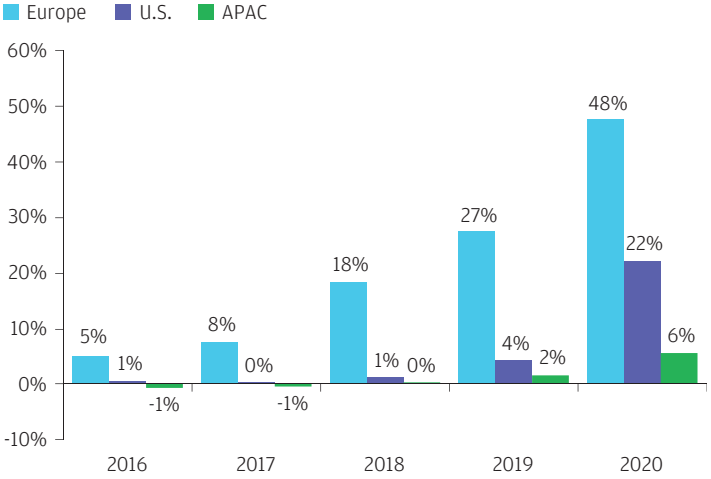
- Interest in sustainable investing is growing globally, driven by investors trying to increase risk-adjusted returns ("doing well") and support sustainable outcomes ("doing good").
- Our analysis finds no meaningful trade-off between doing good and doing well when investing in public markets. Given that environmental, social and governance (ESG) investing does not come at a cost in terms of performance, it can be seen as a "free option" to align portfolios with investors' values, as well as to prepare portfolios for the impacts of potentially tighter environmental or social regulation.
- However, investors should avoid introducing biases into their strategic asset allocation to achieve sustainable outcomes.
  - Rather than tilting toward regions with higher ESG scores, investors should identify sustainable companies in each region.
  - Similarly, investors should not be discouraged from investing in private markets due to a lack of ESG data. Identifying sustainable leaders in private markets can help achieve sustainable outcomes.
- We see value in a two-step approach: choosing an optimal asset class mix based on traditional measures of risk and return, and tilting the portfolio toward ESG leaders or "improvers" within each asset class.

INVESTORS ARE INCREASINGLY TURNING TO ESG INVESTING TO BOTH "DO GOOD" AND "DO WELL"

Interest in sustainable investing is growing globally among a wide range of market participants (**EXHIBIT 1**). Some investors have long been motivated by environmental or societal objectives. Others seek financial opportunities in the companies that stand to benefit from rapid changes in consumer preferences, policy and regulation, spurring further interest in sustainable investing.

Interest in sustainable investing is rapidly rising

EXHIBIT 1: FLOWS INTO SUSTAINABLE STRATEGIES AS PERCENTAGE OF TOTAL INFLOWS BY REGION



Source: Morningstar, J.P. Morgan Asset Management; data as of June 30, 2021.

What are the choices and trade-offs investors face as they integrate environmental, social and governance (ESG) risks and opportunities into multi-asset portfolios?

In general, investors tend to consider ESG factors either to increase risk-adjusted returns ("doing well") or to achieve sustainable outcomes ("doing good"). Our analysis finds no meaningful trade-off between doing good and doing well when investing in public markets. A sector-neutral equity portfolio is not hindered, relative to its benchmark, by a skew toward ESG leaders (defined as companies that perform well on J.P. Morgan Asset Management's ESG scoring framework).

In fixed income, while there is evidence that higher ranked ESG issuers pay lower coupons, investors are likely to be compensated with lower default risk. Total return results will vary depending on which of the many ESG rating systems are being used. Across both equities and fixed income, choosing an ESG rating system that produces reliable ESG "scores" is a critical choice in sustainable investing.

Investors who want their portfolios to have a minimum ESG score might be tempted to avoid certain markets or regions, such as the emerging markets. However, our analysis shows that because of the wide variation of scores in every region, a better portfolio solution is one that optimizes first on region and then within a region on ESG score.

Similarly, investors should not be discouraged from investing in private markets just because ESG data can sometimes be harder to obtain. Indeed, turning away from private markets can be a real loss because these markets are increasingly providing portfolios with solutions for attaining income, diversification and alpha. ESG information can be less transparent in private markets, requiring more research and investigation. But investment in private markets not only can help achieve return objectives, it is also likely to be essential for achieving sustainable outcomes as private markets grow in size and importance.

Investors may again wish to adopt a two-step approach: first, choosing an optimal mix of asset classes based on traditional measures of risk and return, and second, tilting the portfolio toward ESG leaders or "improvers" within each asset class. (That second step is more difficult in private markets.)

EQUITIES: ESG IS NOW WELL ESTABLISHED AND CARRIES NO OBVIOUS COST

Tilting portfolios toward better ESG names in equities does not require sacrificing returns vs. a benchmark. Whether tilting portfolios toward ESG leaders can deliver sustainable alpha is a subject of spirited debate, with extensive research making the case both for and against.

There are two channels through which sustainable business practices can help companies outperform their peers and generate higher returns for investors. The first channel is market forces, where the costs of nonsustainable practices play out and can hurt a company, either because it suffers the effects of regulation (e.g., carbon emissions-related taxation) or because it fails to meet consumer preferences (perhaps inspiring a boycott of businesses with poor labor practices). This market forces effect should be persistent through time.

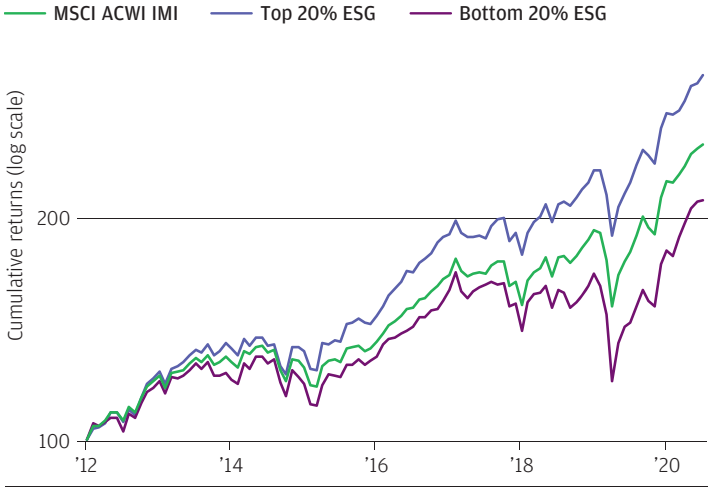
The second channel is via increased demand (and thus higher prices) for these companies' shares relative to their lower scoring peers. This "repricing" effect should be transient as market participants price in ESG considerations more accurately.

EXHIBIT 2 provides an illustration of how ESG screening can affect performance. Based on our J.P. Morgan Asset Management ESG scores, we find that a strategy that is sector neutral and invests in the 20% best ESG companies would have outperformed the benchmark MSCI All-Country World Index (ACWI) by 2.5% per annum, on average, over this period. Conversely, skewing the portfolio toward the bottom 20% ESG companies would have resulted in it underperforming the benchmark by 1.8% per annum. This is over a period when we have seen increased demand for sustainable assets. While we therefore hesitate to use them as evidence that ESG is generally additive to performance, these numbers do give us confidence that ESG investing does not harm performance.[1] The finding that ESG investing does not harm performance is consistent with a large number of other studies.[2]

Put differently, we should not think of modern ESG investing as restricting investors' choice set (e.g., by excluding entire sectors) in a way that is bound to harm performance. Instead, it can be a way of incorporating additional information on potential long-term opportunities (e.g., electric vehicles) into the security selection process. In areas where these opportunities are already starting to be priced in, this can be seen in today's risk-return characteristics.

There is no evidence that investing in ESG leaders harms performance

EXHIBIT 2: TOP ESG SCORING COMPANIES VS. WORST SCORING, PERFORMANCE RELATIVE TO BENCHMARK



Source: J.P. Morgan Asset Management; data as of June 30, 2021.

One common refrain about ESG investing is that ESG is simply "the quality factor in disguise" – and that the performance characteristics of ESG investing reflect an exposure to quality stocks. A company with a strong management team is likely to be more profitable than its industry peers and also to have more robust governance arrangements. As a result, it would score better on traditional quality indicators such as return on equity (ROE) as well as on the "G" of ESG. Similarly, companies with good human capital management practices (like high levels of employee engagement and satisfaction) may have a competitive advantage and higher ROEs,[3] along with being more sustainable than their peers.

[1] In addition to occurring over a period that saw significant inflows into sustainable strategies, the outperformance we find in our back-test is not statistically significant.

[2] Ulrich Atz, Zongyuan Zoe Liu, Christopher Bruno, and Tracy Van Holt, "Does Sustainability Generate Better Financial Performance? Review, Meta-analysis, and Propositions", Working Paper, 2021

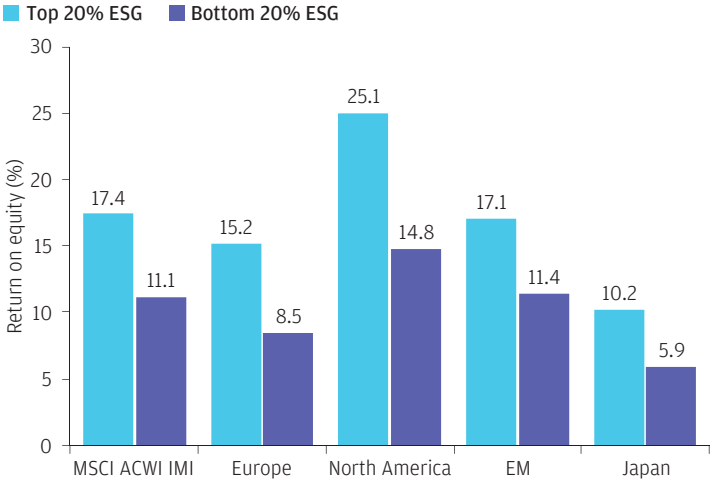
[3] Alex Edmans, "Does the stock market fully value intangibles? Employee satisfaction and equity prices", *Journal of Financial Economics* 101, no. 3: 621-640, 2011, and Woocheol Kim, Judith A. Kolb and Taesung Kim, "The Relationship Between Work Engagement and Performance: A Review of Empirical Literature and a Proposed Research Agenda," *Human Resource Development Review* 12, no. 3: 248-276, 2012.

This overlap between ESG and the quality factor can be seen in the quality characteristics of the ESG portfolios below. The higher scoring ESG portfolio provides both higher profitability and somewhat lower volatility than the lower scoring ESG portfolio (**EXHIBITS 3** and **4**). It means that investors can "do good" while also benefiting from any return potential that is associated with traditional indicators of quality.

ESG analysis that results in a score typically focuses on companies' current ESG profile. Current ESG leaders may outperform due to a repricing effect or if changes in the regulatory and consumer landscapes significantly impact their future earnings. Though it is not possible to test due to a lack of historical data, it is possible that there are alpha opportunities in investing in companies that are moving up the ESG scale, particularly those that other investors have missed. A forward-looking approach to scoring a company is inherently difficult but will most likely capture those businesses that can do good and do well. This underscores the importance of active management even in the presence of third-party ESG scores.

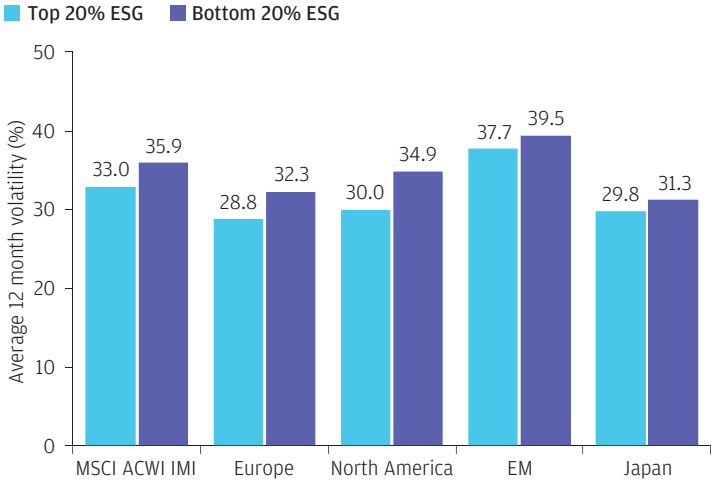
Higher scoring ESG companies are significantly more profitable, and their stocks a little less volatile, than their lower scoring peers

EXHIBIT 3: AVERAGE ROE OF THE BEST AND WORST ESG COMPANIES



Source: J.P. Morgan Asset Management; data as of June 30, 2021.

EXHIBIT 4: AVERAGE 12-MO VOLATILITY OF THE BEST AND WORST ESG COMPANIES



Source: J.P. Morgan Asset Management; data as of June 30, 2021.

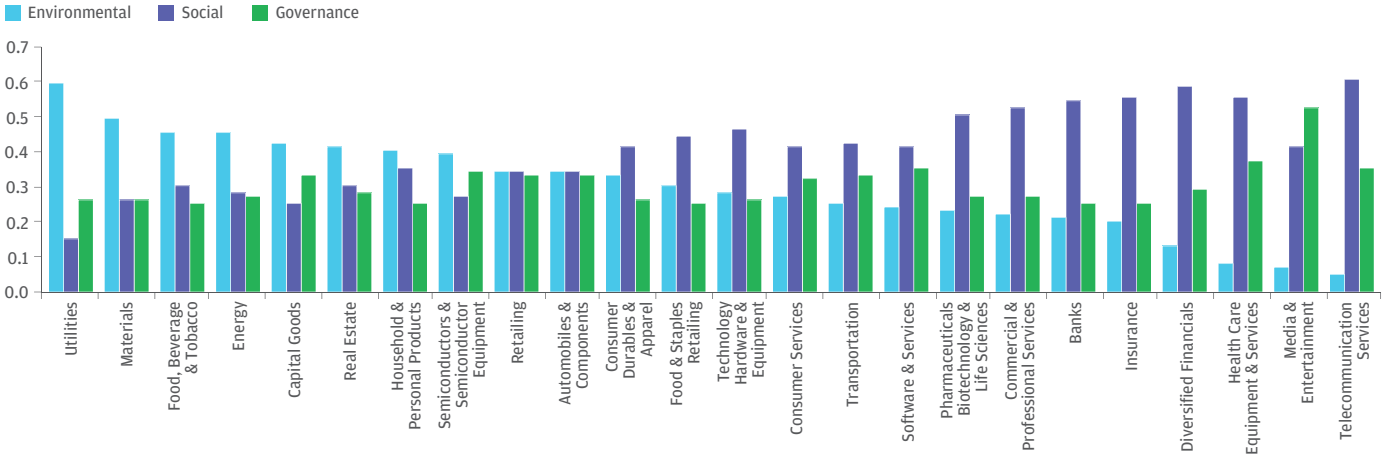
WHAT ARE GOOD ESG PRACTICES?

One of the challenges that investors face is how to identify good ESG companies, given the ambiguous definition of what constitutes "good" ESG practices.[A]

In addition, the sustainability issues that will materially impact a business vary significantly across industries. The scoring system that J.P. Morgan Asset Management uses places a different weight on each of the three pillars (E, S and G) depending on the industry and region (**EXHIBIT B1**).

Our scoring system focuses on the issues that matter most for a given industry

EXHIBIT B1: WEIGHTS PLACED ON E, S AND G BY INDUSTRY BY J.P. MORGAN'S PROPRIETARY ESG SCORE



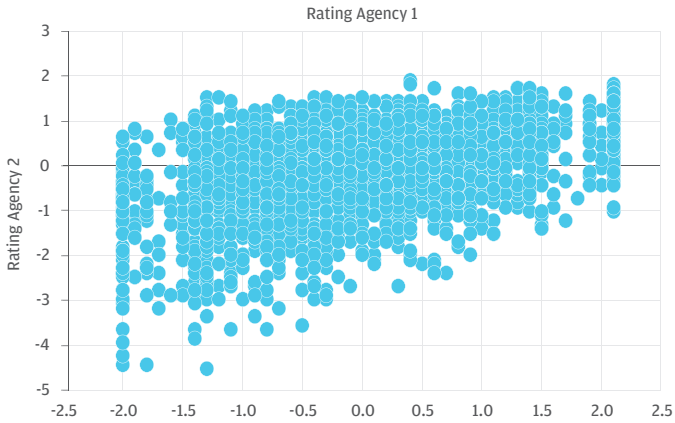
Source: J.P. Morgan Asset Management; data as of June 30, 2021.

As part of our work to continuously expand and refine our sustainable investment framework, we are also developing a new, proprietary tool for making data-driven ESG assessments. This tool makes use of the increasing availability and comparability of granular, firm-specific ESG information, such as greenhouse gas emissions volume, gender diversity or patents on green technologies.

In contrast, existing third-party scores tend to be more heavily driven by exposure assessments (the risks we would expect to see based on a company's industry or geographic footprint) or business controversies (issues companies were criticized for in the past). There is also the risk that established rating methodologies may focus too much on ESG factors that mattered in the past, not those that will likely become important in the future.

EXHIBIT B2 shows the scores available from external providers and notes that there is extensive disagreement among even the largest ESG score providers. For example, a score of -2 from Rating Agency 1 coincides with a range of -4.5 to +1 from Rating Agency 2. More generally, we observe significant dispersion in ESG rating agencies' scores: Correlations tend to be below 50%, compared with over 90% for credit ratings. This lack of consensus can be attributed to each rating provider's discretion in how it uses inputs at each stage of constructing an ESG score, including which issues to consider, which metrics to use to characterize a corporate practice and which peer group to measure each company against.

EXHIBIT B2: RELATIONSHIP BETWEEN MSCI AND SUSTAINALYTICS HEADLINE ESG SCORES



Source: MSCI ESG Research, Sustainalytics, J.P. Morgan Asset Management; data as of June 30, 2021. Normalized ESG scores for a sample of ~2,500 companies in MSCI ACWI.

[A] Interestingly, one study found that greater ESG disclosure actually led to greater ESG rating disagreement. Given the lack of agreement on ESG metrics to assess a firm's ESG performance, greater disclosure led to increased subjectivity and therefore more disagreement among ESG rating providers. (George Serafeim and Aaron Yoon, "Stock Price Reactions to ESG News: The Role of ESG Ratings and Disagreement," Harvard Business School Working Paper 21-079, October 2020.)

FIXED INCOME: ADDITIONAL NUANCE

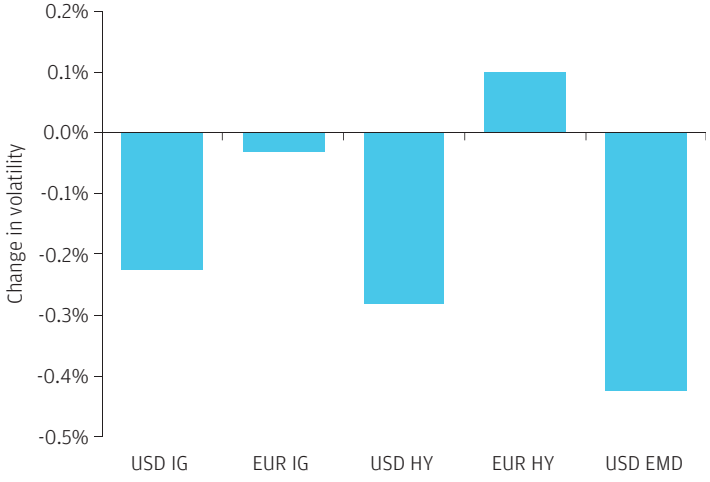
The different position of bond investors in the capital structure means they will always look at ESG through a slightly different lens than equity investors. In particular, they have strong financial incentives to avoid any downside risks that are associated with unsustainable business models.

The rising availability of corporate ESG scores allows for robust ESG assessments of corporate credit. Yet fixed income markets have lagged equities in the application of ESG criteria. This likely reflects a range of factors. Among them: Bondholders do not have any control rights; bonds may be issued by subsidiaries, for which it is more difficult to obtain relevant data; and the shorter maturity of corporate debt means that some long-term considerations are less financially material. Still, recent years have seen a very significant increase in the role of ESG in fixed income.

In one analysis of the trend, a study done by J.P. Morgan Asset Management found that credit portfolios tilted toward top-scoring ESG companies had marginally better excess returns when compared with a non-ESG benchmark.[4] More importantly, these tilted portfolios experienced lower drawdowns, which can improve overall portfolio volatility (**EXHIBIT 5**). Moreover, credit ratings often fail to capture the information contained in ESG scores, highlighting the benefits that ESG scores can provide in security selection.

A tilt toward higher ESG scores can improve overall portfolio volatility

EXHIBIT 5: VOLATILITY OF ESG CORPORATE BOND PORTFOLIOS RELATIVE TO RELEVANT BENCHMARK



Source: ICE BofAML, MSCI ESG Research, J.P. Morgan Asset Management. IG: investment grade; HY: high yield; EMD: emerging market debt. IG data are 2007–19 averages; HY and EMD cover 2013–19. The 2019 figures are first quarter, annualized.

Sovereign bonds

Market participants are increasingly interested in assessing the sustainability characteristics of sovereigns. While there is abundant country-level ESG data, the challenge is what to do with this information. Countries with higher per capita incomes tend to have stronger institutional and regulatory structures and thus tend to score better on ESG metrics than developing nations.

A shift away from low income countries would reduce financial risk and may help investors "do well." But to "do good," investors may instead want to engage with those countries that have credible plans to improve and would benefit from financing environmental or social initiatives.[5]

Green bonds

Sustainable and "green" bonds make up another market segment that has attracted rising interest. These securities' ESG credentials arise not from the bond issuer but from the use of the proceeds (typically for sustainable projects). Yet it is often difficult to assess the credibility of the use of the proceeds. These securities may be most appealing to investors who want to "do good" and see their money support sustainable outcomes.

Such bonds increasingly trade at a systematic premium ("greenium") and thus a lower yield even when issued by the same entity. This most likely testifies to the strength of demand relative to supply. While yields will be relatively lower, total return could be bolstered by further repricing effects as demand for ESG instruments continues to grow. In addition, investors need to consider the potentially lower default risk of green bonds compared with bonds by other issuers.

[4] Bhupinder Bahra and Lovjit Thukral, "ESG in Global Corporate Bonds: The Analysis Behind the Hype," *Journal of Portfolio Management* 46, no. 8: 133–147, 2020.

[5] "A New Dawn: Rethinking Sovereign ESG," World Bank; J.P. Morgan, 2021.

PORTFOLIO CHOICES

Our analysis suggests that an investor choosing to invest in a region's equity or bond market will not face a total return or volatility penalty by incorporating ESG factors. However, when we think about constructing a portfolio there are two further considerations. The first is whether to allocate toward regions or indices within the public markets that have, on average, better scores. The second is how to incorporate private markets, for which ESG information tends to be less readily available.

Regional allocation

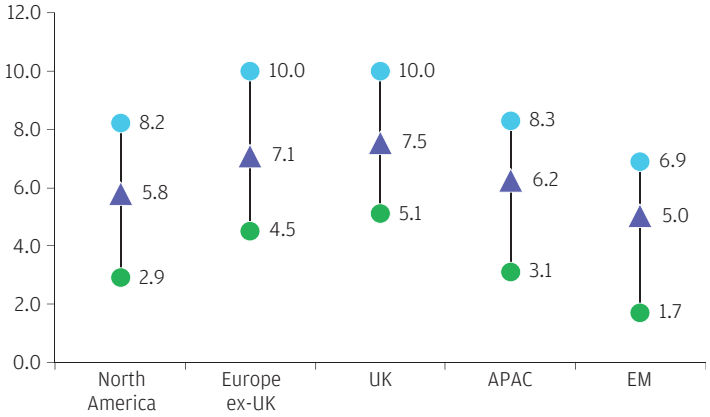
Investors looking to increase the ESG score of their portfolio might be tempted to avoid regions that have lower scores.

EXHIBIT 6 shows that – as one might expect – the aggregate scores are highest in Europe (7.1) and the UK (7.5) and lowest in emerging markets (5.0). ESG-conscious investors might be tempted to simply avoid emerging markets.

Scores vary within regions more than they do among regions

EXHIBIT 6: BENCHMARK ESG SCORES AND THEIR DISTRIBUTION BY REGION

Dots show the 10th and 90th percentile of the score distribution within each region. Triangles show the weighted-average score.



Source: MSCI, J.P. Morgan Asset Management; data as of June 30, 2021.

However, the exhibit also demonstrates that the distribution of scores within any region is much greater than the differences among regions. This means the security selection within a region is a much more powerful lever to improve a portfolio's ESG scores.

For example, removing emerging market equities from a global equity portfolio and reallocating to Europe and the UK, a shift of 11% of the equity portfolio, would increase the overall ESG score from 6.0 to just 6.1. By contrast, even a modest tilt to ESG leaders within each equity region would deliver a bigger boost to the overall equity score while maintaining the benefits of regional diversification.

Private markets

Investors might also be tempted to concentrate on markets where ESG scores are relatively easy to come by, which would focus a portfolio in listed markets (**EXHIBIT 7**).

ESG information is less available in private markets

EXHIBIT 7: SIZE OF DIFFERENT ASSET CLASSES VS. AVAILABILITY OF ESG SCORES

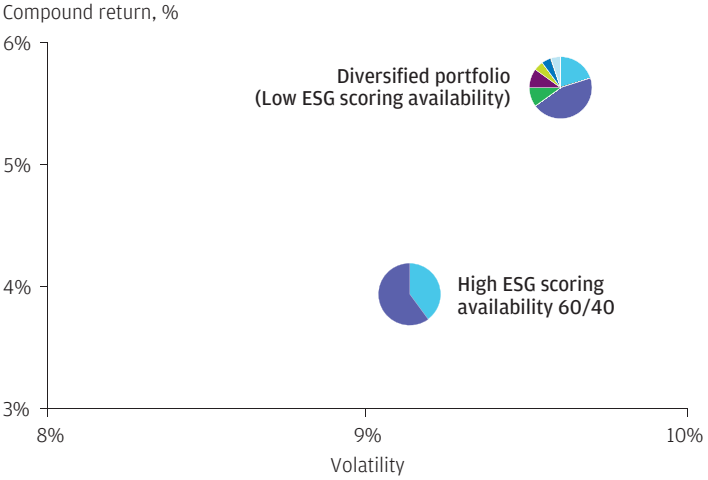
ASSET CLASS		SIZE, TRILLIONS, USD	ESG SCORE AVAILABILITY
GOVERNMENT BONDS	U.S.	21.8	Medium
	Europe	11.0	Medium
	Japan	10.8	Medium
	UK	2.7	Medium
	China	4.1	Medium
	RoW	9.2	Medium
PUBLIC CREDIT	Global investment grade	12.8	High
	Global high yield	3.3	High
PUBLIC EQUITY	U.S.	39.0	High
	Eurozone	5.6	High
	China	3.2	High
	Japan	3.9	High
	UK	2.4	High
	RoW	24.0	High
ALTERNATIVES	Private equity	4.7	Low
	Private debt	0.8	Low
	Real estate	10.3	Medium
	Hedge funds	3.8	Low
	Other real assets	1.0	Medium

Source: Bloomberg, HFR, Preqin, J.P. Morgan Asset Management Guide To Alternatives, J.P. Morgan Asset Management; estimates as of June 30, 2021. Public equity market cap data is taken from MSCI, and the data correspond to each region's headline index. This excludes companies not covered by MSCI, small cap companies, and a portion of the Chinese A-share market.

Yet private assets play an increasingly important role in generating income, diversification and alpha. The total asset universe is significantly reduced if investors focus solely on securities covered by major ESG rating agencies. **EXHIBIT 8** shows that a stylized portfolio that includes only widely scored assets would generate significantly lower returns (at only slightly lower risk) than a fully diversified portfolio.

Diversified portfolios that include "hard to score" assets deliver higher returns

EXHIBIT 8: FOCUSING ONLY ON "EASY TO SCORE" ASSETS REDUCES PORTFOLIO RETURNS



Source: J.P. Morgan Asset Management; data as of September 30, 2021.

Diversified portfolio
- U.S. aggregate bonds 20%
- U.S. large cap 45%
- Private equity 10%
- U.S. core real estate 10%
- U.S. value-added real estate 5%
- Global core infrastructure 5%
- Direct lending 5%

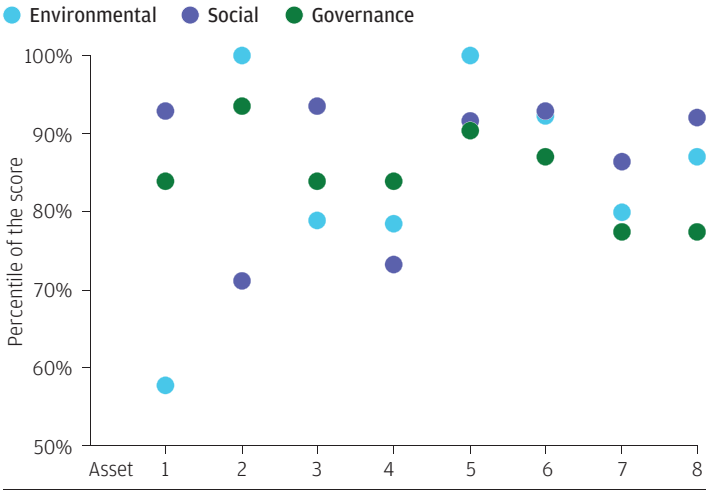
Equities and bonds only
- U.S. aggregate bonds 40%
- U.S. large cap 60%.

Private market assets are among the more difficult to score. But this does not mean that all private assets are the same in terms of their ESG profile. As **EXHIBIT 9** demonstrates, drawing on more specific, custom-made ESG assessments of a sample of infrastructure assets, private markets include assets with both weak and strong ESG credentials. Instead of excluding private market assets altogether – and thus paying some financial cost – ESG-conscious investors should make a sector and security selection within an asset class, whether it is in the public or private markets. This will also help drive sustainable outcomes, given the potential to actively engage with management teams in private markets (see **EXHIBIT 10** for some examples).

In sum, we recommend that investors select asset classes based on a desired risk-return outcome and then optimize for ESG characteristics within each asset class. Of course, within private markets this second step often requires considerable independent research.

Private markets include assets with both weak and strong ESG credentials

EXHIBIT 9: DISPERSION IN ESG RATINGS OF A REPRESENTATIVE SAMPLE OF INFRASTRUCTURE ASSETS



Source: GRESB, J.P. Morgan Asset Management; data as of June 30, 2021.

CONCLUSION

Incorporating ESG considerations does not come at a financial cost unless investors reduce their opportunity set to assets whose ESG characteristics are easy to score and for which scores are readily available. As we've discussed, investors will want to consider different approaches for different asset classes (for example, by focusing on material ESG risk when assessing bonds, while considering both risks and opportunities in the context of equities), while taking into account the important role played by rating agencies and scoring systems.

We see value in a two-step approach: choosing an optimal asset class mix based on traditional measures of risk and return, and tilting the portfolio toward ESG leaders or "improvers" within each asset class. We do acknowledge that finding those leaders can be challenging in private markets, but there are solutions. In many cases, this involves engaging with management and building a deep, fundamental understanding of risks and opportunities in key areas of E, S and G. Across public and private markets, investors need find no inherent tension between doing good and doing well.

Finally, given that ESG investing does not come at a cost in terms of performance, it can be seen as a "free option" to align portfolios with investors' values, as well as to prepare portfolios for the impacts of potentially tighter environmental or social regulation.

Different asset classes require different approaches to measuring ESG considerations

EXHIBIT 10: ILLUSTRATION OF METRICS TO MEASURE ESG IN PRIVATE MARKETS

	RELEVANCE OF ESG CONSIDERATIONS	POTENTIAL METRICS		
		Environmental	Social	Governance
PRIVATE EQUITY	As agents of change, sponsors are uniquely positioned to reform companies in ways that improve their ESG credentials. At the other end of the spectrum, we may see them pick up those assets that public markets are unwilling to fund – so-called brown-spinning.	Report on ESG outcomes of investee companies. Investee companies would be expected to report on metrics that are appropriate for their sector.		
PRIVATE CREDIT	As more investors seek to align their portfolios with sustainable outcomes, we are likely to see more managers begin to measure and report the ESG characteristics of companies they lend to.			
HEDGE FUNDS	Equity-oriented strategies with low turnover, and activism in particular, are well positioned to apply ESG principles. Short-term trend followers, however, may find it harder to formulate credible ESG strategies.			
INFRASTRUCTURE	Infrastructure has long been a focus of investors seeking to improve risk-adjusted returns by being mindful of environmental or social risks. In addition, infrastructure is attractive for those wishing to de-carbonize portfolios, given its ability to advance climate goals. The wall of capital that has recently entered the space is bidding up assets and may be a headwind for future returns.	• Carbon footprint • Physical climate risk assessments • International standards/bodies (e.g., GRESB)	• Human rights and community relations • Affordability • Health and safety	• Anti-corruption programs • Critical incident management
REAL ESTATE	Continually monitoring and improving the performance of properties in terms of energy use, social impact, water use and the amount of garbage waste can significantly improve the ESG credentials of real estate investments.	• Carbon footprint • Physical climate risk assessments • International standards/bodies (e.g., GRESB)	• Occupier satisfaction surveys and other measures of product quality • Labor practices	• Anti-corruption programs • Compliance-linked employee compensation
TRANSPORT	The transport industry is responsible for a significant share of air emissions. As customers start putting more weight on sustainable transportation, profitability and growth prospects may become inextricably linked to sustainable operations.	• Carbon footprint • Other emissions (e.g., NOx, SOx) • International standards/bodies (e.g., Poseidon Principles)	• Labor practices • Health and safety record	• Competitive behavior

Chinese assets: The biggest risk for investors would be to ignore them

Gabriela Santos, *Global Market Strategist, Global Market Insights Strategy*
Sylvia Sheng, Ph.D., *Global Strategist, Multi-Asset Solutions*
Vincent Juvyns, *Global Market Strategist, Global Market Insights Strategy*
Julia Wang, *Global Market Strategist, J.P. Morgan Private Bank*
Jennifer Wu, *Global Head of Sustainable Investing*

IN BRIEF

- Despite short-term uncertainty, the strategic investment case for Chinese public and private markets remains strong; we believe the rewards outweigh the risks over the long term. Diversification opportunities, currency appreciation and potential alpha opportunities may offset Chinese assets' relatively higher volatility for U.S.-dollar based investors.
- Long-term, we forecast:
  - onshore Chinese equity and government bonds returning a substantial premium over developed markets
  - further capital market reforms and opening
  - rising market participation by households as well as domestic and foreign institutions
  - a tilt by Chinese public and private equity toward new economy/growth sectors where the government wants to channel capital
- We believe investors do not have enough exposure to Chinese onshore assets; our hypothetical analysis finds that reallocating some holdings to Chinese onshore equities and government bonds would likely improve a multi-asset portfolio's risk-adjusted returns.
- Among the key factors that could affect our long-term assumptions for Chinese assets: the pace of structural reforms; policies seeking to rebalance efficiency and equality in the economy; liquidity; and the external environment.
- Sustainable funds, green bonds and social impact bonds are fast-growing areas. New rules on corporate environmental disclosure might help investors decide which companies may be challenged by China's climate goals. Social factors pose particular challenges for certain sectors in China.

THE RISE OF CHINESE ASSETS IN GLOBAL PORTFOLIOS

The next decade should see significant structural change in the Chinese economy and continuing capital market reforms, with profound implications for Chinese assets and their role in global portfolios. Despite the recent volatility in Chinese equities amid changing regulations, we still believe it is an opportune time to talk about allocating to Chinese assets. Our 2022 forecasts suggest onshore Chinese equities and government bonds will continue to offer long-term investors a substantial return premium over developed markets, with low correlations.

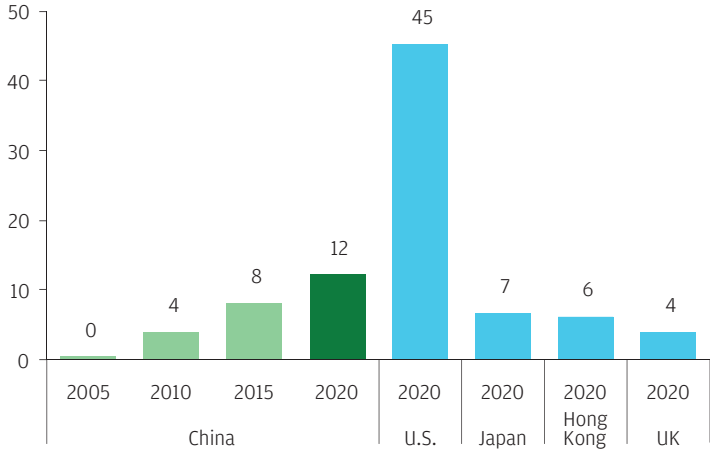
Despite Chinese assets' higher volatility, the diversification opportunities, currency appreciation and alpha opportunities will likely attract more investors – and prompt more individuals and institutions to consider investing in China as a stand-alone allocation.

Over the past 15 years, China's onshore stock and bond markets have become the second largest in the world, helped by international investment flows spurred by China's inclusion in benchmark global stock and bond indices (**EXHIBIT 1**).

China's markets have risen to become some of the largest in the world

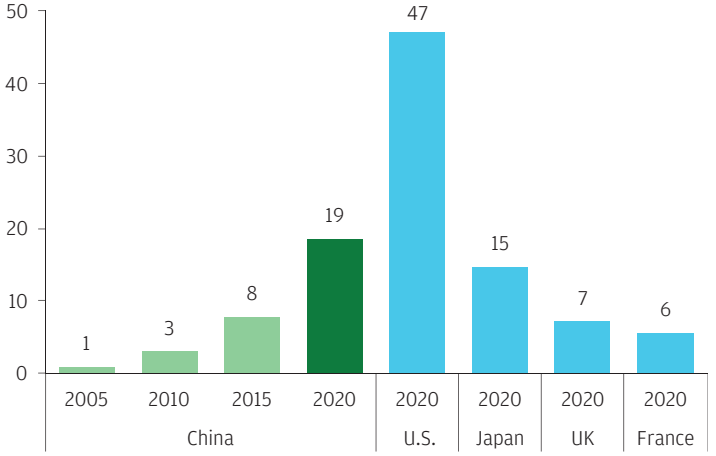
EXHIBIT 1: CHINA'S PUBLIC AND PRIVATE MARKET SIZE (USD TN) VS. OTHER TOP MARKETS

China's onshore equity market size vs. top equity markets (USD tn)



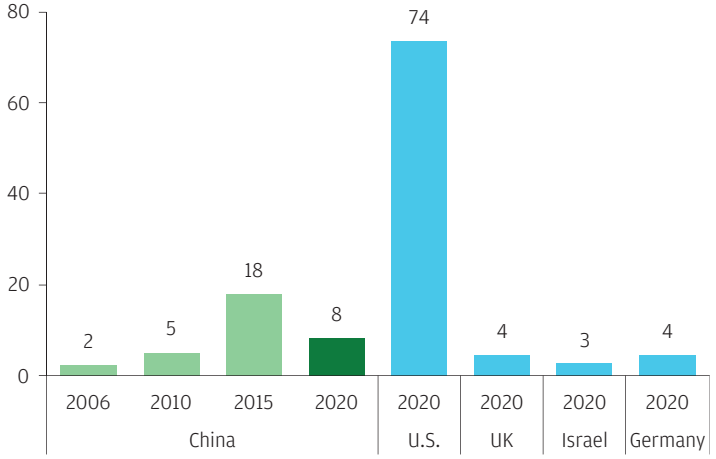
Source: World Federation of Exchanges; data as of December 2020. China: Shanghai and Shenzhen stock exchanges. U.S.: NYSE Euronext and Nasdaq.

China's onshore bond market size vs. top bond markets (USD tn)



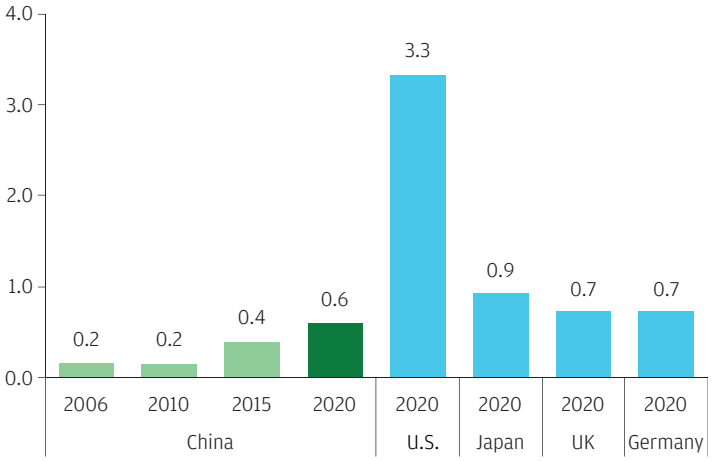
Source: World Federation of Exchanges; data as of December 2020.

China's venture capital fundraising vs. top venture capital markets (USD bn)



Source: KPMG; data as of December 31, 2020.

China's institutionally investible real estate market vs. top real estate markets (USD tn)



Source: MSCI; data as of December 31, 2020.

China is also the world's second-largest market for venture capital (VC) investment, measured by the latest available fundraising, exit values and deal values.[1] China's institutionally investible real estate market is No. 5 in the world,[2] and its new public REITs market, launched in 2021, has the potential to become the world's largest.

Too big to ignore – yet largely overlooked

The average international institutional investor's total China exposure is 4.6% of its total assets.[3] A large part of this is likely to be in offshore Chinese equities, because institutions invest in China mostly through an emerging market (EM) equity strategy, such as allocating to the MSCI EM index. While China accounts for around 34% of the MSCI EM index, the weight of onshore Chinese equities (China A shares) is only about 5%. Given such large onshore equity and bond markets, and ongoing capital market reforms and opening, Chinese assets' weight in global portfolios will likely rise over time.

While we focus here on the market's size and the potential benefits of adding Chinese assets to global portfolios, investing in China has its challenges. Among the key factors that could affect our long-term assumptions for Chinese assets: the pace of structural reforms, policies seeking to rebalance efficiency and equality in the economy, liquidity and the external environment.

Yet investors should not ignore the country's long-term macroeconomic and market trends. Here we consider:

- Three key trends to watch in Chinese capital markets
- How these structural trends are likely to affect Chinese market return, volatility and correlation assumptions
- A hypothetical case study of allocating to Chinese equities and fixed income in a global portfolio
- Three key trends in the ESG space

CHINA'S MARKETS: THREE KEY TRENDS TO WATCH

Over the next 10 to 15 years, we expect China's market reforms, expanding middle class and transition toward a more consumption- and innovation-driven economy to power three major structural trends in its asset markets:

1. Better access for foreign investors
2. A changing investor mix
3. A changing sector mix

1. Better access for foreign investors: Freer participation, RMB internationalization

China's economic weight is 17% of global GDP. Yet China makes up just 4% of the MSCI All Country World Index and just 8% of the Bloomberg Global Aggregate Bond Index. We expect this to shift as China continues easing overseas investors' access to domestic markets[4] and as local investor participation rises.

The shift we expect should extend beyond publicly traded securities to China's private markets. Real estate investors are seeing greater opportunities since, in an important change, companies in certain sectors were granted permission to create offshore entities through which they can pay dividends to foreign investors. In private equity (PE), the Qualified Foreign Limited Partner program permits overseas investors to take equity stakes in Chinese private companies through onshore renminbi (RMB) funds and offshore U.S. dollar funds. (Access to some sectors, including artificial intelligence and semiconductors, is restricted.) China's Foreign Investment Law, as of 2020, also provides more transparency for international investors in domestic private markets.

What could lie ahead? We expect more reforms from Chinese policymakers to pave the way to a larger share of international ownership of onshore Chinese assets. China's 14th Five-Year Plan (FYP), for 2021–25, reiterates the government's commitment to further opening capital markets. The FYP also pledges to push forward RMB internationalization by giving the currency more flexibility and, ultimately, facilitating its free use.

However, policymakers will also be considering potential risks to financial stability. These processes will likely unfold gradually.

[1] "Venture Pulse Q4 2020," KPMG, January 2021. (Greater China [China, Hong Kong, Taiwan, Macao] PE/VC assets under management may be over USD 1 trillion; VC is 46% of Greater China AUM. "Markets in focus: Alternative assets in Asia-Pacific," Preqin, June 2021. Greater China includes primarily mainland-oriented investments.)

[2] MSCI's estimates of China's institutionally investible real estate market, at USD 600 billion, exclude non-institutionally owned assets; if applied worldwide, that methodology would reduce the stock by USD 10 trillion globally, we believe, and meaningfully in China (where transparency is low and private ownership high). Our wider definition puts China's institutional-quality real estate market at about USD 3 trillion, the world's second largest.

[3] "Crafting the Optimal China Allocation Strategy: The Asset Owner's Perspective," Greenwich Associates, April 7, 2020. A full 68% of investors in the study say EM equity strategies are their primary source of China exposure; 21% access Chinese fixed income through EM bond strategies.

[4] Over the past decade, China has allowed greater access for foreign investors to the domestic market through the expansion of programs including Stock Connect and Bond Connect.

2. A changing investor mix: Greater institutional participation

In the next 10 to 15 years, we expect institutional investors in the onshore equity market to rise in importance. In the Chinese government bond (CGB) market, we see the predominance of hold-to-maturity investors diminishing. A key driver should be China's rapidly expanding middle class putting more of its savings into financial products.

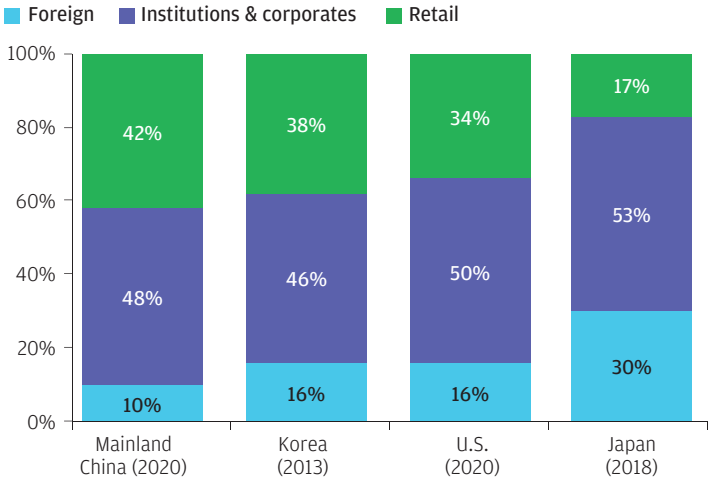
At present, over 60% of China's urban household wealth is concentrated in real estate. Of the remaining 40% of wealth, about 60% is in cash and bank deposits. We expect over time a shift toward stock and bond investing as property market speculation faces more stringent regulation and improvements in the social welfare system reduce precautionary saving in cash. Together, these forces should drive more households to allocate to capital markets through investment in mutual funds and insurance, supporting the development of a more institutionalized investment culture.

EQUITIES Local retail investors once dominated the A-shares[5] domestic stock market, but their footprint has gradually diminished: Retail investor holdings fell to 42% of all equity holdings in 2020, from 60% in 2010, a decline that could continue in the years ahead, though at present retail remains a higher fraction in China than in other major emerging and developed equity markets (**EXHIBIT 2A**). Retail investors still dominate trading volume, accounting for 70% in 2020. In their place in the future, we anticipate more institutional investors, attracted by equity market legislation, such as 2020's new Securities Law, which strengthened investor protections.[6]

FIXED INCOME About 66% of all onshore bonds are held, mostly to maturity, by domestic commercial banks, a significantly higher proportion than in other markets, likely weighing on bond market liquidity (**EXHIBIT 2B**). As domestic asset managers and international investors grow as a fraction of CGB holders, trading activity should rise. That has already begun.

Local retail investors no longer dominate the onshore A-shares stock market; today, institutions have become the biggest holders and own more than in other Asian economies

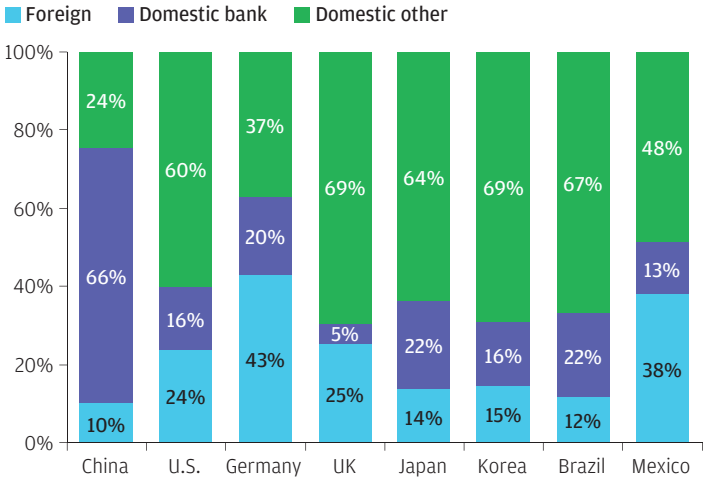
EXHIBIT 2A: SELECTED ECONOMIES' STOCK MARKET INVESTOR STRUCTURE BY HOLDING VALUE



Source: People's Bank of China, Federal Reserve, TWSE, KRX, JPX, Goldman Sachs Global Investment Research, Gao Hua Securities Research; data as of December 31, 2020. Mainland China data reflects free-float market cap, while other markets are based on total market cap. Data based on latest available disclosures.

In a unique pattern, China's domestic banks hold most government bonds, mostly to maturity, hurting liquidity – but this is changing

EXHIBIT 2B: SELECTED ECONOMIES' GOVERNMENT BOND MARKET INVESTOR STRUCTURE BY HOLDING VALUE



Source: WIND, IMF; data as of December 31, 2020. China shows CGB holdings by investor type. Government debt holdings data from the IMF are used as a proxy. Government debt indicates general government gross debt on a consolidated basis, which excludes intergovernmental holdings. Domestic banks are depository corporations residing in the country. Foreign banks are Bank for International Settlements reporting banks residing outside the country. Foreign official includes foreign central bank holdings as foreign exchange reserves, Securities Market Programme holdings of foreign central banks and foreign official loans. Foreign nonbanks and domestic nonbanks are imputed from external and total debt.

[5] A shares are domestic Chinese company stocks listed onshore in Shenzhen or Shanghai. (H shares are listed offshore on the Hong Kong Stock Exchange.)

[6] The law regulated securities markets more tightly in other ways and enforced delistings more strictly.

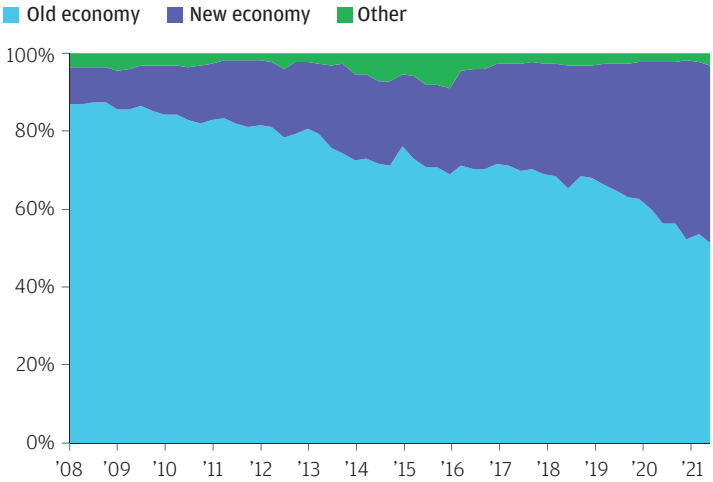
PRIVATE MARKETS Tighter regulation of private investment funds and an emerging REITs market should encourage more institutional participation in private equity and real estate.

3. Chinese markets' changing sector mix: More exposure to growth industries

With China's transition toward a more consumption- and innovation-driven economy from past reliance on investment and exports, its public and private equity markets' sector composition has shifted, too – toward new economy sectors where the government wishes to channel capital. These include consumer goods, technology, health care and high end manufacturing (**EXHIBIT 3**).[7] We expect these shifts to continue, offering potentially more exposure to growth sectors for investors in China compared with emerging markets overall.

The composition of China's benchmark onshore equity index, the CSI 300, has tilted toward growth sectors

EXHIBIT 3: EVOLUTION OF CSI 300: NEW ECONOMY VS. OLD ECONOMY SECTOR WEIGHTINGS



Source: Refinitiv, J.P. Morgan Asset Management; data as of September 30, 2021. New economy sectors include technology, telecom services, consumer goods and health care; old economy sectors include financials, materials, industrials and energy. The CSI300 index is a free-float weighted index that consists of 300 A-share stocks listed on the Shanghai Stock Exchange or the Shenzhen Stock Exchange.

We highlight a few additional recent market developments relevant to potential sector shifts:

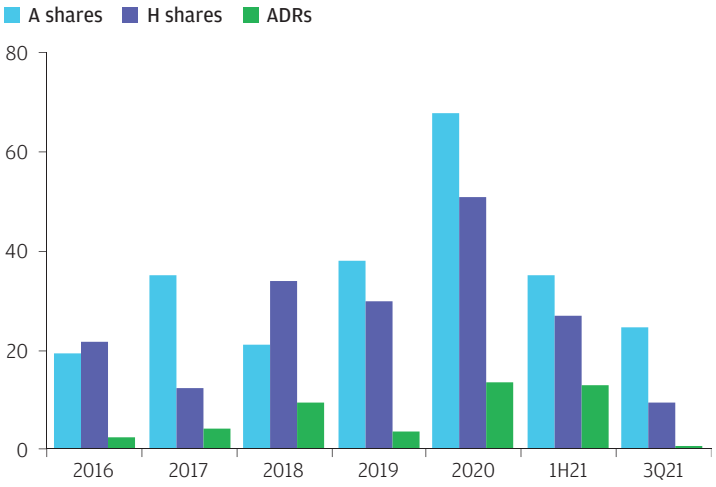
EQUITIES

Reform of the initial public offering (IPO) system should ease the way for more IPOs. China now has a registration-based IPO system, but it is currently limited to the STAR Market and ChiNext board.[8] These rules will likely expand in the coming quarters to all IPOs across the A-share market. China A-share IPO volume growth has accelerated since 2019, while offshore Chinese IPOs (both H shares and American depositary receipts [ADRs]) have slowed since July 2021 (**EXHIBIT 4**).

Reforms of the IPO system will also be likely to support private market investors. We expect IPO system reform to ease listings by venture capital-backed firms, which now make up almost half the PE market, as regulators now permit as-yet unprofitable companies to sell shares in IPOs in onshore markets.

Expect ongoing IPO reform to prompt more onshore IPOs compared with ADR listings

EXHIBIT 4: ANNUAL VOLUME, CHINESE IPOS (USD BN)



Source: Bloomberg; data as of September 30, 2021. Unlike domestically listed A shares, H shares are listed offshore on the Hong Kong Stock Exchange. ADR: American depositary receipt, USD-denominated overseas company share listed on U.S. exchanges.

[7] In 2020, for example, Chinese policymakers announced a "dual circulation strategy" balancing the development of internal commerce and external trade ("circulation") to boost domestic consumption and improve self-reliance in core technologies.

[8] The Shanghai Stock Exchange launched the Science and Technology Innovation Board (the STAR Market) in June 2019 with rules meant to speed listings. The Nasdaq-style ChiNext market (of the Shenzhen Stock Exchange) was created to foster innovative, emerging industries. It is tracked by the 100-stock ChiNext Index.

Overseas regulatory change and rising domestic concerns about data security could prompt more domestic IPOs, especially for data-rich Chinese technology companies. Chinese firms may prefer to list domestically, as U.S.-listed Chinese firms have faced a higher risk of being delisted since the passage of a new U.S. law in 2020.[9]

CORPORATE BONDS

This market is undergoing structural shifts, too. The current dominance by local governments and property developers will likely fade as private businesses become bigger issuers. Other shifts are likely to be:

- More efficient pricing of default risks in the market as the perceived implicit guarantee on the debt of state-owned enterprises (SOEs) diminishes
- Fiscal consolidation, leading to more clearly defined liabilities on local government bond issuers
- Better risk-pricing practices by domestic credit rating agencies, spurred by the entry of foreign rating agencies

REAL ESTATE

Within income-producing real estate, we believe some types of commercial real estate may offer higher income potential as China's economic transition continues. These include data centers, logistics, medical labs and office properties in service industries such as tech, biomedicine and high end manufacturing. The nascent public REITs market should in time expand to potentially high growth sectors such as logistics, office and retail, and will likely permit private sponsors.

HOW DO THESE STRUCTURAL CHANGES IMPACT OUR CHINESE MARKET RETURN ASSUMPTIONS?

What will these structural themes mean for Chinese markets? Their net impact on returns isn't necessarily apparent. Given the wide dispersion of returns among managers in Chinese markets, we expect active investing/alpha to be a potentially larger contributor to investors' total returns over the long term. Here are the considerations by asset class that help explain why.

Fixed income

Over the last decade, China's trend growth has slowed, leaving less room for catch-up growth as the population has become wealthier. Core bond yields, however, have not declined in tandem. The five-year average 10-year CGB yield, 3.3%, has barely budged in the last 20 years. (The 10-year average yield is 3.4%; the 20-year average is 3.5%.)

Why is that, and where do we see yields going from here? In our view, structural factors are pulling yields in opposite directions: Slower structural growth and higher indebtedness – economy-wide debt has doubled since the 2008 global financial crisis, to 290% of GDP at the end of 2020 – should put downward pressures on yields.[10] On the other hand, reduced financial repression and the authorities' ongoing efforts to de-lever should support yields.

LONGER-DATED RATES: After factoring in our long-term macro assumptions for trend GDP growth and inflation, and the prospect of modestly less financial repression,[11] we forecast cycle-neutral average 10-year CGB yields at 3.7% – a modest amount of normalization. Our assumption implies that CGBs will continue to have a unique risk and return profile among global bonds (**EXHIBIT 5**). The spread between 10-year CGBs and 10-year U.S. Treasuries in 3Q 2021 was 160 basis points (bps), an attractive yield pickup, higher than it has been, on average (116bps), during the last decade. Cycle-neutral, and given our 10-year U.S. Treasury yield assumption of 3%, we forecast a CGB yield spread of 70bps over Treasuries.

SHORT-DATED RATES: China's development of a reference short-dated policy rate is still a work in progress, leaving investors to monitor several rates, including China's medium-term lending facility (MLF), the main rate at which the central bank lends to big commercial banks. Our estimated cycle-neutral average three-month interest rate, at 2.7%, is slightly lower than the MLF rate, 2.75%. China's short-dated rates contrast favorably with those in most developed markets, which are not only very low but probably still a few years away from normalization.

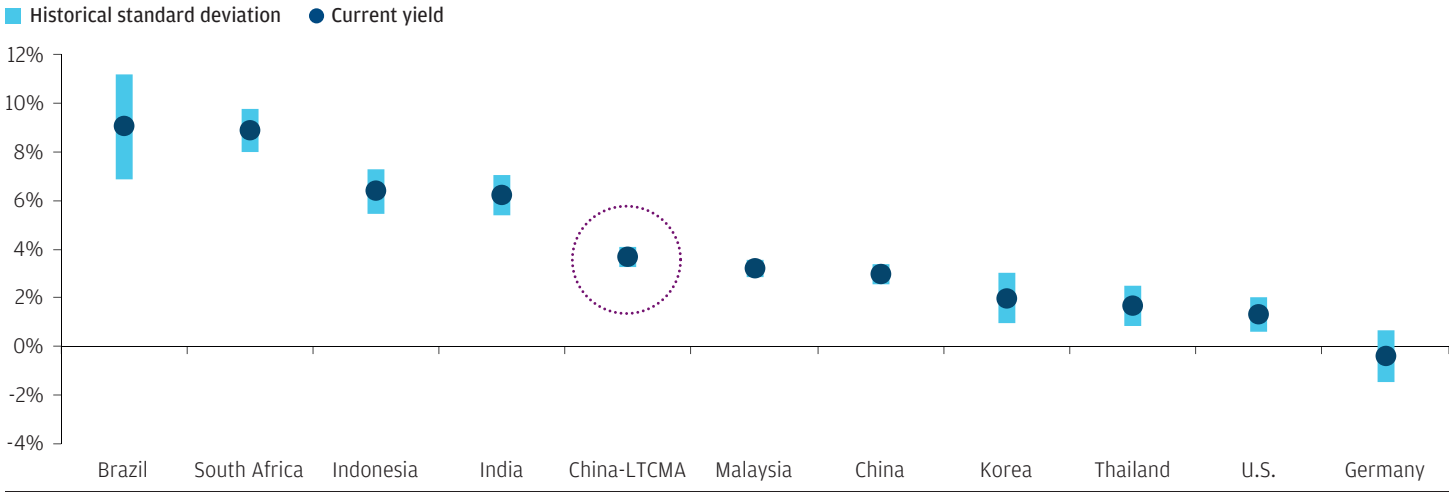
[9] The *Holding Foreign Companies Accountable Act* (2020) requires foreign companies that list on U.S. stock exchanges to be audited for three consecutive years by the Public Company. Accounting Oversight Board on behalf of the Securities and Exchange Commission.

[10] "Debt Securities Statistics," Bank for International Settlements, June 2021.

[11] We expect less financial repression as the People's Bank of China moves away from a credit growth-based policy framework, giving greater influence to interest rates.

CGBs have a unique risk-reward profile

EXHIBIT 5: YIELD AND VOLATILITY CHARACTERISTICS OF GLOBAL BONDS



Source: WIND, Bloomberg; data as of September 30, 2021.

CORPORATE BONDS: Reforms in this market, such as the government providing fewer implicit guarantees to state-owned enterprises, should translate over time into more efficient pricing of risk. That should lead to higher default rates, tipping the mix of bonds near the end of our forecast horizon toward higher quality companies and spread compression. The next few years should be particularly volatile as reforms are rolled out.

Equities

Our 2022 long-term assumptions for China A-share returns rise to 6.6% in local currency terms and 8.2% in USD terms, up from 6.3% and 7.5%, respectively, last year. These are considerably higher than our developed market equity return assumptions. The many structural changes discussed here, however, should net out to a minimal impact on A-share index returns due to the following considerations in our forecasting:

We forecast a higher A-share target equilibrium P/E level vs. the post-global financial crisis average, primarily because of our expectations for significant international and domestic investor flows.

The shift in China's equity index composition toward new economy sectors leads us to raise the target margin.[12] Yet we see some offsetting effects. The Chinese government's recent regulatory actions have clearly demonstrated a strong resolve to focus on social and environmental issues. But the impact on China A shares may be milder than the impact on the broader MSCI China Index, which seems to have a larger concentration of stocks in sectors thought most likely to experience actions.

The flip side of China's financial market deepening is a larger net dilution effect as more companies turn to equity markets as a source of direct financing (EXHIBIT 4).

Private equity/venture capital

This private market has outperformed public markets in China over the past 15 years, with pooled time-weighted returns of 19% topping the MSCI China Index by 889bps. Manager selection has been crucial: Median net internal rate of return (IRR) was 16%, but top-quartile funds delivered 29% while bottom-quartile funds returned only 8% in the same period. In a global context, China's past median PE/VC IRR has been fairly in line with other regions.[13]

[12] For more on how changing sector mix has influenced multiple and margin assumptions in other markets: "Equity Assumptions: Better through-cycle returns, challenging starting point," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021.

[13] IRR and time-weighted returns: Burgiss, September 30, 2021; includes PE and VC across Greater China. Over 15 years, median IRR was 13.1% for the U.S. and 11.2% for Europe.

However, it is tough to forecast a sustainably higher median IRR vs. global peers, given that policymakers are seeking to rebalance efficiency and equality in the economy, and because China's PE/VC-backed companies compete with state-backed entities. China-focused PE/VC should nonetheless continue to be appealing to foreign investors to deploy accumulated dry powder. We expect China's private markets to continue beating public ones, for venture capital to remain the dominant strategy and for the pool of managers to improve in quality.

Throughout, manager selection should remain a key variable: As China's economic growth rate likely continues a structural decline, investors will need to apply management know-how to the capital deployed and focus on those new economy sectors that enjoy policy support.

Real estate

China real estate returns data is spotty and varies significantly by sector and location. We think the days of double-digit returns in residential and commercial real estate are over, with returns already on a downward trend over the past five years compared with the previous five. Looking forward, as certain areas of commercial real estate aligned with FYP priorities receive more support, they should deliver better returns relative to other sectors, through both higher yields and their potential for moderate capital appreciation.

Residential for-sale properties will likely continue to face regulatory scrutiny. On the other hand, private sector residential rental housing and the multi-family sector may benefit, as the Chinese government is expected to continue with policies to bolster affordable housing for lower income citizens and those migrating into new cities seeking job opportunities. Senior care housing will be on the receiving end of policies to meet the demands of China's aging urban population. These areas of development are still early-stage but worth watching in the long run.

REITs in China currently have an average yield of 6.1% (ranging from 4.2% to 11.5%)[14] – a bit higher than other Asian markets. As China's REITs market develops, the average yield should decrease as the sector mix shifts away from higher yielding sectors and public sponsors. Returns may also be boosted by capital appreciation and rerating if properties are efficiently run.

The renminbi

The RMB should appreciate during our forecast horizon as a result of ongoing efforts to improve its convertibility; higher foreign investor inflows; China's likely continuing growth advantage vs. developed markets; and the RMB's undervaluation on a purchasing power parity (PPP) basis. As the RMB becomes more freely convertible and widely used, it should converge toward its fair PPP value. We forecast an equilibrium USD/CNY level of 5.29, implying an annual appreciation of 1.6% vs. the USD.

HOW DO THESE STRUCTURAL CHANGES IMPACT OUR CHINESE MARKET VOLATILITY ASSUMPTIONS?

Equities

We expect onshore equities' high volatility to fall over the next 10 to 15 years as institutional investors' share of total holdings and volume gradually increases. A shares' volatility should approach that of other major EM equity markets toward the end of our forecast horizon, with the potential for policy-induced volatility along the way.

Fixed income

CGBs' volatility, currently lower than other EM government bonds (**EXHIBIT 5**), could pick up slightly, to levels comparable with major developed market government bonds. We expect this outcome as an interest rate-led monetary policy framework ramps up, and also due to more active trading by asset managers on- and offshore.

RMB

The RMB's volatility is currently lower than most EM currencies'; this differential is likely to narrow as a more flexible FX regime evolves. But we believe the RMB's lower volatility than other EM currencies vs. the U.S. dollar, and vs. a basket of trading partner currencies, is likely to persist, as China's capital account liberalization is likely to be a gradual process. For investors with the flexibility, an unhedged allocation to China is worth considering, given our forecast for RMB appreciation in the coming years.

[14] Bloomberg, as of July 31, 2021.

IMPLICATIONS FOR PORTFOLIO CONSTRUCTION: THE CASE FOR A STRATEGIC ALLOCATION TO CHINA

What makes an appropriate China allocation within a portfolio? It depends on an investor's risk and return objectives. In practice, investors may also be constrained by implementation restrictions, regulatory risks and macro policy uncertainty. We believe that as China's onshore markets remain complex and volatile, active management will be key to help navigate the challenges.

Diversification

Chinese onshore equities and government bonds have historically shown low correlations with global assets, offering global investors potential diversification opportunities when they add them to a portfolio. Correlations will likely rise as foreign investor participation rises; however, we believe it will remain below that of developed market assets, given China's distinct economic and policy cycles.

Onshore equities, and unhedged CGBs in USD terms, have higher volatility than global equities and bonds.[15] But under our 2022 return and volatility assumptions, correlations between Chinese and global assets are unlikely to rise high enough to negate the diversification opportunities of adding Chinese assets to a global portfolio.[16] Adding both Chinese onshore equity and government bonds offers additional diversification benefits, as they have a low correlation (0.08) with each other. Moreover, stock-bond correlations were negative during periods of market stress, such as March 2020, suggesting Chinese government bonds act as a hedge for Chinese equities during those periods.

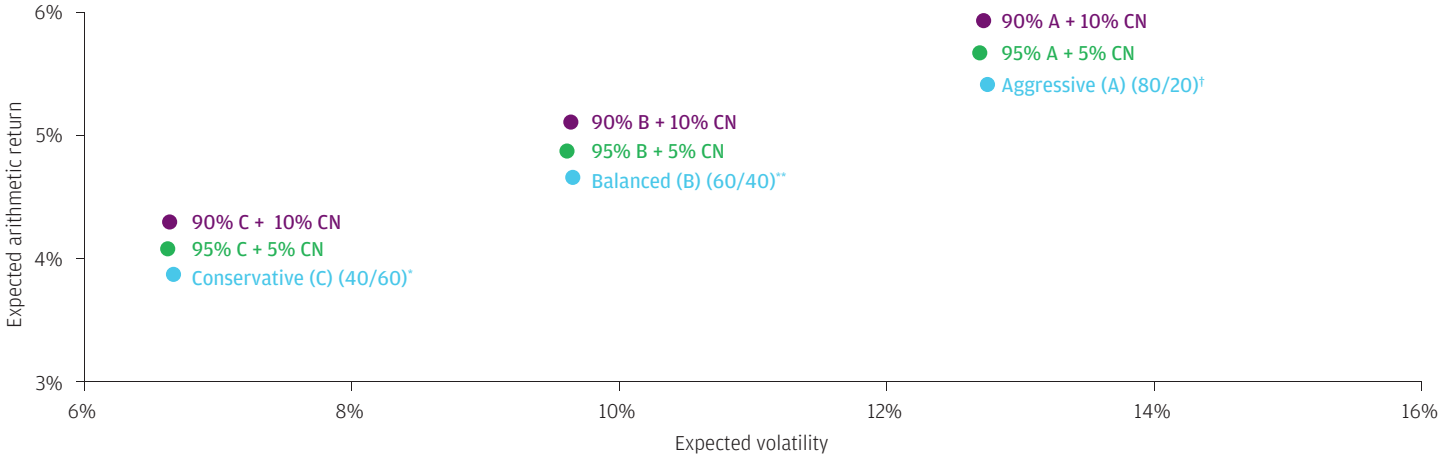
Case study: Allocating to onshore Chinese equities and CGBs can improve risk-adjusted returns

A hypothetical case study illustrates how investors with different risk-return objectives can potentially improve a traditional global stock-bond portfolio with a diversified allocation to Chinese onshore equities and government bonds.

We start with three multi-asset portfolios with different stock-bond allocations: conservative (40/60), balanced (60/40) and aggressive (80/20). Next, for each portfolio we reallocate 5% and 10% of capital from global equities and bonds to Chinese onshore equities and government bonds, in line with their risk preference. In each case, incorporating Chinese onshore equities and government bonds improves the portfolio's risk-adjusted return (**EXHIBIT 6**).[17]

Incorporating Chinese onshore equities and government bonds improves hypothetical portfolios' risk-adjusted returns

EXHIBIT 6: VOLATILITY AND RETURN CHANGE, 3 HYPOTHETICAL PORTFOLIOS BEFORE AND AFTER ALLOCATING TO DIVERSIFIED ONSHORE CHINESE STOCKS, BONDS



Source: J.P. Morgan Asset Management; data as of September 30, 2021.
Portfolio expected returns and volatilities are mapped via asset classes available in 2022 LTCMAs, USD version. CN: Chinese assets, which are China A shares and CGBs. Stocks and bonds before reallocation: Global equities are MSCI AC World Equity (WE) index; global bonds are Global Aggregate Bonds index.

* Conservative: 40% MSCI AC World Equity, 60% Global Agg. *95% C + 5% CN*: 38% MSCI ACWI, 57% Global Agg, 2% China A, 3% CGBs. *90% C + 10% CN*: 36% MSCI ACWI, 54% Global Agg, 4% China A, 6% CGBs.

** Balanced: 60% MSCI AC WE, 40% Global Agg. *95% B + 5% CN*: 57% MSCI ACWI, 38% Global Agg, 3% China A, 2% CGBs. *90% B + 10% CN*: 54% MSCI ACWI, 36% Global Agg, 6% China A, 4% CGBs.

† Aggressive: 80% MSCI AC WE, 20% Global Agg. *95% A + 5% CN*: 76% MSCI ACWI, 19% Global Agg, 4% China A, 1% CGBs. *90% A + 10% CN*: 72% MSCI ACWI, 18% Global Agg, 8% China A, 2% CGBs.

[15] The analysis uses the 10-year CGB *unhedged in USD terms*, which has a higher volatility than Global Agg bonds hedged in USD terms under our 2022 LTCMA assumptions. However, if the CGB was in local currency terms, volatility would be lower.

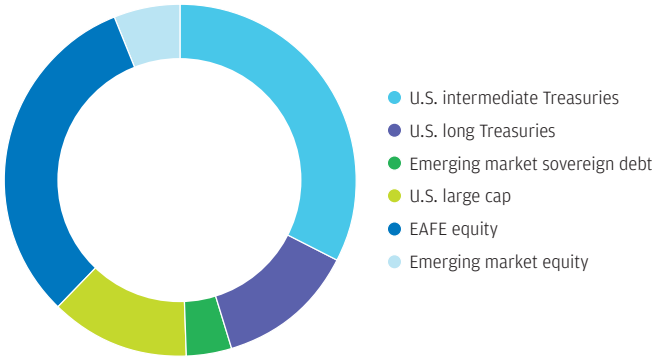
[16] Our assumptions show correlation must rise above 0.95 for the diversification benefit of adding onshore China equities to an MSCI ACWI portfolio to disappear. In fixed income, the diversification opportunities of adding the 10-year CGB unhedged in USD terms to a Global Agg portfolio hold when their correlation rises to 1.

[17] In this case study, we included only Chinese public assets, but investors should also consider how Chinese private assets can complement private allocations in other regions.

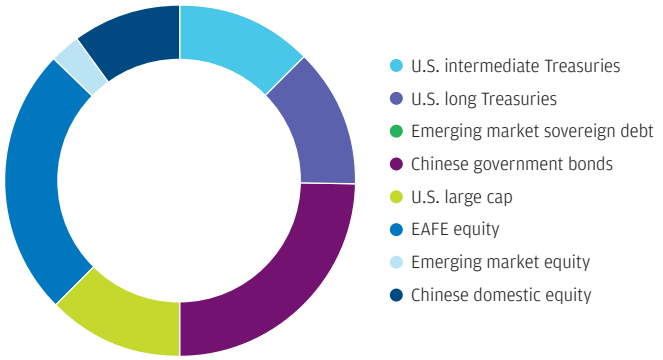
An optimized global multi-asset portfolio can potentially enhance its risk-adjusted return with onshore Chinese assets

EXHIBIT 7: ASSET ALLOCATION OF MEDIUM RISK PORTFOLIO USING MEAN-VARIANCE FRAMEWORK WITH AND WITHOUT CHINESE ONSHORE ASSETS

Medium risk portfolio (8% vol with expected return of 4.8%)



Medium risk portfolio with Chinese assets (8% vol with expected return of 5.8%)



Source: J.P. Morgan Asset Management; data as of September 30, 2021. For illustrative purposes only.

We define a medium risk portfolio as a risk equivalent of 50% equity/50% bonds. To ensure sufficient diversification, we impose minimal exposures within equities (e.g., minimum U.S. equities weight is 25% of total equity weight) and bonds (e.g., U.S. government bonds allocation is 50% of total fixed income).

Asset allocation using a mean-variance framework

How, specifically, might Chinese onshore equities and government bonds reshape a global multi-asset portfolio? Using a mean-variance framework, our analysis shows that an optimized portfolio with onshore Chinese assets can potentially enhance the risk-adjusted return (**EXHIBIT 7**).

In a medium risk portfolio, our analysis suggests that an allocation to Chinese government bonds should be funded mainly from U.S. intermediate Treasuries. An equity allocation would likely best be funded from Europe, Australasia and Middle East (EAFE) and emerging market equities.

However, it is important to note that there is no universal advice on the appropriate China allocation. It very much depends on each investor's risk and return objectives.

CHINESE ASSETS: BECOMING MORE MAINSTREAM IN GLOBAL PORTFOLIOS

Despite the growing size of Chinese public and private markets, and their expanded weight in indices, global investors remain underinvested. We've scanned the key structural changes over the next decade that should profoundly impact Chinese asset returns, volatility and correlations: rising participation by overseas and domestic institutional investors; a tilt to new economy sectors. These themes underlie our return forecasts for Chinese public assets, which are higher than those for developed markets over the next 10 to 15 years.

Yet the variability around our China forecasts is high, too. A lot can change quickly in China. Investors should be mindful of the challenges, which constrain somewhat the practical implementation of an optimal China allocation. Among the key factors that could affect our long-term assumptions for Chinese assets: the pace of structural reforms, policies seeking to rebalance efficiency and equality in the economy, liquidity and the external environment.

Progress likely won't be linear, and not every change will net out to a positive impact for investors. Yet we find that when investors add Chinese onshore equities and government bonds to a global stock-bond portfolio (we expect over time that China will become a stand-alone allocation, not one made within emerging markets),[18] they potentially stand to benefit from superior risk-adjusted returns as a result of the diversification opportunities. In particular, we believe China A shares may become a bigger area of growth within portfolios, compared to offshore Chinese equites, as investors seek the sectors likely to be at the forefront of China's future growth, as well as A shares' singular diversification opportunity.

Lastly, investors should increasingly focus on alpha as a key source of returns. For some of the many reasons related to sustainability, see the box, **CHINA'S ESG OUTLOOK: WHAT MATTERS**.

[18] There are many reasons for this, including the market indices' new economy tilt, government bonds' lower volatility vs. EM peers and China's phase of economic development; for a detailed examination of the last point, see Michael Hood, Patrik Schöwitz, Sylvia Sheng et al., "The Next Phase of China's Growth: China's path to becoming a higher income country," *2021 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2020.

CHINA'S ESG OUTLOOK: WHAT MATTERS

As the "world's factory" and the most populous country on earth, China will not be able to escape increasing scrutiny of its environmental, social and governance (ESG) practices by regulators and global investors. While China is perceived as starting from a low base in ESG standards and disclosure, it's traveling in a positive direction. The central government's latest Five-Year Plan focuses on environmental and social responsibility, prioritizing "quality development" and "common prosperity." Meanwhile, China aims to become a major player in the fast-growing area of sustainable investing – which should open diversification opportunities for ESG-focused investors.

Here are three noteworthy areas of change:

1. ESG DISCLOSURES ARE ON THE RISE, AS IS SUSTAINABLE INVESTING

Chinese regulators, such as the China Securities Regulatory Commission, are focused on raising ESG information reporting requirements for companies listed onshore. The Shenzhen and Shanghai stock exchanges don't yet require all listed companies to publish ESG reports, but certain sectors – for example, thermal power generation, steel, cement, aluminum and mineral production – already must disclose environmental impact information.

While environmental disclosure has been voluntary for other sectors, it is increasingly widespread, and rates of voluntary disclosure improved after China's inclusion in global stock and bond indices.

Moving from environmental to ESG disclosure overall, in 2020, 86% of China Securities Index (CSI) 300 companies issued ESG reports, up from 49% in 2010, and we expect still more corporations to begin providing ESG disclosure, allowing investors a better understanding of the financial impacts arising from the government's new climate and decarbonization policies, and helping investors assess companies' readiness for the changes ahead.

Incorporating ESG considerations into investing and management is on the rise among local asset managers and owners: The number of signatories to the U.N. Principles for Responsible Investment was 73 at publishing time, up from single digits in 2012.[*] Though still a small part of the USD 2 trillion global ESG funds market, assets under management by China's ESG funds have more than doubled since 2019, to USD 12 billion; green and climate-related funds have garnered the most attention, drawing 86% of China's total ESG fund flows in 2020.[**]

To finance its climate and social change ambitions, China has become a major issuer of green and sustainable bonds, with USD 150 billion issued since 2014. China is now responsible for 12% of global green bond issuance, up from less than 1% in 2014, making it the world's third-largest green bond issuer.[†] In 2020, China also made a remarkable entry into the social bond market with a USD 69 billion bond sale (earmarked for "employment generation ... financing and microfinance"), so that China now accounts for 15% of the total social bond market worldwide. Existing international standards, such as the Green Bond Principles, Climate Bonds Standard and Social Bond Principles, are also widely adopted by issuers in China.

2. CHINA'S DECARBONIZATION AMBITIONS HAVE NEAR-TERM IMPACTS

China's goal of reaching peak emissions by 2030 and carbon neutrality by 2060 requires it to reduce CO_2 emissions intensity per unit of GDP in several ways: by putting a price on carbon; by decreasing the share of fossil fuels in primary energy consumption;[††] and by structurally changing the nation's energy mix. Even in the near term, Chinese companies will feel the impact as the policies are enacted to achieve these targets.[Δ]

---

[*] "Signatory directory," Principles for Responsible Investment, United Nations.

[**] ESG funds encompass ESG, socially responsible and environmentally friendly funds identified by Bloomberg. AUM data: Bloomberg, March 31, 2021.

[†] Climate Bonds Initiative, June 2021.

[††] Primary energy refers to energy consumption before losses due to thermal conversion, power plant use and transmission.

[Δ] We focus here on China's policies to reach its stated emissions goals over the next few decades. The point of departure is challenging: As of 2018, coal represented 59% of China's primary energy and China contributed 28% of global CO_2 emissions that year. In the short term, to meet demand and support economic growth China may continue to build coal-powered capacity (in 2020, three times more new coal capacity was built in China than in the rest of the world combined).

CONTINUED OVER ➔

China's new emissions trading system (ETS) is already the world's largest. It covers power plants responsible for over 40% of the country's CO_2 emissions from fossil fuel.[†††] However, that won't likely be sufficient, in light of the European Union's carbon border adjustment mechanism.[‡] China's ETS initially covers only the power sector, and China's carbon price, USD 8 per ton of CO_2, is far lower than Europe's USD 63 per ton. That gap, if not closed before 2023, will have to be paid for by Chinese steel, cement and aluminum manufacturers if they want to sell into Europe.

The industrial sector accounts for 65% of China's energy consumption. To mitigate the coming shock to the sector's margins during China's long transformation away from heavy industry, increasing energy efficiency and electrification will be key. The government's goal is increasing electrification across the industrial, building and transportation sectors, to 30% of energy use in 2030 and 70% in 2050.[‡‡]

While electrification can help reduce emissions in sectors where carbon intensity is hard to abate, a shift on the supply side from coal to renewable energy sources is needed imminently. China needs to generate at least 25% of its energy from nonfossil fuel sources by 2025 to achieve its carbon neutrality goals.[‡‡‡] Wind, solar, biomass and hydrogen are considered crucial to getting there.[◊]

3. LEADERS WILL BE SEEKING TO FULFILL BOTH SOCIAL AND ECONOMIC RESPONSIBILITIES

After decades of exponential growth and lifting millions from poverty, China now faces the challenge of balancing further growth with security, referred to as the goals of "common prosperity" and "quality development." Setting aside formidable environmental risks for a moment, income inequality in China increasingly poses a risk to society. The urban-rural income gap continues to widen. The share of national income going to the top tenth of the population, 42%, dwarfs the 15% share going to the bottom-earning half.[◊◊]

As policymakers rebalance efficiency and equality in the economy, sectors such as internet, education, health care and real estate will likely face regulatory changes. China will also seek to promote "social" sectors able to enhance welfare, which should benefit industries such as biotech (for reasons of public health), cybersecurity (for consumer data protection) and insurance (for broadening financial access). Joining this preferred set may be companies that can demonstrate better management of corporate governance, environmental issues and human capital.

[†††] "China National ETS," International Carbon Action Partnership, August 9, 2021.

[‡] This import tariff is designed to ensure that the environmental footprint of a product is priced the same whether it is manufactured locally or imported.

[‡‡] "China's Long-Term Low Carbon Development Strategy and Pathway: A comprehensive report," *China Population, Resources and Environment* 30, no. 11, 2020.

[‡‡‡] Lauri Myllyvirta,"How to tell a strong Chinese Five-Year Plan from a weak one?" Center for Research on Energy and Clean Air, October 29, 2020.

[◊] Based on the 14th Five-Year Plan, which commits to accelerating wind and solar and investing in hydrogen to meet targets; based on current renewables capacity, all will need to be built out to hit a 25% target.

[◊◊] Thomas Piketty, Li Yang and Gabriel Zucman, "Capital Accumulation, Private Property and Rising Inequality in China, 1970–2015," *American Economic Review* 109, July 2019. Compared to other emerging market countries globally, China's measures of inequality – such as the share of national income going to the top 10% or the Gini coefficient – fall in the middle of the pack. However, inequality is higher than in several developed countries, for example in Europe.

Cryptocurrencies: Bubble, boom or blockchain revolution?

David Kelly, Ph.D., CFA, *Chief Global Strategist, Head of Global Market Insights Strategy*
Thushka Maharaj, D.Phil., CFA, *Global Strategist, Multi-Asset Solutions*
Michael Albrecht, CFA, *Global Strategist, Multi-Asset Solutions*
Sean Daly, CFA, *Portfolio Manager, Global Fixed Income, Currency & Commodities*
Meera Pandit, CFA, *Global Strategist, Global Market Insights Strategy*
Maria Paola Toschi, *Global Strategist, Global Market Insights Strategy*
Daniel Weisman, *Alternative Investments, J.P. Morgan Private Bank*

IN BRIEF

- The current generation of cryptocurrencies,[1] including most notably Bitcoin, are unsuitable as currencies and unlikely to ever be widely used as a medium of exchange.
- While there is great investor interest in cryptocurrencies, their role in portfolios is still evolving. They look like highly speculative assets, with high volatility, unreliable correlations and a significant risk of their values eventually falling to zero. They could, however, have limited uses as call options on the development of blockchain technology[2] itself.
- Private sector stablecoins,[3] while less risky than market-priced cryptocurrencies, provide less security than commercial or central bank deposits and are likely to be the subject of ongoing regulatory scrutiny and tightening.
- Despite the limitations of cryptocurrencies and stablecoins, central bank digital currencies[4] are likely to be introduced in the years ahead. Such a transition should be achievable, if done correctly, without significant financial disruption.
- While some central bank digital currencies may include elements of blockchain ledgers, the utopian (or dystopian) ideal of authority-free and decentralized financial systems, allegedly enabled by blockchain technology, will likely fade in the years ahead.
- Please note that cryptocurrencies are not legal assets in China. Consequently, investors who fall within that jurisdiction should treat this paper as purely informational. More broadly, recent regulatory changes relating to cryptocurrencies serve to underline that the asset class is still in its infancy and is subject to significant practical uncertainties.

[1] A cryptocurrency is a digital currency that is protected from counterfeiting by cryptography and is normally maintained on a blockchain network.

[2] Blockchain technology is code that creates and maintains decentralized, distributed and immutable electronic ledgers of digital asset transactions.

[3] A stablecoin is a cryptocurrency that purports to offer a stable exchange rate relative to a fiat currency and is backed by reserve assets.

[4] A central bank digital currency is a digital token, issued and regulated by the central bank of a country or currency bloc, representing a virtual form of the fiat currency for that region.

OVERVIEW

Cryptocurrencies, stablecoins and blockchain technology are not only important features of today's financial landscape, but they are also likely to have a meaningful impact on financial markets in the decades ahead. Since the first Bitcoin block was mined in 2009, the price of Bitcoin has soared, trading in mid-October 2021 near peak levels above USD 66,000,[5] with a total market cap exceeding USD 1.24 trillion, according to CoinMarketCap. Bitcoin's success has spawned thousands of competitor cryptocurrencies and helped establish a decentralized finance ecosystem.

The rise of cryptocurrencies and stablecoins has pressured some central banks to issue their own digital currencies, while the blockchain technology that underpins cryptocurrencies has been proposed as a solution to a wide range of financial, economic and logistical problems. In a portfolio context, Bitcoin has been referred to as a safe haven asset, a view we question later in this paper, potentially challenging gold's perceived role.

Yet cryptocurrencies face hurdles and limitations, as currencies and assets, that call into question how much they will ever be adopted as traditional currencies or what roles they should play in portfolios. Bitcoin is highly volatile and hasn't exhibited the characteristics of a reliable portfolio diversifier. Cryptocurrencies have raised environmental, social and governance (ESG) concerns. And while the Bitcoin boom isn't yet of a magnitude that would pose a risk to the economy or financial markets, could cryptocurrencies eventually threaten economic stability, traditional currencies and commercial and central banks? We believe there are sufficient threats to make greater regulation inevitable – and we expect the development of central bank digital currencies (CBDCs) may be one of cryptocurrencies' lasting legacies, even if the boom ultimately goes bust.

THE RISE OF CRYPTOCURRENCIES

The original cryptocurrency, Bitcoin, first emerged in October 2008 as an idea in a technical white paper by an anonymous author using the name Satoshi Nakamoto. The premise was to enable peer-to-peer online payments without the need for a trusted third party. Nakamoto's white paper also outlined the key properties of blockchain technology:

TRUSTLESS: Peer-to-peer transactions are enabled without a trusted third party by leveraging a decentralized network of nodes (i.e., computers running software) that store copies of a blockchain file and agree on updates (i.e., add transactions) to the file through a consensus mechanism called mining.

PERMISSIONLESS: The software that powers blockchain is open source, free for all to download.

CENSORSHIP RESISTANT: A decentralized network, along with consensus blockchains, makes it nearly impossible for any individual, government or organization to suppress access or deny transactions.

INCENTIVES DRIVEN: Miners run blockchain software and verify transactions to earn the potential reward of newly issued "coins" or "tokens."

Perhaps most importantly, blockchain technology solved the most fundamental problem of any decentralized digital currency – the risk of the same asset being "double-spent." By utilizing a blockchain ledger, any two parties can transfer value over the internet without the need for a trusted third party, since blockchains provide open, transparent and immutable records of who owns what.

WHAT HAS DRIVEN THE GROWTH OF CRYPTOCURRENCIES?

The growth of Bitcoin owes a great deal to its innovative use of blockchain technology. Predetermined scarcity – a maximum of 21 million bitcoins can ever be mined – has likely enhanced its appeal. Prominent psychological studies have demonstrated that humans find scarce goods more attractive.[6]

Bitcoin is also a sovereign asset – that is, its owner can self-custody, similar to the way someone can keep physical cash or gold in their home. However, unlike cash and gold, bitcoins are easily divisible and transportable, making them exceedingly difficult to seize.

[5] An intraday price on October 20, 2021.

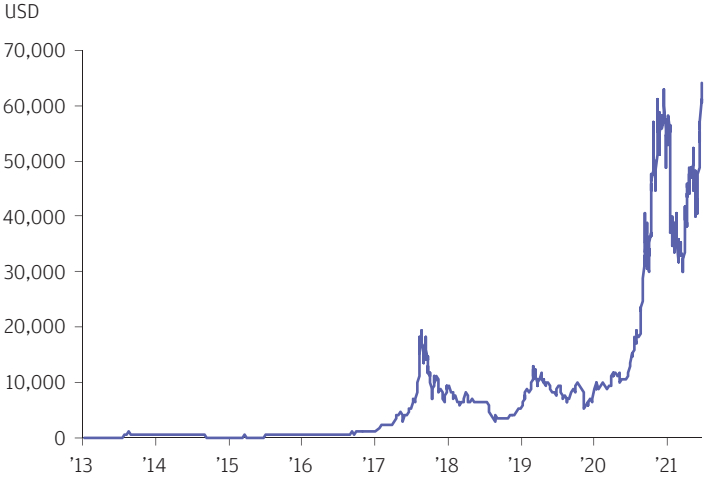
[6] Robert B. Cialdini, *Influence: The Psychology of Persuasion* (Harper Business, new and expanded edition, May 2021).

The period since the global financial crisis has been particularly auspicious for the growth of cryptocurrencies. When Bitcoin was launched in 2009, trust in governments and financial institutions was at a low, making a currency that bypassed both particularly attractive. Many investors were searching for "the next big thing" following the tech, housing and commodity booms. In addition, short-term interest rates have consistently remained close to zero, facilitating investments in a wide range of speculative ventures. Cryptocurrencies may also have benefited from the boom in online sales and digital transactions during the pandemic lockdowns.

While Bitcoin has, from the start, been very volatile, it has also seen massive appreciation (**EXHIBIT 1**). The rapid rise of digital assets and the fortunes made by early adopters have attracted large pools of (mostly retail) capital. Also catering to investors' speculative appetite has been a largely unregulated, relatively frictionless market where participants can trade on mobile devices 24/7. Cryptocurrency exchanges are the primary venue for trading activity, and Coinbase, the largest regulated crypto exchange in the U.S., has roughly 68 million customers.[7]

Investors have been drawn to Bitcoin's sizable price gains, despite its volatility

EXHIBIT 1: THE PRICE OF BITCOIN (BTC)



Source: Bloomberg, J.P. Morgan Asset Management; data as of October 18, 2021.

THE LIMITATIONS OF CRYPTOCURRENCIES AS CURRENCY

Despite their popularity, cryptocurrencies face severe limitations in their efficacy as currencies.

The high volatility of cryptocurrencies makes them poorly suited to the three traditional uses of a currency: as a store of value, as a unit of account and as a medium of exchange. In fact, apart from occasional publicity stunts, it is hard to see why any normal business would be willing to be paid in bitcoins. An auto dealer that agreed to sell a car on Monday for delivery on Friday should not be willing to price the vehicle in bitcoins, for fear that the price would fall during the week. A grocery store would hardly want to put price tags on its merchandise at 9:00 a.m. only to have to retag it all by 4:00 p.m.

Stablecoins, pegged by the issuer to the local currency, are one possible solution to this problem. Tether, USD Coin and Binance USD, for example, have been launched in recent years. However, for a stablecoin to be completely stable, it needs to be backed by local currency reserves. A coin backed 100% by local currency reserves would not be profitable for the issuer, however. And one backed by less than 100% cash reserves or by reserves held in more volatile assets could leave holders in the lurch in the very possible event of a run on the stablecoin.

There is a potentially profitable middle ground for issuers. A stablecoin mostly backed by local currency reserves could allow the issuer to skim profits off the top and still leave the currency "stable" until most of the coinholders wanted their money back. For users, this should limit the attractiveness of stablecoins relative to national currencies issued and fully backed by central banks. Moreover, central banks are generally hostile to stablecoins, seeing them as both infringing on their territory and adding an unnecessary risk to economic stability.

Security and transaction volume challenges

Security presents another challenge to holders of cryptocurrencies. As a digital bearer asset, cryptocurrencies belong to the holder of the private keys[8] associated with each token and are therefore inherently susceptible to theft and loss. Several cryptocurrency custodians, such as Coinbase, Anchorage and NYDIG, have emerged to provide professional security services, but investors may still be skeptical of these relatively new vendors.

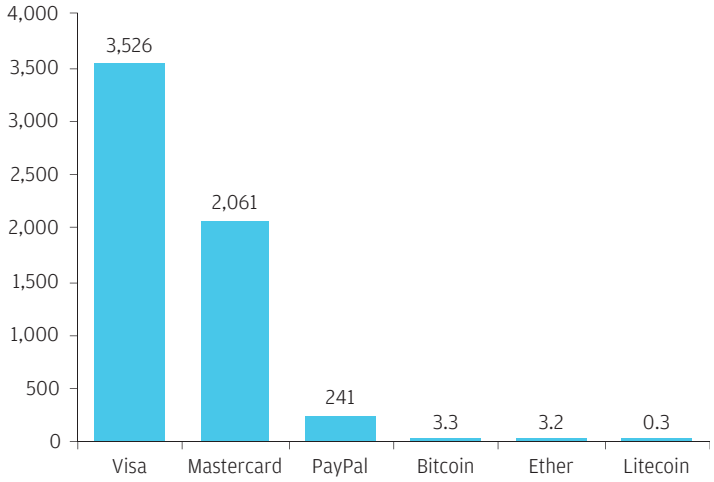
[7] Coinbase, September 26, 2021.

[8] A private key is a code generated by cryptography that allows a user to access their cryptocurrency.

Another, nonobvious limitation to cryptocurrencies is low transaction volume. Current cryptocurrency networks process a fraction of the transactions handled by Visa, Mastercard and PayPal (**EXHIBIT 2**). This may be due to cryptocurrencies' various limitations as mediums of exchange. In the case of Bitcoin, however, the very energy-intensive nature of its "proof of work" verification structure (described below) imposes a physical limit on the pace of transactions. Other verification processes, such as the "proof of stake" structure used by, for example, the Cardano blockchain, have the potential to be faster. However, the path to speedier transactions generally implies a more centralized, or less secure, network than originally envisioned for cryptocurrencies.

The designs of cryptocurrency verification processes limit transaction speeds

EXHIBIT 2: TRANSACTIONS PROCESSED PER SECOND



Source: Bank for International Settlements, BitInfoCharts, J.P. Morgan Asset Management; data as of August 31, 2021.

THE ESG IMPLICATIONS OF CRYPTOCURRENCIES

Cryptocurrencies also have significant drawbacks from an ESG perspective.

Energy consumption is one concern. Bitcoin's annual electricity use is nearly equal to Sweden's (**EXHIBIT 3**). This is due, again, to Bitcoin's proof-of-work validation structure, through which miners compete for the right to validate the latest block in the blockchain by solving complex computational problems. The race, repeated roughly every 10 minutes, in which only one of thousands of competitors wins in each iteration, rewards the winner in newly mined bitcoins.

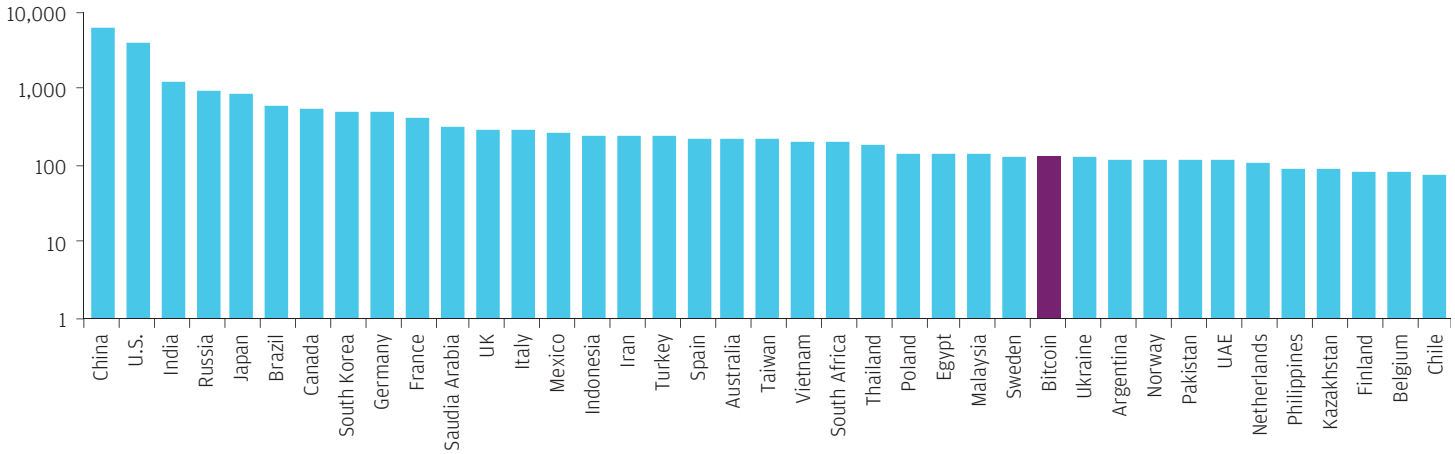
This competition requires significant computing power and thus electricity. Power consumption is one of the reasons for China's recently introduced restrictions on cryptocurrency mining, which, as widely reported, have at least temporarily led to a significant decline in global bitcoin mining.

However, not all cryptocurrencies use this method of validating transactions. Some blockchains, like Cardano, as previously mentioned, use proof-of-stake validation, in which miners are allocated mining power in proportion to the coins they post as collateral, a method that is meaningfully less energy intensive. Other methods that would consume far less energy are also possible, though they would diminish the security or decentralized nature of blockchain validation.

Bitcoin's verification process is very energy intensive

EXHIBIT 3: ELECTRICITY USE BY SELECTED MARKETS AND FOR BITCOIN

Terawatt-hours per year, log scale



Source: Bloomberg, J.P. Morgan Asset Management; data as of August 31, 2021.

Even if environmental obstacles can be mitigated, governance issues remain. Most notably, cryptocurrencies have been widely used in financing illicit transactions. That said, the distributed ledger technology stores the history of each user's transactions, so while users may be anonymous, tokens previously involved in illicit activity could, theoretically, be identified and then disqualified from future use. As one often-noted example, a block explorer (an online tool for viewing all transactions that have taken place on the blockchain) was used to recover funds from the Colonial Pipeline hackers, who demanded a ransom in bitcoins.

Finally, from a social perspective, cryptocurrencies purport to be more inclusive and accessible than hard currencies; to some extent, this may be true. They are permissionless and censorship resistant, preventing any government or organization from blocking transactions. In countries suffering from hyperinflation or underdeveloped banking or payment systems, cryptocurrencies could have utility as a medium of exchange (although they would seem to be less useful in this regard than the USD). However, the distribution of cryptocurrency wealth is likely just as unequal as the distribution of conventional wealth, and, in a very new industry, consumer protections need to be enhanced.

MACRO RISKS FROM THE CRYPTOCURRENCY BOOM

Could volatility in cryptocurrencies trigger risks to global financial stability, as in the tech and housing bubbles? The volatility seen in May 2021, when Bitcoin fell by more than 40%, certainly heightened fears of instability.[9] At this point, we think this comparison likely overstates the risks to the broad economy.

To be sure, there are similarities between the cryptocurrency surge and the internet bubble that burst in 2000:

- Blockchain technology has generated considerable excitement despite confusion about how it works or could be used.
- Price swings in cryptocurrencies appear to be driven by momentum rather than by changes in fundamentals.
- Valuations are very difficult to justify using traditional cash flow discounting models and seem to be based instead on new and untested paradigms.

But there's a difference. Part of the damage caused by the bursting of the tech and housing bubbles came from very broad wealth losses, reflecting the diffusion of tech stocks and toxic credit instruments across households, corporate portfolios and bank balance sheets, as well as significant leverage. By contrast, the effect of the May 2021 Bitcoin collapse was pretty mild, showing that the diffusion of these instruments is not yet large enough to create spillover effects.

Are cryptocurrencies in many portfolios?

Tracking the distribution of cryptocurrencies in retail and institutional portfolios is not easy. According to Bloomberg Law, 2% of accounts control 95% of all bitcoins.[10] But these concentration measures could be misleading because they are based on virtual addresses that can hide multiple users.

Another recent report estimates that 31% of bitcoins are held by very large nonexchange entities likely to represent institutions, funds, custodians, over-the-counter desks and some high net worth individuals. On the other hand, it found that smaller entities represent around 23% of owners, indicating significant retail interest that has increased since 2017.[11] Institutional investors are gradually growing but still have a low presence in this market, reducing the risk to financial stability from cryptocurrencies for the time being.

THE ROLE OF CRYPTOCURRENCIES IN PORTFOLIOS

An explosion of interest in cryptocurrencies as assets has occurred despite obvious questions about their role in portfolios.

We examine three potentially beneficial roles cryptocurrencies might be expected to play within a portfolio: as diversifiers, as inflation hedges or as growth assets (like tech stocks). In each case, we find the potential contributions of cryptocurrencies (specifically Bitcoin, which we focus on, given availability of data) come up short – at least at this stage.

We conclude that an investment in Bitcoin may best be thought of as a call option on its underlying blockchain technology and that even modest allocations should be approached with caution.

[9] It was not the first correction, but it was more worrisome than prior slumps due to Bitcoin's greatly increased market capitalization.

[10] Olga Kharif, "Bitcoin Whales' Ownership Concentration Is Rising During Rally," Bloomberg Law, November 18, 2020.

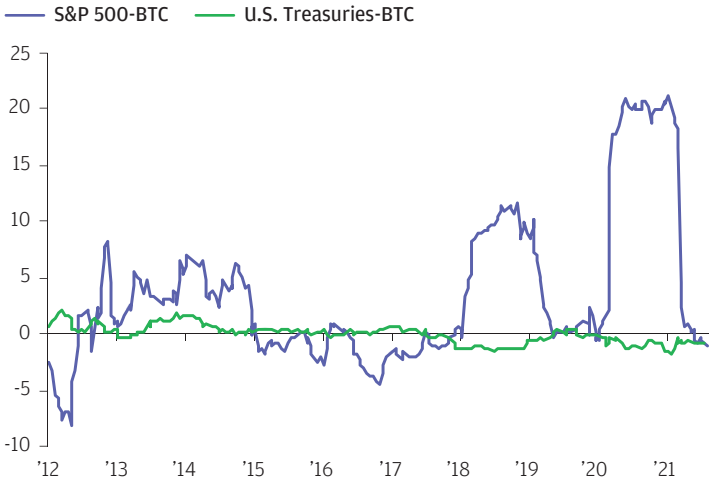
[11] Rafael Schultze-Kraft, "No, Bitcoin Ownership Is Not Highly Concentrated – But Whales Are Accumulating," Glassnode Insights, February 2021.

Cryptocurrencies as diversifiers

It is clear from our analysis that to date Bitcoin has demonstrated very unstable correlations with stocks and bonds (**EXHIBIT 4**), making it a poor choice as a portfolio diversifier.

Bitcoin's correlations with stocks and bonds have been unstable

EXHIBIT 4: BITCOIN 1-YEAR ROLLING CORRELATIONS



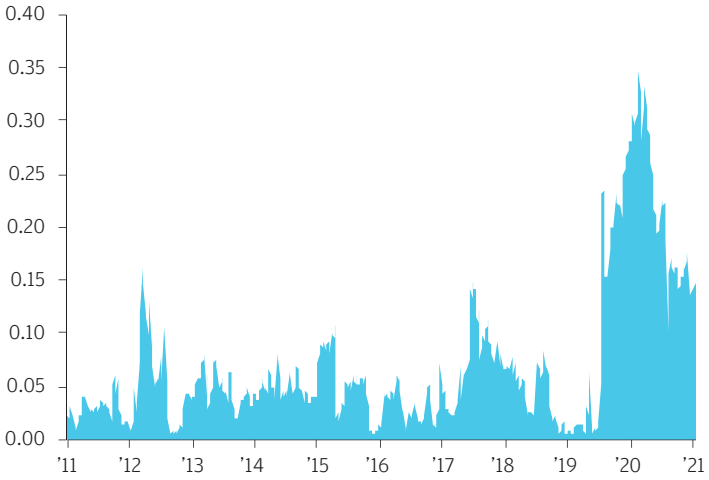
Source: Bloomberg, J.P. Morgan Asset Management; data as of August 31, 2021. U.S. Treasuries represented by Bloomberg US Treasury Index (LUATTRUU).

Nor has Bitcoin exhibited the characteristics of a safe haven asset. Like gold, Bitcoin is not issued or controlled by any entity, institution or government. That characteristic has allowed gold to serve as a safe haven during some periods of increased political and/or economic uncertainty. Our analysis thus far suggests that Bitcoin's price has not mimicked gold's and that Bitcoin has been far more volatile than gold or traditional assets (**EXHIBIT 5**).

Moreover, when trying to assess the macroeconomic or market-related drivers of cryptocurrencies' performance, we find that Bitcoin exhibits a significant amount of idiosyncratic risk; its performance so far has not been easily explained by that of other assets or macro-linked commodities (**EXHIBIT 6**). While idiosyncratic sources of return can improve portfolios' risk-return profiles, we caution that the volatility this cryptocurrency delivers dominates and overrides the majority of the risk-return benefits.

Bitcoin has exhibited high idiosyncratic risk since its inception

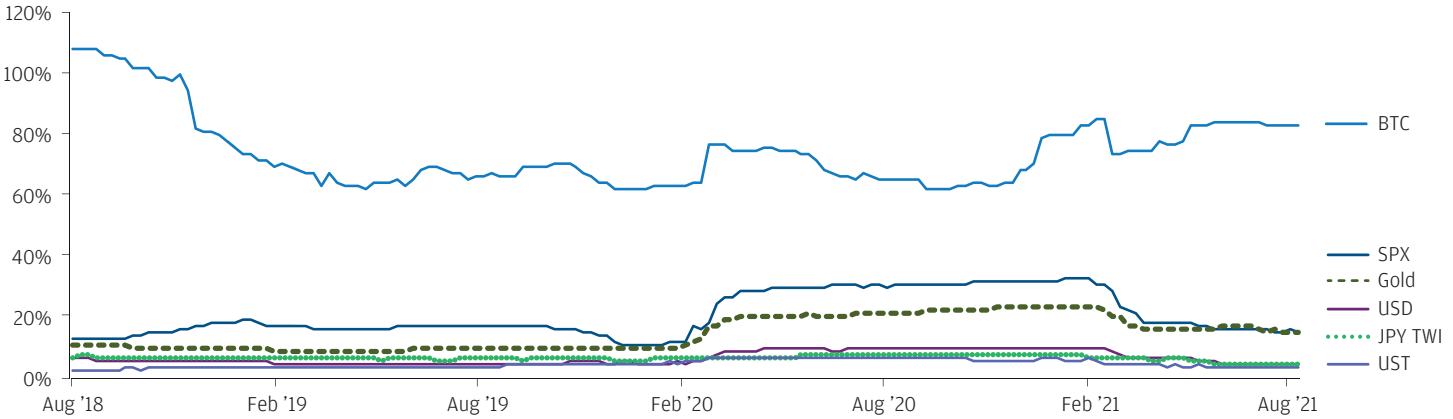
EXHIBIT 6: 1-YEAR ROLLING R^2 FROM REGRESSION OF BITCOIN ON S&P 500, U.S. 10-YEAR TREASURIES, COMMODITY INDEX AND CBOE VOLATILITY INDEX – WEEKLY CHANGES



Source: Bloomberg, J.P. Morgan Asset Management; data as of August 31, 2021.

Bitcoin is highly volatile and has not exhibited a strong correlation to gold

EXHIBIT 5: BITCOIN VS. OTHER ASSETS – 52-WEEK ROLLING VOLATILITIES (ANNUALIZED, %)



Source: Bloomberg, J.P. Morgan Asset Management; data as of August 31, 2021. SPX refers to the S&P 500, JPY TWI to the Japanese Yen Trade-Weighted Index and UST to the 10-year U.S. Treasury.

Cryptocurrencies as an inflation hedge

Also like gold, bitcoins are limited in supply, suggesting they may offer some degree of inflation protection. The evidence so far, however, doesn't seem to support this thesis. Consider the relationship between Bitcoin's price and two measures of expected future inflation: the University of Michigan's survey readings on inflation expectations and market breakeven rates. Although Bitcoin has briefly acted like gold (most notably around the Federal Reserve's announcement in March 2020 of its plans to support the economy amid the pandemic), it has not exhibited the correlation with macro inflation expectations that investors seek from an effective inflation hedge (**EXHIBITS 7A** and **7B**).

Cryptocurrency – growth asset or call option?

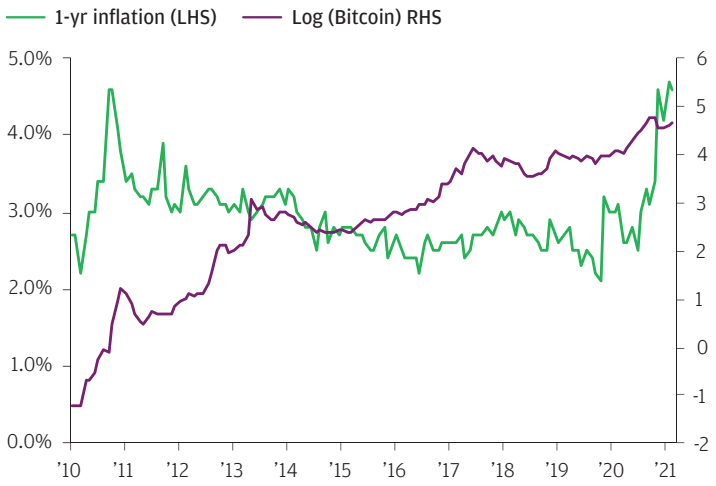
Recently, a close correlation between the prices of Bitcoin and tech stocks has led some investors to view cryptocurrencies as a way to gain exposure to the tech sector. We would question this view for several reasons. First, this correlation could be spurious, capturing retail investors' quest for "the next big thing" rather than an evaluation of Bitcoin's technological underpinnings.

Second, cryptocurrencies lack key features of tech stocks – namely, equity ownership and control. Whereas shareholders of Apple, Microsoft or Google can in aggregate shape these companies' strategies, holders of cryptocurrencies do not have similar privileges. In addition, as noted in a recent paper by Nassim Taleb, while growth stocks with no current dividends can rationally have high valuations due to the prospect of future dividends or buybacks, the valuation of cryptoassets, which lack both earnings and residual values, is more problematic.[12] Finally, cryptocurrencies are significantly more volatile than tech stocks.

Perhaps the most appropriate way to think about a cryptocurrency in a portfolio is as a call option on its underlying blockchain technology. In the same way that a call option holder cannot influence the direction of the underlying company, investors in Bitcoin cannot easily shape the evolution of the currency. And, as with equity options, the holders of cryptocurrencies need to be able to stomach higher volatility than is normally seen with equities. Here, it is important to distinguish between cryptocurrency platforms that are continuing to develop and evolve, such as Ethereum, and those that stick more closely to their original coding, such as Bitcoin.

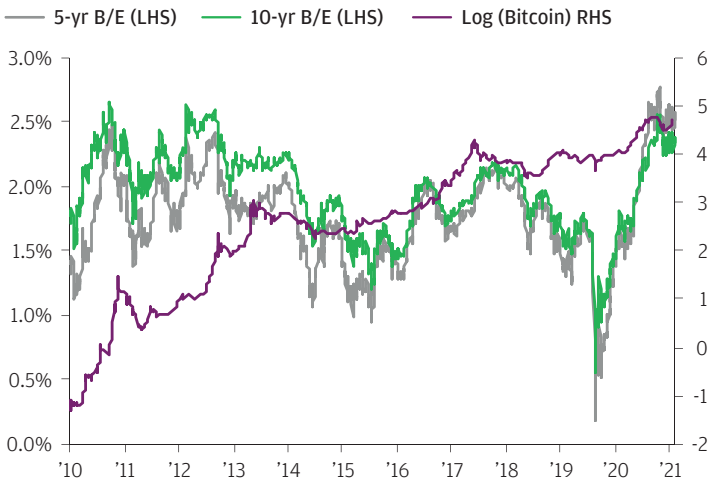
Bitcoin has not yet proven its effectiveness as an inflation hedge

EXHIBIT 7A: UNIVERSITY OF MICHIGAN INFLATION EXPECTATIONS AND LOG (BITCOIN)



Source: Bloomberg, University of Michigan, J.P. Morgan Asset Management; data as of August 31, 2021.

EXHIBIT 7B: MARKET INFLATION BREAKEVENS AND LOG (BITCOIN)



Source: Bloomberg, J.P. Morgan Asset Management; data as of August 31, 2021.

[12] Nassim Nicholas Taleb, "Bitcoin, Currencies, and Fragility," Tandon School of Engineering, New York University, June 2021.

What could a cryptocurrency allocation mean for a 60/40 portfolio?

Taking a total portfolio view, we ask what the expected return for various Bitcoin allocations to a 60/40 portfolio would have to be to maintain the portfolio's volatility-adjusted return (Sharpe ratio). The answer: The required return is extremely high, and any allocation should be approached with caution.

For example, assuming Bitcoin volatility remains at its historical level, our analysis shows that even a 2.5% allocation to Bitcoin increases the annualized volatility (risk) of the portfolio by close to 2%. Given Bitcoin's extreme volatility, an annualized return of 33% – or 316% over five years – would be needed to maintain the portfolio's Sharpe ratio and for the investment to be considered an appropriate use of the risk budget (**EXHIBIT 8**).

CENTRAL BANK DIGITAL CURRENCIES

One of the most important macro implications of cryptocurrencies is the pressure they place on central banks to issue digital currencies.

The rise of cryptocurrencies and stablecoins has prompted dozens of central banks to study, pilot and, in one case, launch digital currencies of their own. These currencies are mostly designed to be direct claims on a country's central bank and equal in value to its physical currency. While some CBDCs may use blockchain technology, in many ways they would upend the pseudo-anonymity promised by cryptocurrencies, providing central banks with much more visibility into transactions throughout the economy.

Most notably, the People's Bank of China (PBOC) has been researching a digital yuan since 2014. Its pilot programs resulted, by the middle of 2021, in the opening of almost 25 million e-CNY wallets, enabling citizens and companies to transact in digital yuan. As the PBOC has made clear, a digital yuan would be linked one-to-one with cash and could provide obvious efficiencies relative to cash and be useful in regions where financial services are scarce.[13]

Offsetting Bitcoin's impact on portfolio risk requires a high expected rate of return

EXHIBIT 8: EXPECTED RATES OF RETURN NEEDED TO MAINTAIN A 60/40 PORTFOLIO'S SHARPE RATIO, FOR DIFFERENT BITCOIN ALLOCATIONS, %

BITCOIN ALLOCATION	60/40 ALLOCATION	PORTFOLIO RETURN	PORTFOLIO RISK	REQUIRED BITCOIN EXPECTED RETURN TO MAINTAIN SHARPE RATIO
0.0	100.0	4.33	8.28	N/A
1.0	99.0	4.50	8.72	21
2.5	**97.5**	**5.05**	**10.13**	**33**
5.0	95.0	6.44	13.69	46
10.0	90.0	9.90	22.58	60

Source: Bloomberg, J.P. Morgan Asset Management; data as of June 30, 2021.

[13] "Progress of Research & Development of E-CNY in China," Working Group on E-CNY Research and Development of the People's Bank of China, July 2021.

The PBOC is also exploring regulations to prevent a central bank digital currency from triggering financial institution disintermediation, or bank runs, should citizens quickly transfer funds into e-CNY accounts in times of stress. E-CNY would, in principle, employ "managed anonymity" – that is, anonymity for small value transactions and traceability for high value transactions.

The Federal Reserve (Fed) is also investigating the launch of a digital U.S. dollar. This is in part an effort to provide digital central bank money as a superior alternative to private sector stablecoins and cryptocurrencies. Some Fed officials have expressed skepticism about whether a digital USD would really increase economic access for the unbanked or is necessary to combat any risks stablecoins pose to financial stability.[14] However, a digital USD might be necessary just to maintain the global dominance of the dollar in the face of international competition; this reality could fast-track the development of a digital currency, already set in motion by the arrival of cryptocurrencies.

CONCLUSION

At this point, we see cryptocurrencies as having significant shortcomings as broad mediums of exchange, and we take a cautious view of their role in portfolios beyond that of a call option on their underlying technology. We expect central bank digital currencies to become a part of the financial market landscape over the next decade or two and see this digital transition as achievable without significant financial disruption. But while some central bank digital currencies may incorporate elements of blockchain technology, the resulting landscape is likely to be something short of the idealized, authority-free, decentralized financial systems originally envisioned with the unveiling of the technological innovation that has made the explosive growth of cryptocurrencies possible.

[14] "Parachute Pants and Central Bank Money," remarks by Randal K. Quarles, Vice Chair for Supervision, Board of Governors of the Federal Reserve System, June 28, 2021.

Alternative investments: The essential buyer's guide

Pulkit Sharma, CFA, CAIA, *Head of Alternatives Investment Strategy & Solutions*
Anthony Werley, *Chief Investment Officer, Endowments & Foundations Group*
Jason DeSena, CFA, *Alternatives Strategist, Alternatives Investment Strategy & Solutions*
Shay Chen, CFA, CAIA, *Alternatives Strategist, Alternatives Investment Strategy & Solutions*
Christopher Sediqzad, CFA, *Research Analyst, Multi-Asset Solutions*
David Lebovitz, *Global Market Strategist, Global Market Insights Strategy*
Xiao Xiao, CFA, *Quantitative Analyst, Multi-Asset Solutions*
Paul Summer, *Global Alternatives*

IN BRIEF

If you are convinced of *why* you should invest in alternatives but unsure *how* to build out your allocation, invest more effectively or just get started, our guide is designed to:

- Help you focus on your desired investment outcomes and take a holistic approach to allocating to alternatives.
- Provide tools for matching desired outcomes with the appropriate categories of alternative assets and choosing the potentially best investment vehicles for execution.
- Emphasize that even as access to alternatives improves with an expanding set of more liquid vehicles, the risks inherent in private market investing remain.
- Offer insights for allocating within core and non-core alternatives,[1] and explain the advantages and limitations of different measures of risk and return.
- Present approaches to portfolio construction, categorized to help you select those most closely aligned with your investment objectives.

[1] Core alternatives are scalable asset categories in which the majority of the return is derived from long-dated, forecastable, stable cash flows. Non-core alternatives are asset categories intended to deliver global diversification and return enhancement, with the majority of the return derived from capital appreciation.

ADDRESSING THE "*HOW*"

Diminishing opportunities for alpha, income and diversification in the public markets have made alternative investments essential, not optional, for meeting portfolio objectives.[2] Convinced of *why* alternatives are necessary, investors now grapple with *how* to add alternatives.

Incorporating alternatives into portfolios presents unique challenges for outcome-oriented investors, be they experienced institutions or first-time alternatives investors. Barriers to effective execution can include lack of familiarity, limited information and transparency, liquidity concerns, risk budgets, vehicle access restrictions, fee loads, minimum investment requirements, measuring and modeling complexities, and intra- and inter-asset class correlations and dispersions, among others.

Too often, investors have approached alternative investments as ad hoc, one-off opportunities or by searching within specific asset class silos (e.g., real assets, private equity, private credit and hedge funds). Without a disciplined and holistic allocation framework and a "how to" guide for execution, the result is frequently a haphazard collection of "great investment ideas" rather than a purpose-driven portfolio.

Rising target (if not actual) alternatives allocations are evidence investors have been won over by the *why*. Here, we address the *how*.

HOW TO CHOOSE ALTERNATIVE ASSET CLASSES FOR A PURPOSE-DRIVEN PORTFOLIO

In building an allocation to alternatives, investors first need to determine their investment objectives. The multi-faceted nature of alternatives and the differences across the alternatives universe provide a robust investor toolkit. The broadness of this array is advantageous but requires an added level of scrutiny to uncover the underlying attributes of each alternatives category, as well as any overlapping risks. While some alternatives have distinct primary functions in a portfolio (e.g., private equity as a source of appreciation-driven returns), other categories can play multiple roles.

EXHIBIT 1 compares broad categories of alternatives according to three main portfolio functions – public equity diversification, income and capital appreciation – and the degree to which each category can be expected to deliver on these goals.

Using this filter, investors can sort the universe of alternatives according to the primary (and secondary) attributes they are looking to target. Once alternatives categories are identified, investors can turn their attention to determining the best way to access them.

Choose alternative asset classes by their investment attributes

EXHIBIT 1: ALTERNATIVES AS SOURCES OF DIVERSIFICATION, INCOME AND APPRECIATION*

● High ◑ Medium ○ Low

	ALTERNATIVES CATEGORY	PUBLIC EQUITY DIVERSIFICATION**	INCOME-DRIVEN RETURNS**	APPRECIATION-DRIVEN RETURNS**
CORE FOUNDATION	Core private credit	◕	●	○
	Core real assets	●	◕	◔
	Low vol core equity***	○	◕	◔
CORE COMPLEMENTS	Subordinated credit	◔	◑	◑
	Hedge funds	◕	◔	◕
	Non-core real assets	◑	◔	◕
RETURN ENHANCERS	Distressed credit	○	◔	◕
	Private equity	○	○	●

Source: J.P. Morgan Asset Management; data as of September 2021. * For additional details on the role alternatives can play in a portfolio, see "Alternatives: From optional to essential," *2021 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2020. ** Public equity diversification score is based on public equity beta; income-driven returns are based on the component of total returns derived from contracted income; appreciation-driven returns are based on the component of total returns attributable to increases in valuation over time. All scores are in the context of the alternatives shown in the table. *** Low volatility core equities are representative of liquid alternatives with an income-oriented return profile.

[2] For more on the "why" of alternatives, see "Alternatives: From optional to essential," *2021 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2020.

ACCESS AND EXECUTION IN ALTERNATIVE INVESTMENTS

Better access – similar private market risks

Opportunities in the private marketplace are becoming increasingly accessible to noninstitutional investors. However, for some investors, improved access should not necessarily mean larger allocations – and no investment should be made without first understanding the nuances of investing in alternatives.

The institutionalization of terms for accessing alternatives and a proliferation of new investment vehicles are allowing smaller investors to build more diversified portfolios incorporating unique potential alpha sources. That is a positive development, but buyer beware! This improved access comes with the traditional risks inherent in private market investing, and these risks can vary significantly depending on the underlying investment characteristics of the private market asset class.

Semiliquid strategies (interval funds[3] or evergreen strategies,[4] for example) can create a false sense of security that one's capital is readily accessible, masking the fact that the underlying investments may not be very liquid.

Investors also need to consider risks associated with the dispersion of returns characteristic of alternative investments. The very wide dispersion of returns across managers is well recognized. But asset class dispersion (the difference in returns between the best- and worst-performing sub-asset classes within a given time period) can also be wide, and the distribution of returns tends to have fat tails (implying a higher than "normal" probability that extreme high or low returns will occur).

Asset class dispersion risk is somewhat elevated for noninstitutional investors. That's because investors with smaller pools of capital may make more concentrated allocations, encounter greater competition for top manager access and face the marginally higher fees generally associated with noninstitutional vehicle structures.

While the potential for additional capital inflows may give asset managers an incentive to improve investment vehicle terms, the headwinds for smaller investors will likely be reduced, but not eliminated, in the intermediate term.

Matching investment vehicles to desired outcomes

Investors acknowledge the benefits that private markets can provide but rarely discuss execution. To us, the choice of investment vehicle starts with defining the outcome an investor is trying to achieve and then identifying the best fund structure for achieving it – while being aware of some common misperceptions.

When the goal is diversifying public equity risk and generating income-driven returns – which often involves investing in higher quality, yield-oriented, stabilized assets (such as core real estate, infrastructure and transportation) – an evergreen (open-ended) fund structure makes the most sense. On the other hand, when the goal is capital appreciation (as, for example, in private equity and distressed credit), closed-end funds can provide general partners with the time they need to make the necessary operational improvements before an asset is sold and capital is distributed to investors.

A note of caution: Investors considering allocating through a fund-of-funds structure should not assume liquidity alignment between the master fund and the subfund components. If the master fund is offering more favorable liquidity terms than its component funds, this may result in a liquidity squeeze during periods of market stress or languishing product performance.

EXHIBIT 2 illustrates factors investors should take into account before making an allocation to alternatives – from fund structure to how a given strategy incorporates environmental, social and governance (ESG) considerations in its investment process. Many of these factors are particularly relevant for smaller investors, who may confront limitations in accessing and competing for excess returns in the private markets. Importantly, the potential illiquidity premium, or additional return, expected for locking up an investor's capital may be compromised by some vehicles' terms. As ESG becomes more fully integrated into the management of alternatives, all investors should understand its implications for their investments.

[3] Interval funds are closed-end funds that do not trade on the secondary market and periodically offer to buy back a percentage of outstanding shares at net asset value (NAV).

[4] Evergreen strategies are strategies with perpetual life, open-end vehicle structures.

Be sure the vehicles you choose for alternatives execution align with your investment objectives

EXHIBIT 2: KEY CONSIDERATIONS FOR ALTERNATIVES EXECUTION

EXECUTION FACTORS	DRIVER	KEY CONSIDERATIONS
FUND STRUCTURE	Liquidity alignment	Ensure alignment between the liquidity of a fund's structure and the liquidity needed for its underlying investments to achieve desired investment objectives. As a rule of thumb, investments with a more opportunistic risk profile that depend on operational improvements to generate returns should be accessed through vehicles with minimal liquidity in the early period.
PORTFOLIO CONSTRUCTION	Investment objectives	Clearly define investment objectives (e.g., equity diversification, income-driven returns or appreciation-driven returns), and align these with the profile of alternative investments under consideration. In determining allocation sizing, consider investment objectives and factor in liquidity needs. Determine whether more liquid investments in the public markets may provide sufficiently comparable desired outcomes.
COMMITMENT SIZING	Available capital	With investment objectives in mind, let the amount of capital being committed to alternatives largely dictate the investment options to be considered: Smaller allocations are better suited to more diversified single-fund solutions; larger allocations provide flexibility to consider multiple and more targeted investments, including direct/co-investments.
FEES	Gross/net return spread	Understand the range of fees that may be charged (placement fees, management fees, performance fees) and how dilutive they may be at different return levels.
ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG)	Attractive risk-adjusted returns in a sustainable manner	Implement a systematic framework for making investment decisions that takes into consideration ESG factors in identifying risks and opportunities across investments. Identify strategies that have an established ESG framework as part of the ongoing asset management process, including the screening of new investments.

Source: J.P. Morgan Asset Management, September 2021.

Bridging the public-private market gap

Investors for whom liquidity is a nonfungible investment attribute may turn to public market equivalents, where available. REITs, for example, can provide a substitute for private real estate. High yield bonds can provide a substitute for distressed debt. The inefficiency of small or mid cap equities offers an alpha opportunity similar to core private equity's. However, while these options may potentially deliver similar long-term return outcomes, they are typically more highly correlated with public equities. That means their diversification benefits may be less pronounced.

At the same time, the three key drivers of excess returns – quality of execution, optimal vehicles and fee structures – are becoming increasingly accessible to smaller institutions and individuals. Put differently, a bridge is being built for those investors who cannot or will not take a full step into private markets. Investors should monitor these developments, understand the risks and assess the ability of an evolving set of investment vehicles to help them meet their investment objectives.

BALANCING MANAGER DISPERSION AND ASSET CLASS SELECTION

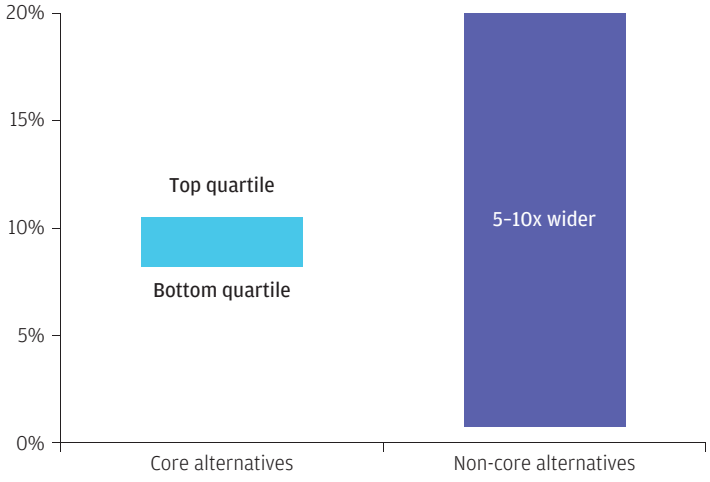
As previously mentioned, there are two measures of return dispersion that investors should consider when allocating to alternatives: *manager dispersion* and *asset class dispersion*. Whether investing in core or non-core alternatives, both types of dispersion matter. However, for reasons we will discuss, the emphasis and implications may be different when allocating to core vs. non-core assets.

In our view, investors should be laser-focused on manager selection when allocating to non-core alternatives, where manager dispersion is relatively high. Within core alternatives, the primary focus should be on actively managing an allocation across core categories. While manager dispersion within core asset classes is low, there is a high level of return dispersion across core asset classes, which may offer opportunities for diversification and potential return enhancement.

The far greater manager dispersion within non-core vs. core alternatives likely reflects the tremendous importance of manager skill in creating value within, for example, private equity, venture capital or non-core real estate. Poor manager selection can seriously jeopardize the capital appreciation outcomes for these investments – the primary objective driving investors' non-core allocations (**EXHIBIT 3**).

Manager dispersion is far more pronounced in non-core than in core alternatives

EXHIBIT 3: MANAGER DISPERSION FOR CORE VS. NON-CORE ALTERNATIVES



Source: Cambridge Associates, HFRI, Lipper, NCREIF, *J.P. Morgan Asset Management Guide to Alternatives 3Q 2021*; data as of September 2021.

Core alternatives are represented by core real assets; non-core alternatives are represented by hedge funds, private equity and non-core real estate. Manager dispersion is based on the annual returns for U.S. core real estate over the 10-year period ended 2Q 2021. Hedge fund returns are based on annual returns from February 2011–January 2021. U.S. non-core real estate, global private equity and U.S. venture capital are represented by the internal rate of return for the 10-year horizon ended 1Q 2021.

While core alternatives exhibit relatively low manager dispersion, the category has consistently exhibited high asset class dispersion, exceeding 20%, on average, over the past 15 years. That speaks to the importance of a diversified exposure to the core opportunity set (**EXHIBIT 4**).

One explanation for this high asset class dispersion is that the underlying drivers of return vary across core assets and are impacted by different economic factors at different stages of the economic cycle. For example, core infrastructure, with its relatively stable cash flow profile, outperformed within core alternatives in 2020 amid COVID-19-driven macro uncertainty. Conversely, periods of broad macroeconomic strength have benefited core private real estate. Additionally, elevated shorter-term correlations between core liquid real estate (e.g., REITs) and public equities often lead to dislocations between market pricing and operating fundamentals, providing compelling relative value opportunities in REITs vs. private core real estate.

This diversity in return drivers, combined with the potential for dislocations at extremes within the economic cycle, may add another potential source of enhanced portfolio returns for investors who actively manage a broad core alternatives allocation. That may round out the two primary objectives for allocating to core alternatives: diversifying portfolio equity risk and generating income-driven returns.

Allocate to the full core alternatives opportunity set to take advantage of its high asset class dispersion

EXHIBIT 4: RELATIVE RETURN RANKINGS BY YEAR FOR CORE ALTERNATIVE ASSET CLASSES

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Higher return	U.S. REITs	APAC core RE	Global core infra	U.S. REITs	U.S. REITs	Global core infra	U.S. REITs	Global core transport	U.S. REITs	Global core transport	APAC core RE	APAC core RE	APAC core RE	U.S. REITs	Global core infra
	APAC core RE	Global core transport	Global core transport	Direct lending	Global core transport	U.S. core RE	Direct lending	U.S. core RE	Global core infra	APAC core RE	Global core infra	Global core transport	Global core infra	Global core transport	Global core transport
	U.S. core RE	U.S. core RE	APAC core RE	Global core infra	U.S. core RE	Global core transport	Global core infra	Direct lending	U.S. core RE	U.S. core RE	Direct lending	European core RE	U.S. core RE	Direct lending	Direct lending
	European core RE	Direct lending	Direct lending	European core RE	Direct lending	Direct lending	U.S. core RE	Global core infra	APAC core RE	European core RE	U.S. core RE	Global core infra	European core RE	Global core infra	European core RE
Lower return	Direct lending	Global core infra	U.S. core RE	APAC core RE	Global core infra	APAC core RE	APAC core RE	APAC core RE	Global core transport	Global core infra	U.S. REITs	U.S. REITs	Global core transport	APAC core RE	U.S. core RE
	Global core infra	European core RE	European core RE	Global core transport	APAC core RE	U.S. REITs	Global core transport	European core RE	Direct lending	Direct lending	Global core transport	Direct lending	Direct lending	European core RE	APAC core RE
	Global core transport	U.S. REITs	U.S. REITs	U.S. core RE	European core RE	European core RE	European core RE	U.S. REITs	European core RE	U.S. REITs	European core RE	U.S. core RE	U.S. REITs	U.S. core RE	U.S. REITs

Annualized return dispersion across core alternative asset classes has averaged over 20% (2006–20)

Source: ANREV, Bloomberg, Cliffwater, EPRA/NAREIT, FTSE, INREV, MSCI, NCREIF, J.P. Morgan Asset Management. Illustrative long-term analysis using asset class annual returns from 2006 to 2020. Note: Past performance is not a reliable indicator of current and future results. Diversification does not guarantee investment returns and does not eliminate the risk of loss. For discussion purposes only.

HOW TO MEASURE RETURN AND RISK IN ALTERNATIVES

Using a quantitative lens to evaluate the risk and return of alternative investments has traditionally been challenged by data limitations and a potentially confusing array of performance measures. An awareness of the pitfalls and what measures are most appropriate for different types of alternatives is essential to an objective assessment.

Data on alternative investments, especially those in the private markets, is limited in terms of historical returns, quality and transparency. Datasets have grown in recent years, enhancing investors' ability to analyze these asset classes, but as the breadth and depth of data increase, taking its quality into account becomes even more important.

Performance measurement

Rates of return are measured differently across alternatives, depending on the underlying vehicle structure (**EXHIBIT 5**).

- An evergreen (open-end) strategy is often measured by its time-weighted return (TWR), which excludes the timing of cash flows, over which managers have no control, in the calculation of investment performance.
- Closed-end strategy performance is measured using the internal rate of return (IRR), where the timing of cash flows can impact the end result.

This difference in methodologies means IRRs and TWRs cannot be directly compared and often yield very different results, particularly over short horizons. We advocate looking at multiples on invested capital (MOIC),[5] net of fees, for an apples-to-apples comparison of long-term performance across alternative assets.

Measuring volatility is also challenging. Private investments have an inherent "smoothing effect," as returns are often derived from appraisal-based valuations on a time lag. Applying a de-smoothing approach to mitigate the impact of any prior valuations on current valuations is likely to provide a closer representation of these investments' "true" volatility. Furthermore, to adjust for the nonnormal return distribution of alternative assets, we prefer an approach that incorporates downside volatility, such as the Sortino ratio,[6] value at risk (VaR)[7] or conditional value at risk (cVaR).[8]

[5] Multiple on invested capital is 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.

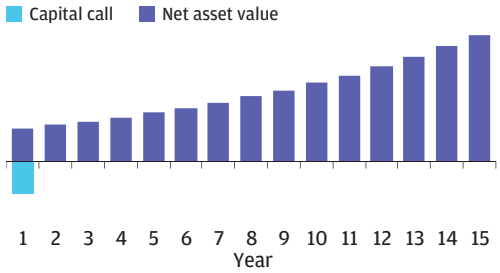
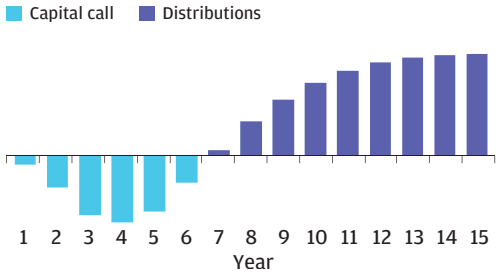
[6] The Sortino ratio is defined as excess portfolio expected return over portfolio downside volatility.

[7] Value at risk measures the potential investment loss at a given confidence level.

[8] Conditional value at risk measures the amount of tail risk at a given confidence level.

Vehicle structure matters when measuring performance and risk

EXHIBIT 5: STANDARD MEASURES OF RISK AND RETURN FOR DIFFERENT ALTERNATIVES STRUCTURES

TYPICAL VEHICLE STRUCTURE	EVERGREEN PRIVATE FUNDS	CLOSED-END PRIVATE FUNDS
CAPITAL GROWTH PROFILE		
RETURN MEASUREMENT	Time-weighted return (TWR)	Internal rate of return (IRR)
DEFINITION	Captures the true investment performance by eliminating all the effects of capital addition and withdrawals from the portfolio	Measures the portfolio performance by including all cash inflows and outflows
CHALLENGE	Does not differentiate between an initial investment and a series of investments	Impacted by the timing of cash flows
	As a result, TWR and IRR measure different return performance and cannot be compared directly.	
SOLUTION	Use of multiple on invested capital (MOIC), net of fees, to compare long-term performance	
RISK AND CORRELATION	Private market returns are subject to smoothing effects and often have nonnormal distributions and embedded optionality. An empirical approach with adjustments for nonnormality and optionality is recommended and used in our analysis.*	

Source: J.P. Morgan Asset Management. Capital growth profile is for illustrative purposes only. Illustrative cash flows shown here for closed-end private funds are representative of a single vintage. In our Long-Term Capital Market Assumptions, the returns shown for private funds are based on a steady-state investment profile.
* See "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, for detailed methodology and analysis.

HOW TO DESIGN ALTERNATIVES ALLOCATIONS FROM A TOTAL PORTFOLIO PERSPECTIVE

A range of portfolio construction methodologies can help investors determine the size and composition of alternatives allocations within a total portfolio context.

Determining a strategic alternatives allocation depends largely on factors specific to the investor, including risk-return objectives, liquidity constraints, level of access to alternatives and the ability to execute. Variation in these and other parameters can be significant across investors, with implications for choosing portfolio construction approaches.

We summarize some common portfolio construction methodologies, along with their objectives, strengths and limitations when allocating to alternatives (**EXHIBIT 6**). These approaches may not be mutually exclusive, and the list is not exhaustive. Although some investors may prefer to rely on a single methodology, the complexity of investor objectives and constraints, and the variations across models, suggest there are potential benefits to be gained from employing multiple methodologies.

Let investment objectives guide your approach to portfolio construction

EXHIBIT 6: STRENGTHS AND LIMITATIONS OF SOME METHODOLOGIES FOR CONSTRUCTING ALTERNATIVES PORTFOLIOS

	POTENTIAL METHODOLOGY	PORTFOLIO CONSTRUCTION OBJECTIVES	STRENGTHS AND LIMITATIONS	ALTERNATIVES ALLOCATION IMPLICATION
1	Modern portfolio theory	Improve portfolio risk and return profiles through a quantitative framework	+ Able to quantify return, risk and correlation + Efficient frontier provides a visual of the role of diversification – Assumes normal return distribution, thus ignores asymmetries and tail risks	Favors higher Sharpe ratio alternatives
2	Post-modern portfolio theory	Optimize portfolio downside risks over return through a quantitative framework	+ Incorporates downside risk measurement to address the asymmetrical return distribution – Downside risk can be hard to measure in alternatives due to data limitations	Favors alternatives categories with fewer and smaller drawdown events
3	Risk budgeting models	Risk management	+ Capture the importance of setting limits on risk and risk contributions – Do not specify an explicit return goal	Varies by client's risk target; favors lower risk alternatives
4	Omega ratios	Outperform portfolio return threshold	+ Optimize gain vs. losses based on return target – Risk minimization is not the priority	Favors alternatives categories with higher upside volatility
5	Scenario-based models	Examine alternatives portfolio in various macroeconomic environments	+ Estimate the impact of macroeconomic variables on the portfolio in an isolated environment – Less applicable to alternatives with low correlation to macroeconomic variables	Varies by scenario
6	Liability-driven investments	Liability cash flow management	+ User-friendly for pensions and insurance companies to meet projected liabilities – Not suitable for all types of investors	Favors alternatives with high surplus risk-adjusted returns
7	Endowment model	Seek aggressive returns through alternatives	+ Takes illiquidity premium into account – Limited to investors with greater illiquidity tolerance	Tends to overweight alternatives with higher return, less liquidity and complex fee structures
8	Factor-based models	Establish quantitative research approach for a more liquid-oriented alternatives portfolio	+ Focus on effects of common factors that drive return and risk – Require a great amount of data; certain alternatives categories might show high residuals in the regression model – Factors might be unstable; definition and selection can be arbitrary	Limited to alternatives categories with better data transparency and higher correlation with selected factors
9	Pre-defined portfolios	Choose pre-defined alternatives model portfolios based on objectives and constraints	+ Easier process for selection; more suitable for less sophisticated investors – Less flexibility for customizing choice of alternatives and size of allocation within pre-set portfolios	Varies by investment policy target
10	Core (traditional) vs. satellite (alternatives) portfolios	Group alternatives exposure into one simple satellite portfolio	+ Simplified allocation process, allowing more effective decision-making – Difficult to differentiate attributes within alternatives	Varies by investor risk profile

Source: Chartered Alternative Investment Analyst Association (CAIA), J.P. Morgan Asset Management.

To aid investors in choosing suitable portfolio construction methodologies, we group the approaches discussed in Exhibit 6 according to some primary objectives and/or constraints investors commonly have when allocating to alternatives:

MANAGING RISK AND/OR RETURN: When screening alternatives on a risk-return basis, *modern portfolio theory (MPT), post-modern portfolio theory (PMPT)* and *Omega ratio models* are appropriate, as they use various approaches to quantify the return potential and/or risk of different alternative investments.

For buyers with an emphasis on risk management, *risk budgeting models* are useful tools that specifically address an investment's contribution to total portfolio risk, when an overall portfolio risk limit has been set. *Scenario-based modeling* is used to analyze the risks to portfolio performance under different macroeconomic assumptions.

MANAGING LIQUIDITY: For less constrained investors with a generous liquidity budget, the *endowment model* is appropriate. A *liability-driven investment framework* may be more suitable for pensions or insurance companies with ongoing liability obligations and liquidity/cash flow needs.

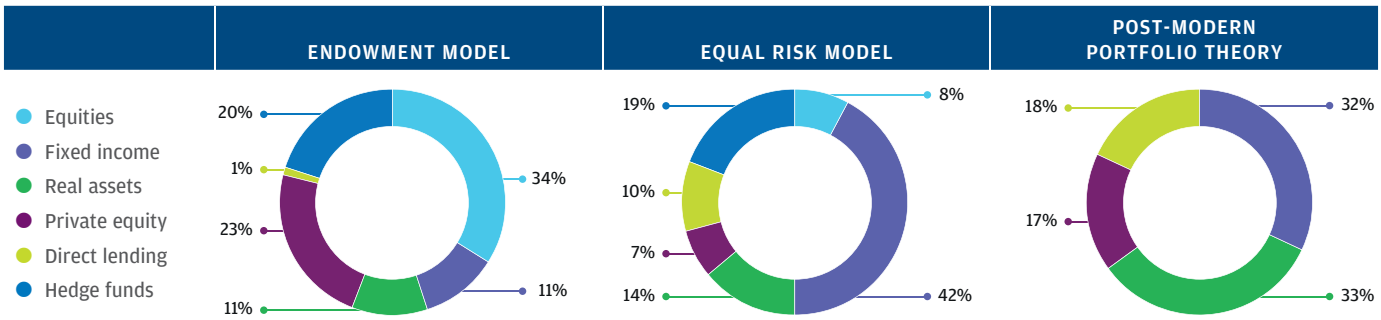
LIMITED ABILITY TO EXECUTE ALTERNATIVES: For investors whose ability to execute limits them to using only liquid alternatives, we suggest taking advantage of *factor-based models*. These data-intensive models are specifically designed for more liquidity-oriented alternatives portfolios.

LIMITED ACCESS TO ALTERNATIVES: Access has traditionally been more limited for individual investors vs. larger institutions. As alternatives are becoming more accessible, *a pre-defined portfolio* or the *core vs. satellite model* offers relatively straightforward execution and can deliver diversified exposure to alternatives with lower investment minimums.

Our **CASE STUDY: COMPARING RESULTS FOR THREE PORTFOLIO CONSTRUCTION METHODOLOGIES**[9] uses different portfolio construction models to illustrate how distinct their resulting portfolio/alternatives allocation solutions can be. The takeaway? It's important to clearly define objectives and factor in constraints when choosing an appropriate methodology.

[9] See "Portfolio implications," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021 for a further discussion of how to allocate to alternatives across the overall portfolio.

CASE STUDY: COMPARING RESULTS FOR THREE PORTFOLIO CONSTRUCTION METHODOLOGIES



PORTFOLIO SUMMARY			
Return	6.2%	4.5%	6.0%
Volatility	10.9%	5.0%	6.6%
Sharpe ratio*	0.44	0.64	0.71
Downside volatility**	9.4%	4.8%	6.7%
Sortino ratio	0.52	0.67	0.70
Liquidity	Medium	High	Low

Source: 2020 NACUBO-TIAA Study of Endowments, data as of June 30, 2020; J.P. Morgan Asset Management 2022 Long-Term Capital Market Assumptions, data as of September 30, 2021.

* The Sharpe ratio is defined as excess portfolio expected returns relative to the risk-free rate, divided by portfolio volatility.

** Downside volatility is defined as the standard deviation across returns that are below a certain level. Here, we use the historical average as the threshold.

For illustrative purposes, we have made simplified portfolio allocation assumptions in this case study. The imposed portfolio constraints may not reflect an investor's specific situation or asset allocation parameters. In practice, investors should view the output of these models in the context of market themes and cyclical trends while maintaining the flexibility to adjust allocations over time.

CASE STUDY *continued*

METHODOLOGIES DEFINED

The **ENDOWMENT MODEL** was originally made prominent by large endowment funds – institutions that typically have perpetual investment horizons and relatively high illiquidity budgets. The approach assumes that illiquid asset strategies will reward investors with an illiquidity premium and can be expected to deliver greater returns over the long run relative to more liquid investments. Resulting portfolios tend to have a relatively high allocation to alternatives, along with a relatively low Sharpe ratio.

The **EQUAL RISK MODEL** is a specialized risk budgeting model that looks to assign an equal risk budget to individual portfolio assets. Applying this model results in a fixed income-dominated portfolio with lower returns and lower risk but also higher liquidity.

POST-MODERN PORTFOLIO THEORY solves for the highest Sortino ratio while limiting the contribution to downside volatility from individual portfolio components. The model favors alternatives that exhibit higher Sortino ratios, such as real assets, direct lending and private equity, as these asset classes demonstrate upside skew† with less frequent and/or smaller magnitudes of return drawdown. Although PMPT portfolios have relatively high Sharpe and Sortino ratios, this comes at the cost of lower liquidity and, potentially, a more concentrated allocation.

† Upside skew denotes the higher likelihood of nonnegative asset returns.

ALLOCATING TO ALTERNATIVES – SUMMING UP THE "HOW"

Investors of all types and sizes may find themselves suffering from what behavioral scientists call "overchoice" – a term first coined by Alvin Toffler in 1970 to describe how decisions become increasingly difficult due to an abundance of options, many potential outcomes and the risks that may result from the wrong choice.[10] Though investors may be convinced they need the diversification, income and alpha that alternatives can potentially deliver, even the most intrepid "shoppers" can be easily overpowered by the array of alternative asset classes, styles, combinations, frameworks, models and vehicles on offer.

The multitude of asset managers specializing in specific alternative asset classes may not make the buyer's job any easier, as they may be peddling the idea that somehow it's always the right time to invest in a particular alternatives category.

Keep in mind that successful alternatives investing starts with a well-defined investment objective. With the investment objective as true north:

- Screen the universe of alternative investments by function within a portfolio to match investment choices with your desired investment outcomes.
- Determine the investment vehicles or structures most appropriate for executing on your investment objectives.
- Improve portfolio outcomes by emphasizing inclusion of the full opportunity set within core alternatives, and focus on manager selection for non-core alternatives.
- Pay attention to the quality of the data being used to make decisions.
- Take into account the nuances of how volatility is calculated and important differences among the various measures of return.
- Consider using a variety of portfolio construction approaches, aligned with different aspects of your investment objectives, to ensure a broad perspective.

We wish the buyer's guide were simpler – do this, don't do that – but knowing *why* to invest in alternatives is far more obvious than knowing *how* to invest in them. With this guide, our intent is to provide investors with the essential information needed to build a purpose-driven alternatives portfolio and make informed decisions on investment solutions aligned with their specific investment needs.

[10] Alvin Toffler, *Future Shock* (New York: Random House, 1970).

Weighing the impact of tax loss harvesting on long-term saving goals

Joel Ryzowy, *Portfolio Manager, Advisory and Core Beta Solutions*
Mallika Saran, *Investment Research and Design, Advisory and Core Beta Solutions*
Katya Chegaeva, *Quantitative Retirement Strategist, Multi-Asset Solutions*
Leonid Kogan, *Chief Investment Scientist, 55ip*
Shu Wang, *Quantitative Researcher, 55ip*
Ravi Pagaria, *Investment Director, 55ip*
John Bilton, CFA, *Head of Global Multi-Asset Strategy, Multi-Asset Solutions*
Jed Laskowitz, *Global Head of Asset Management Solutions*

IN BRIEF

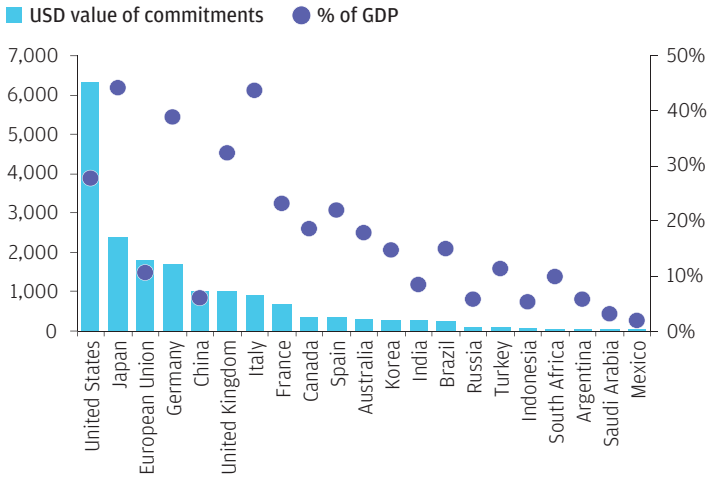
- Higher taxes are likely in the wake of a major boost in fiscal stimulus, unleashed in response to COVID-19.
- Higher taxes clearly present important implications for investors and savers – especially for those with long-term saving goals and those investing for retirement. To address these implications, investors can use active tax management, a valuable but often overlooked component of portfolio strategy.
- In particular, investors can draw on established principles and tools to manage short-term tax liabilities. In this way, long-term savers properly account for the long-term tax liabilities that are due. At the same time, they take reasonable steps to manage liabilities that arise purely from short-term market moves – moves that might otherwise damage long-term, after-tax investment outcomes.
- To illustrate the impact of active tax management, we simulate the experiences of three personas as they invest from age 50 to retirement at age 65. The analysis demonstrates that active tax management – specifically, harvesting unrealized losses – can offer significant benefits to investors holding taxable accounts. While tax loss harvesting is generally well understood, many investors may not fully appreciate the value of doing it systematically and in a deliberate fashion over an extended period of time.
- Tax loss harvesting is a useful countercyclical tool that investors can employ to strengthen their long-term post-tax outcomes.

IN THE WAKE OF COVID-19

Over the last two years, governments around the globe have made public spending commitments totaling almost USD 20 trillion in response to the COVID-19 pandemic. Such fiscal intervention, unprecedented in peacetime, leaves the ratio of government debt-to-GDP at a level last seen in the late 1940s. It also presents governments with a dilemma: how to balance the books at a time when there is little political appetite to drastically cut government programs and social safety nets, and policymakers are anxious not to do anything that would compromise economic growth (**EXHIBITS 1A** and **1B**).

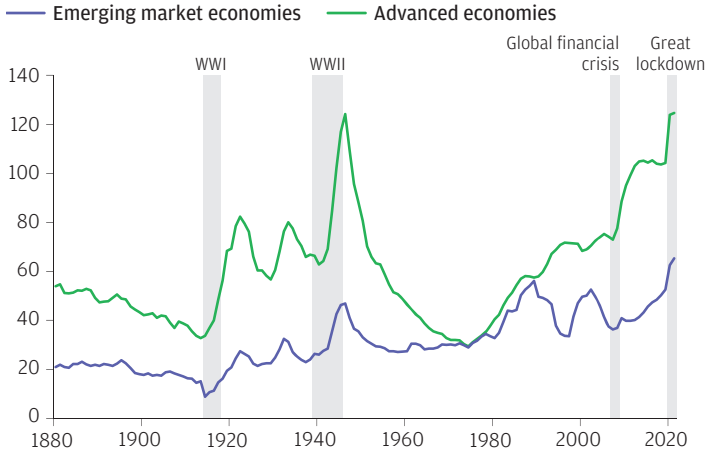
Post-pandemic spending commitments have swollen outstanding public debt

EXHIBIT 1A: THE FISCAL RESPONSE TO COVID-19 REPRESENTS ALMOST USD 18 TRILLION, OR 19% OF G20 GDP



Source: IMF *World Economic Outlook and Fiscal Monitor*; data as of April 2021.

EXHIBIT 1B: HISTORICAL PATTERNS OF GENERAL GOVERNMENT DEBT (PERCENT OF GDP)

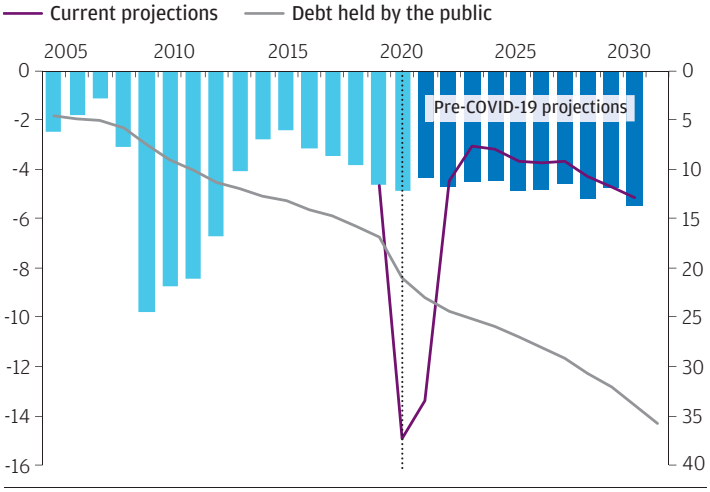


Source: International Monetary Fund (IMF) Historical Public Debt Database, IMF *World Economic Outlook* database, Maddison Project Database, IMF staff calculations; data as of April 2021.
Note: The aggregate public-debt-to-GDP series for advanced economies and emerging market economies is based on a constant sample of 25 and 27 countries, respectively, weighted by GDP in purchasing power parity terms.

Even as governments in most developed nations can borrow at historically low rates, budget deficits will continue to be significant. In the U.S., given the size and trajectory of the federal budget deficit (**EXHIBIT 2**), some higher taxes seem likely.

Budget deficits will be significant even as low rates help ease the burden

EXHIBIT 2: PROJECTED BUDGET DEFICIT AND OUTSTANDING DEBT, USD TRILLION



Source: Congressional Budget Office (July 2021 for projections).

It remains to be seen precisely who will pay those higher taxes and what form they will take. As this is written, Congress is poised to enact a range of higher taxes as part of a plan to raise over USD 2 trillion in new revenue over the next decade. In whatever form they take, higher taxes clearly have important implications for investors and savers – especially for those saving and investing for retirement.

In this paper, we first explore how governments might choose to raise revenues and the trade-offs these decisions will require. We then highlight some of the available tax management strategies, using an analytical framework to estimate the impact of different potential tax policies on savings at retirement. As we consider how higher taxes might affect asset allocation, we focus on how active tax management can be a worthwhile, if often overlooked, component of portfolio management – in particular for long-term savers.

Increased tax rates are set to affect after-tax outcomes of those who rely on long-term savings for capital appreciation and income. Long-term savers are clearly liable for long-term taxes. However, where short-term liabilities arise, a range of well-established active tax management strategies can be helpful. Investors in the U.S. can work within Internal Revenue Service (IRS) guidelines to ensure that they appropriately manage short-term tax liabilities in a way that

matches their long-term goals. Essentially, they aim to convert the short-term tax liabilities into long-term tax liabilities. Such active strategies provide long-term savers with opportunities to improve their after-tax outcomes for retirement and other lifetime saving goals.

Today, savers face a dual challenge – lower returns than in the past, and an implicit assumption that they must take charge of their own investments. With defined contribution (DC) plans now common and defined benefit (DB) plans increasingly rare, MIT professor Robert Merton notes a "dramatic shift among developed nations toward putting retirement risks and responsibilities in the hands of individuals."[1] Those risks are real. But in our view, appropriately managing short-term liabilities that arise from short-run fluctuations in asset markets can align with long-term saving goals and contribute meaningfully to investment outcomes at retirement.

GLOBAL POLICYMAKERS' REVENUE-RAISING CHOICES AND TRADE-OFFS

Many of us feel taxation most acutely through income taxes, but they are just one of the potential channels open to tax authorities to raise revenue. The bulk of taxes in most countries fall into three broad categories:

- **Taxes on individuals** – personal income, capital gains and wealth taxes
- **Taxes on corporations** – broad-based corporate taxes charged on company earnings
- **Taxes on transactions** – sales tax, stamp duty and financial transaction taxes

In this analysis, we focus on individuals' taxes and look specifically at investment outcomes – how they're affected by income taxes and capital gains taxes, or, put differently, the interplay of short-term liabilities and long-term liabilities. Tax policies and preferences around the world vary significantly. **EXHIBIT 3** summarizes some of the trade-offs associated with the different types of taxes and identifies some of the regional preferences for different revenue sources.

Tax types vary by revenue potential and relative political popularity

EXHIBIT 3: CONSIDERATIONS OF IMPOSING DIFFERENT TYPES OF TAXES

LEVY	SPECIFIC TAX	TRADE-OFFS/CONSIDERATIONS	REGIONAL IMPACT
INDIVIDUALS	Income tax	Simple to administer but limited potential to boost government revenues; politically difficult to push through hikes.	All, but less scope to raise in some already higher tax countries
	Capital gains tax	Fairly simple to administer; progressive; good potential for revenue-raising but subject to market risk.	All
	Annual wealth tax	Harder to implement with assets across jurisdictions; patchy track record of collection.	Possible, if unlikely in the U.S.; possible in the EU, UK
	Estate/ inheritance taxes	Levied on accumulated wealth at the time of death, typically above a threshold. Large loopholes (trusts, etc.) may enable estate tax avoidance. Planning with the use of various sanctioned trusts and related party transactions may materially reduce or avoid these taxes.	Most developed nations
CORPORATIONS	Corporate tax	Simple to administer, reliable revenue raiser, broadly politically popular; low corporate taxation used to attract foreign direct investments (FDI) in small open economies (e.g., Ireland); main trade-off is with raising revenue vs. attracting foreign investment.	All
TRANSACTIONS	Sales tax	Exists in most jurisdictions; can distort consumption and inflation metrics in the short term; can be somewhat regressive.	All
	Stamp duty	Levied on large transactions in some regions; can distort pricing, and may be regressive, as it targets the prospective asset owner, not the existing beneficial owner.	Exists in UK for some transactions
	Financial transaction (Tobin) tax*	Imposes a levy on financial market transactions; politically popular, especially in Europe post-global financial crisis; while it may limit speculative behavior in markets, it is likely to be passed on to end investors and savers via lower returns.	Not likely in U.S., considered by eurozone

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

* A Tobin tax is a levy on financial transactions, in particular currency transactions.

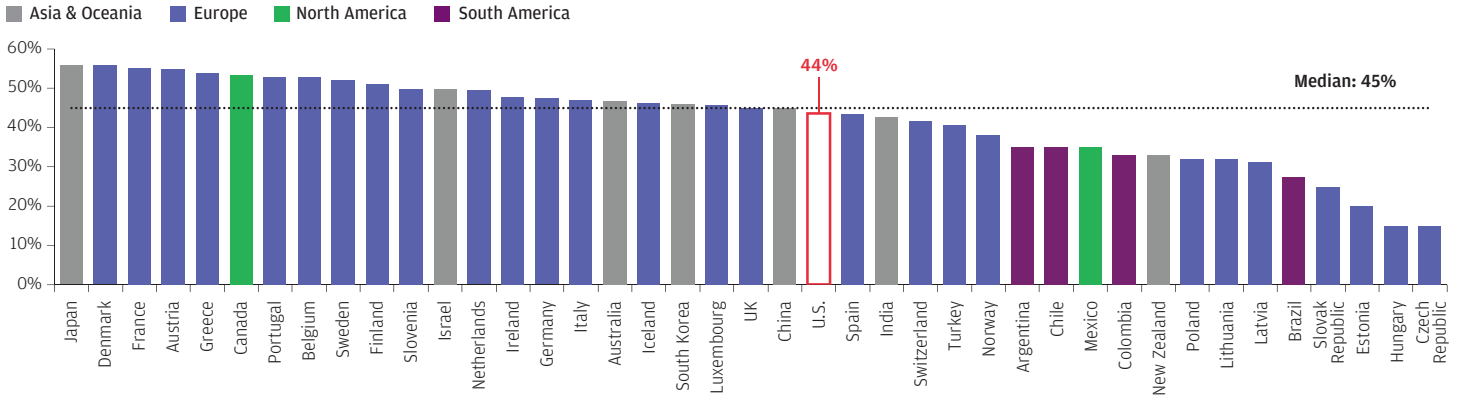
[1] Robert C. Merton, "The Crisis in Retirement Planning," *Harvard Business Review*, July – August 2014.

U.S. TAXES IN A GLOBAL CONTEXT AND THE CHOICES FACING POLICYMAKERS

The U.S. is sometimes viewed as a relatively low tax economy, especially by observers in most other developed economies. But the truth is that in both income tax and corporate tax terms, U.S. tax levels are either at or a little above median global levels (**EXHIBIT 4**). Capital gains taxes, however, are below the global median.

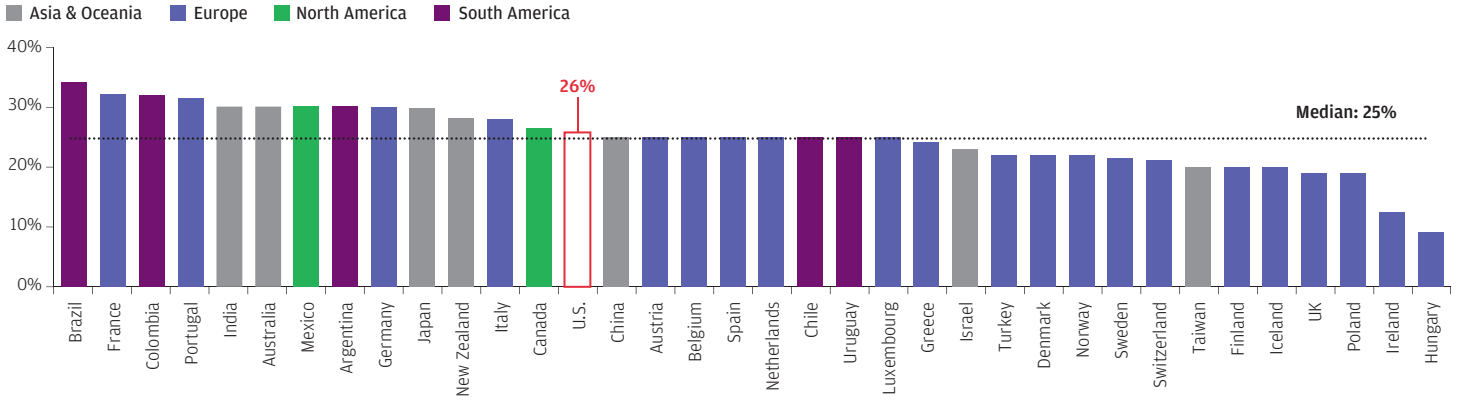
U.S. income and corporate taxes are at or slightly above the global median

EXHIBIT 4A: TOP PERSONAL INCOME TAX RATE BY MARKET, 2020



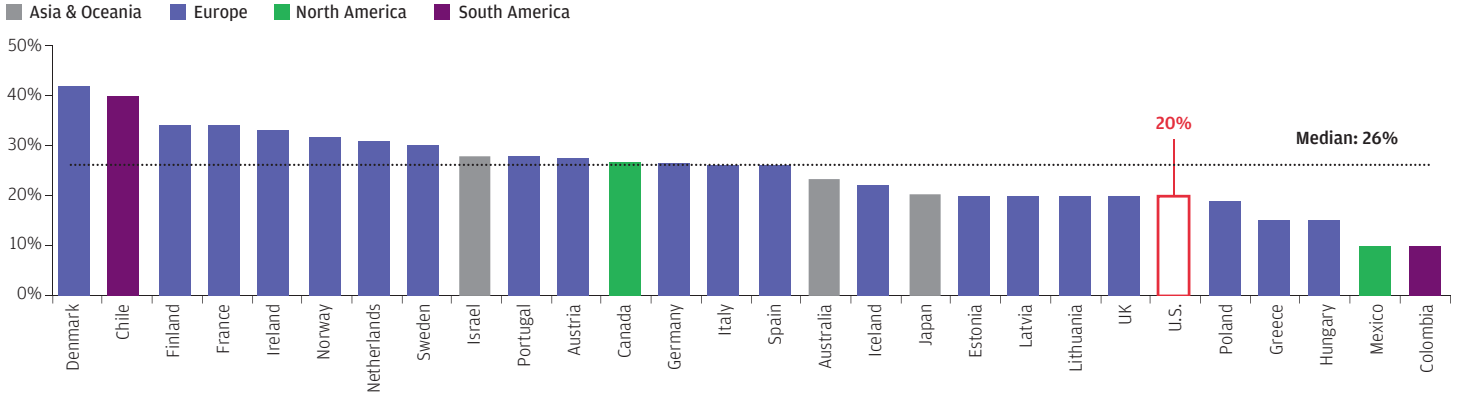
Source: OECD, J.P. Morgan Asset Management.

EXHIBIT 4B: COMBINED CORPORATE INCOME TAX RATE BY MARKET, 2020



Source: Tax Foundation, J.P. Morgan Asset Management. Note: The U.S. rate includes an average of state taxes, which range from 0% to 11.5%.

EXHIBIT 4C: CAPITAL GAINS TAX RATE BY MARKET, APRIL 2021



Source: Tax Foundation, J.P. Morgan Asset Management.

In the U.S., as this is written, Congress looks likely to increase taxes to address the budget deficit and secure funding for other initiatives, including infrastructure.[2]

Below we examine the feasibility of raising corporate and individual taxes:

CORPORATE TAXES: According to both the Congressional Budget Office (CBO) and independent studies, raising the corporate tax rate provides a meaningful revenue boost. The latest proposal in Congress would leave intact the 21% corporate tax rate but impose a 15% minimum tax on corporations with reported financial statement income in excess of USD 1 billion. It would also raise taxes on U.S. corporations' foreign income. The G7 took a significant step toward global tax coordination in June when it agreed to establish a minimum corporate tax rate of 15%. This tax would require companies to pay at least 15% in each foreign country where they operate. Further momentum came in late October when the G20 agreed that companies should pay a minimum corporate tax rate of 15% in each of the countries in which they operate. Ongoing discussion may focus on closing loopholes.

INDIVIDUAL TAXES: Earlier Congressional proposals called for raising capital gains taxes from 20% to 25% and increasing the top marginal income tax rate from 37% to 39.6%, a 35-year high. The final outcome remains uncertain. As this is written, the latest proposal would impose a 5% surcharge on adjusted gross income over USD 10 million and an additional 3% surcharge on income over USD 25 million (**EXHIBIT 5**).

A 39.6% U.S. marginal income tax rate would mark a 35-year high

EXHIBIT 5: MARGINAL TAX RATES IN THE U.S.

Source: Tax Foundation; data as of December 31, 2020.

Changing capital gains taxes – and thus shifting the ratio of short-term (income) vs. long-term (capital gains) tax levels – would present clear investment implications, which we discuss below.

WHY ARE WEALTH TAXES NOT USED MORE EXTENSIVELY?

For the first time in many years, an annual wealth tax was under serious consideration in Washington. Congress briefly debated the details of a so-called "billionaire's tax." Taxpayers with more than USD 100 million in annual income or more than USD 1 billion in assets for three consecutive years would be subject to taxation of their unrealized capital gains.

Wealth taxes enjoy more apparent popular support in Europe, but their use is diminishing. In 1990, 12 OECD countries had wealth taxes. By 2017, the number had fallen to only four – France, Norway, Spain and Switzerland – and in 2018 France replaced its wealth tax with a property tax.[3] European wealth taxes typically raised only about 0.2% of GDP in revenues. Given how little revenue they raised, it is not surprising that wealth taxes had "little effect on wealth distribution," as one study noted.[4]

As is the case in most developed economies, U.S. wealth is skewed toward assets: In 2020, U.S. families owned more than USD 101 trillion in financial assets and USD 39 trillion in nonfinancial assets.[5] But even with advances in asset reporting and concerted efforts from regulators, it remains difficult to get a fair market value on many assets, such as art, jewelry, private enterprises and farmland. Identifying the beneficial owner of an asset is a further complication, and the IRS has significant difficulty collecting taxes for assets it cannot track.[6] In jurisdictions that impose wealth taxes, avoidance is commonplace. Additionally, in the U.S. the legality of wealth taxes might be called into question on constitutional grounds.

[2] H.R. 5376 Build Back Better Act, 117th Congress (2021–22).

[3] Janet Holtzblatt, "Should Wealth Be Taxed?" Tax Policy Center, September 24, 2019.

[4] Chris Edwards, "Taxing Wealth and Capital Income," Cato Institute, *Tax and Budget Bulletin*, no. 85, August 1, 2019.

[5] "Financial Accounts of the United States: Flow of Funds, Balance Sheets, and Integrated Macroeconomic Accounts," Federal Reserve, June 10, 2021.

[6] "Trends in the Internal Revenue Service's Funding and Enforcement," Congressional Budget Office, July 2020.

RAISING REVENUE THROUGH THE CAPITAL GAINS TAX

It's no surprise that policymakers have turned to the prospect of higher capital gains taxes as a reliable way to raise revenue.

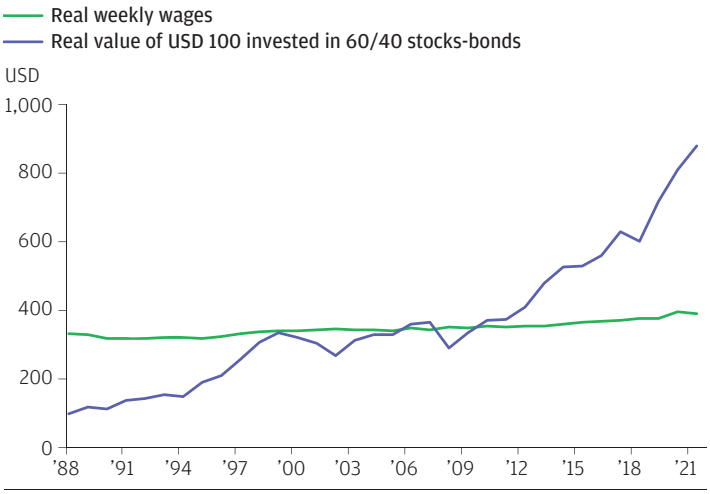
First, as discussed, U.S. capital gains taxes are low by international standards. Second, and critically, there's a growing pool of assets to tax. Over the last 30 years, asset markets, as proxied by a U.S. 60/40 stock-bond portfolio, have experienced a compound annual real growth rate of almost 10% (**EXHIBIT 6**). The Federal Reserve estimates that the value of public equity and debt securities owned by U.S. households has doubled in just eight years – from USD 19 trillion in 2012 to USD 39 trillion in 2020. As more and more Americans move from saving to investing, and as access to capital markets becomes ever more democratized, the asset pool from which capital gains taxes are taken will likely grow.

Additionally, capital gains taxes are relatively progressive, impacting wealthier individuals, who typically own more assets. That's a key appeal to politicians and policymakers. Almost 90% of the revenue from capital gains taxes is collected from the top 5% of earners. At a time when wealth inequality is a focus across the political spectrum, progressive tax hikes are likely to gain bipartisan support.

Finally, higher capital gains taxes are good revenue raisers. The CBO has studied the potential impact of higher income, capital gains and corporate taxes (**EXHIBIT 7**). Raising long-term capital gains (LTCG) by about 3% is roughly equal to increasing the top two income tax brackets by 1%. We expect policymakers broadly will be more inclined to raise capital gains taxes than income taxes.

Wages have roughly maintained purchasing power over the last three decades, but asset markets have grown tenfold in real terms

EXHIBIT 6: GROWTH IN WAGES AND ASSET MARKETS, 1988–2021



Source: Bloomberg, Bureau of Labor Statistics, Haver, J.P. Morgan Asset Management; data as of August 2021.

Note: Wages based on spliced series from BLS average wages from 2006, and production & nonsupervisory wages (m/m change) pre-2006; 60/40 real returns based on CPI adjusted performance of S&P Total Return Index and U.S. agg bonds, rebalanced annually.

How higher taxes might impact asset allocation over an investor's saving life cycle

Higher capital gains taxes present important implications for investors – especially, savers who are investing over the long term and potentially accumulating meaningful capital appreciation. As savers near retirement, the emphasis shifts from capital appreciation to capital protection, and from reinvesting income and dividends to generating income.

As policymakers know, higher capital taxes are good revenue raisers

EXHIBIT 7: REVENUE RAISED IN DIFFERENT TAX HIKE SCENARIOS

REVENUE RAISED (USD BILLION)											
2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2021–25	2021–30
Raise all tax rates on ordinary income in the top two brackets by 1 percentage point											
7.0	10.6	11.2	11.8	12.6	11.6	11.6	12.1	12.5	12.9	53.2	113.8
Raise long-term capital gains and qualified dividends by 2%											
1.4	6.4	7.1	7.6	8.1	8.5	8.4	8.8	9.3	9.6	30.6	75.2
Increase corporate income tax by 1%											
4.5	7.3	8.5	9.1	9.8	11.0	12.0	12.3	12.4	12.5	39.2	99.3

Source: "Options for Reducing the Deficit: 2021 to 2030," Congressional Budget Office, December 9, 2020; data as of September 30, 2020.

As the ratio of income and capital gains taxes changes, this can affect the investment choices and optimal asset allocation for a saver approaching or in retirement. For example, consider the implications for equities that typically generate the vast majority of their total return in the form of capital gains, now taxed at higher rates, as opposed to bonds that generate the vast majority of their total return in the form of income. As we've noted, with returns likely lower than in the past, appropriate, active tax management during the saving and investing life cycle can meaningfully enhance long-term investment outcomes at retirement.

To help illustrate the real impact on the lives of retirees, we simulate the experiences of three personas as they invest from age 50 to retirement at age 65 (**EXHIBIT 8**). Our analysis demonstrates the effects of different tax regimes and tax management strategies on investment outcomes. The results can be significant, especially in light of the diminished level of asset market returns we expect over the next decade.

THE THREE PERSONAS

Our three personas, Alex, Bobby and Cameron, are all 50 years old, with different levels of wealth and significant differences in both asset allocation and risk tolerance.[7] By many industry definitions, Alex would be categorized as affluent, while both Bobby and Cameron would be identified as high net worth savers.

We note that the average American faces a more precarious retirement than our three personas. For example, 65% of respondents in J.P. Morgan Asset Management's 2021 Defined Contribution Plan Participant Survey say that in the past year they have not contributed the amount they believe they should to their retirement plan. Inadequate retirement savings continues to be a cause of concern for policymakers and industry specialists broadly.

At the same time, many (relatively) well-off U.S. households have maximized their tax-preferential savings opportunities and are accumulating significant wealth in taxable accounts to support their retirement. That presents its own challenge, as we will explore in the experiences of our three personas.

We assume that Alex, Bobby and Cameron all start investing at age 30, taking a tax-agnostic approach, making regular contributions (slightly different for each saver) and steadily de-risking until retirement. At retirement, savers with higher wealth levels have a higher risk tolerance and ending equity allocation. We draw on these profiles to compare a tax-agnostic portfolio (rebalanced every quarter) with a tax-managed portfolio (rebalanced at least every month to harvest losses).

Tax management strategies incorporate the significant difference between short-term and long-term tax rates

EXHIBIT 8: SUMMARY OF ASSETS AND TAX RATES BY SAVER[8]

Saver	Total assets age 50	% Taxable at age 50	Short-term rate*	Long-term rate*
Alex	USD 1mm	13%	32%	15%
Bobby	USD 5mm	50%	35%	20%
Cameron	USD 10mm	80%	37%	20%

Source: J.P. Morgan Asset Management.

* Tax rates are determined assuming expected salary for each of these personas at age 50 and holding it flat throughout the analysis.

We note that all three of our personas are making the maximum contributions to their tax-advantaged retirement plans. We do not consider those savings as part of our analysis, but, as we will discuss, it helps explain the relative difference in the percentages they are saving in taxable accounts.

Alex is a successful professional with USD 1 million in assets at age 50, of which roughly 13% is held in taxable accounts. Alex regularly contributes 2% of wages to taxable accounts. Of the three savers, Alex has the most conservative equity allocation at retirement.[9]

Bobby is a senior executive with USD 5 million in assets at age 50, with around 50% in taxable accounts. Bobby regularly adds to taxable accounts, steadily boosting the contribution rate as wealth grows. Bobby's tax-shielded accounts are invested conservatively at retirement, but taxable accounts are more balanced, with a higher ending equity allocation than Alex's.

Cameron, a successful business owner, has USD 10 million in assets, of which 80% is in taxable accounts at age 50. At opportune moments in the business, Cameron makes large account contributions. We assume that Cameron may have other income sources (e.g., real estate rental income) and is thus comfortable with more risk at retirement. Of our three savers, Cameron has the highest equity allocation at retirement.

[7] The profiles and assumptions have been constructed leveraging data from the Survey of Consumer Finances (SCF).

[8] State taxes are assumed to be zero; excludes net investment income tax.

[9] Our assumptions about what percentage of our savers' wealth is held in taxable vs. non-taxable accounts draws on research from J.P. Morgan Asset Management Retirement.

Back-test and simulations

Our analysis focuses only on the taxable accounts for our three saver personas. For each saver, we conducted a back-test of their portfolios from ages 30–50 to arrive at a sample portfolio at age 50 using tax lot level data (a tax lot is a record of a transaction's cost basis). We then simulated a range of asset returns over the next 15 years (ages 50–65).[10] Our analysis evaluates how outcomes compare at age 65 with and without active tax management.[11]

One principle is quite clear. Active tax management – specifically, systematically harvesting unrealized losses – can offer significant benefits to investors holding taxable accounts. The benefits of tax loss harvesting are generally well understood. Investors typically harvest losses at year-end to offset realized short-term gains. But many investors do not fully appreciate the value of doing it in a systematic and deliberate fashion over an extended period of time.

Short-term capital gains are taxed at the regular income rates, which are generally higher than the rates on long-term gains. IRS rules penalize short-term speculative trading, but at the same time the rules can help investors pursuing long-term objectives, like saving for retirement. Here's how it works:

In the regular rebalancing of a portfolio, long-term investors tend to realize some short-term capital gains. This means that a long-term investor may face an excessive tax burden because of inefficiencies in the implementation of an investment plan. Active tax management portfolio strategies help address this issue, better aligning the tax liabilities of retirement savers with their investment goals.

[10] The simulated investment outcomes are based on Long-Term Capital Market Assumptions (LTCMA) 10- to 15-year horizon returns; glide path of asset allocation (across stocks/bonds/cash/real estate/private equity); risk tolerance at end of glide path; typical percentage of taxable accounts vs. total asset holdings; and the extent of the use of tax management over the forward horizon.

[11] Saver profiles and assumptions draw on data from the Survey of Consumer Finances. We assume a simplified version of tax loss harvesting using pooled vehicles in one taxable account. For each 50-year-old saver, we simulate 50 sets of monthly asset returns over the next 15 years using our Long-Term Capital Market Assumptions. We assume investment in multi-asset portfolios that hold only ETFs. All distribution statistics are calculated based on the 50 paths and the 15-year horizon.
We compare tax-managed portfolios that use tax loss harvesting (TLH) with tax-agnostic portfolios. We assume the tax-agnostic portfolio is rebalanced every quarter to a target model or when a contribution occurs. We assume that all accounts follow the HICO rule, under which the tax lots with the highest cost basis are the first to be sold.
In tax loss harvesting, an investor sells a security (primary) in the portfolio that has underperformed expectations. This creates a positive tax loss realization that is first used to offset realized gains of the same character. Then any excess losses may be carried forward for use against subsequent year gain realizations. The primary security is replaced with a similar security (proxy). We note that IRS wash-sale rules prohibit an abuse of the strategy in which essentially identical securities are swapped within 30 days either side of the loss trade date to avoid recognition of net taxable gains without ever being effectively economically out of the position.
In addition: Capital losses can offset capital gains, but taxpayers must apply the following "netting" rules: 1) offset short-term gains with short-term losses to arrive at a net short-term gain or loss; 2) offset long-term capital gains with long-term capital losses; 3) Offset any net short-term gain with any net long-term loss, and vice versa. Only up to USD 3,000 per year of net capital losses may be used to offset other types of income (e.g., earned income, dividends), and any amount in excess of USD 3,000 must be carried forward to the next tax year. Capital losses carried forward do not expire until the taxpayer dies.
The portfolio in our analysis is rebalanced as needed to keep the tracking error relative to the target model portfolio below 1%.

Quantifying the benefits of active tax management

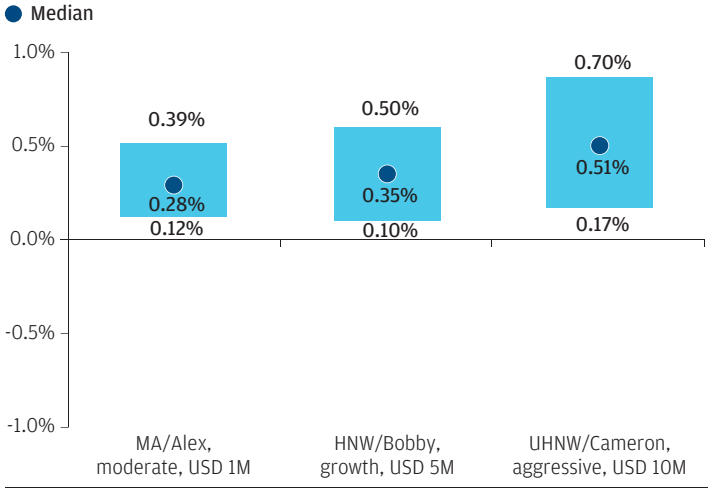
Our analysis of the three personas underscores the value of active tax management. A portfolio that employed active tax management during the 15 years we analyzed delivers a meaningfully different – and generally stronger – post-tax performance than a portfolio that did not employ it. Here, we look at two key metrics, tax savings and total losses carried forward, to quantify the value of active tax management.

Tax savings

For the three personas, we calculated the total tax savings using the tax rates included in our assumptions.[12] The median potential tax saving ranged from ~28 basis points (bps)–51bps, with the 10th and 90th percentile levels indicated in **EXHIBIT 9**. With the expected return for a 60/40 portfolio around 4%, according to our Long-Term Capital Market Assumptions, active tax management clearly provides an additional potential source of after-tax returns.

Median potential tax saving ranges from around 28bps to 51bps

EXHIBIT 9: POTENTIAL TAX SAVINGS (MEDIAN, 10TH AND 90TH PERCENTILE) FOR EACH STYLIZED SAVER



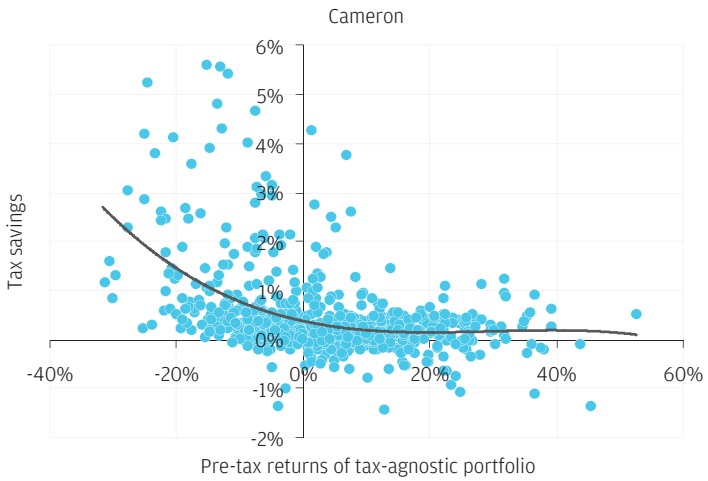
Source: J.P. Morgan Asset Management; data as of December 31, 2020. Simulation begins January 1, 2021.

[12] Average tax savings are calculated by comparing actual account activity with a "shadow" account created by 55ip. The shadow account has the same inception date and is invested in the same model as the actual account but does not incorporate 55ip's tax-smart technology for rebalancing. Gains and losses are accrued for both the actual account and the shadow account to produce the estimated tax bill.

Timing can also help. Not surprisingly, losses may be more commonly harvested during market downturns. As a result, the opportunities to harvest losses tend to increase when market performance is poor. We conducted 750 simulations (15 years, 50 simulations per year) of market returns. As seen in **EXHIBIT 10**, the tax savings benefit for Cameron's portfolio increases as the market returns become more negative (as it does for our other two savers). Simply put, long-term savers get the welcome benefit of future tax offsets during a period of unwelcome market losses. In sum, tax loss harvesting is a useful countercyclical tool investors can employ to enhance their long-term post-tax outcomes.

Tax loss harvesting can be a useful countercyclical tool

EXHIBIT 10: TAX SAVINGS IN DIFFERENT MARKET CONDITIONS



Source: J.P. Morgan Asset Management; data as of December 31, 2020. Simulation begins January 1, 2021.

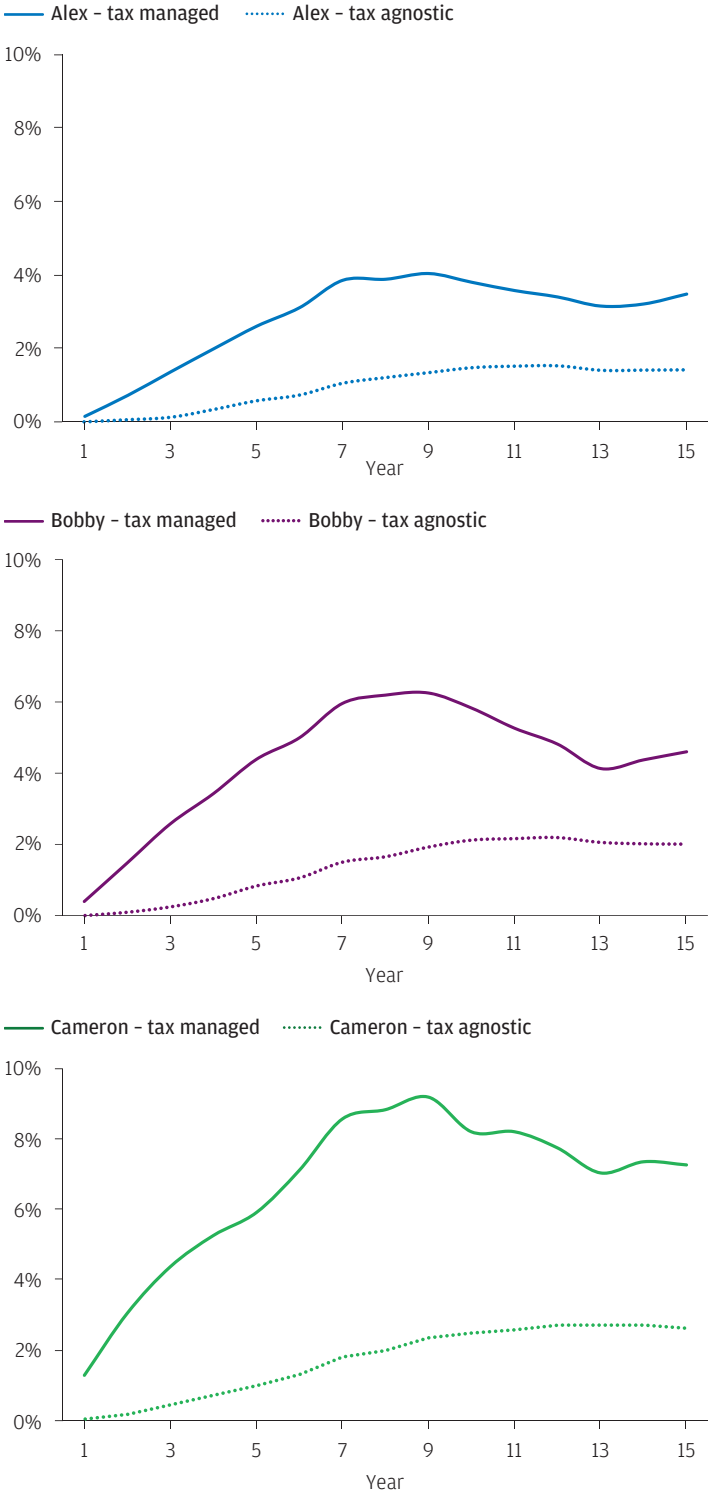
Quantifying total losses carried forward

Total losses carried forward (TLCF) are the cumulative losses harvested net of the capital gains that were offset. Essentially, TLCF is a "bank" of harvested losses that can be used to help offset future tax liabilities associated with capital gains.

On average, our three savers had accumulated TLCF that represented about 4%–7% of the portfolio value at age 65. The TLCF at age 65 for the tax-managed portfolio is about 2.5x that of the tax-agnostic portfolio. Generally, the more equity a portfolio has, the greater the ability to harvest losses and generate TLCF, as seen in a comparison of Cameron's and Alex's TLCF (**EXHIBIT 11**).

A portfolio with a higher equity concentration typically provides a greater opportunity to harvest losses

EXHIBIT 11: LOSSES CARRIED FORWARD WITH AND WITHOUT TAX MANAGEMENT, AS A PERCENT OF PORTFOLIO VALUE



Source: J.P. Morgan Asset Management; data as of December 31, 2020. Simulation begins January 1, 2021.

Tax loss harvesting can also serve as a tool to manage market volatility. Consider the ordinary exercise of portfolio rebalancing. When investors rebalance portfolios with no view to tax management, they can generate unexpected tax liabilities, which can fluctuate greatly from year to year. Imagine that an investor realized capital gains at the beginning of a year that ended with significant portfolio losses. A portfolio that did not employ active tax management would most likely incur short-term tax liabilities on the realized gains while not claiming any of the benefits of harvesting losses through large drawdowns.

To quantify the benefit of tax loss harvesting during periods of market drawdowns, approximately 40% of the 750 simulated yearly returns associated with Cameron's portfolios occurred in a down market. The portfolio with active tax management realized short-term tax liabilities on its net capital gains in only 11% of those down periods. On the other hand, the tax-agnostic portfolio encountered short-term tax liabilities in three times as many scenarios (34%) because it did not benefit from offsetting gains with harvested losses (**EXHIBIT 12**).

In short, even if savers are entirely focused on their long-term investment outcomes, inevitable volatility in markets, together with consequent rebalancing, can incur short-term liabilities. Addressing this issue with established tax management tools better aligns the day-to-day operational management of a portfolio with its long-term saving goals.

While this paper has focused explicitly on tax loss harvesting, some investors may want to use additional tools to further enhance their long-term post-tax investment outcomes. For instance, high net worth individuals may opt to use individual securities to implement their desired risk exposures. Such "direct indexing" would allow their tax loss harvesting strategies to leverage security-level price dispersion to potentially improve after-tax returns.

Investors with high wealth distributed across taxable and tax-exempt accounts can further benefit from a more tax-aware approach to asset allocation. This could include improved asset location and holistic portfolio rebalancing strategies that take advantage of the tax-exempt portion of their overall holdings. For instance, fixed income securities generating income taxed at the personal income rate, or high turnover active strategies generating short-term capital gains, may be best located in tax-exempt accounts. (Analysis of direct indexing and tax location strategies is beyond the scope of this paper.)

Tax-agnostic portfolios realize short-term tax liabilities much more frequently than their tax-managed counterparts

EXHIBIT 12: FREQUENCY OF SHORT TERM TAX LIABILITIES IN DOWN MARKETS

750 total periods considered	TAX MANAGED			TAX AGNOSTIC		
When the market is going down ...	**Moderate**	**Growth**	**Aggressive**	**Moderate**	**Growth**	**Aggressive**
# of down markets	230	280	322	230	280	322
# of down + positive net gains	44	44	36	95	103	108
% of positive net gains	19%	16%	11%	41%	37%	34%

Source: J.P. Morgan Asset Management; data as of December 31, 2020. Simulation begins January 1, 2021.

CONCLUSION

Benjamin Franklin was right when he said that one of life's certainties is taxes, and despite generous tax breaks available for retirement saving, long-term investors continue to be liable for taxes on long-term gains. At the same time, the random walk of asset prices and prudent portfolio rebalancing may incur short-term tax liabilities. Just as investors with an eye on their long-term saving goals should seek to manage through short-term fluctuations in asset markets, so, too, can they draw on established principles and tools to manage short-term tax liabilities. In this way, long-term savers properly account for the long-term tax liabilities that are due. At the same time, they take reasonable steps to manage liabilities that arise purely from short-term market moves – moves that might otherwise damage long-term, after-tax investment outcomes.

Higher taxes do seem all but inevitable, in the U.S. and across many developed economies. With greater fiscal stimulus post-COVID-19 comes a greater need for governments to find sources of revenue through higher taxation. By extension, the impact of active tax management on the post-tax outcomes for long-term savers will increase as prevailing tax rates rise. Although the analytical component of this paper is focused on the U.S., other regions face similar pressures. Higher capital gains taxes present a particular challenge, as we have discussed. While tax rates move broadly higher, the ability to deploy active tax management should help improve long-term post-tax returns for savers already facing a low return environment across many asset markets.

II Assumptions

Higher inflation expectations change the pathways for interest rates

Thushka Maharaj, D.Phil., CFA, *Global Strategist, Multi-Asset Solutions*
Michael Feser, CFA, *Portfolio Manager, Multi-Asset Solutions*
Michael Albrecht, CFA, *Global Strategist, Multi-Asset Solutions*
Jason Davis, CFA, *Portfolio Manager, Global Fixed Income, Currency & Commodities*
Sean Daly, CFA, *Portfolio Manager, Global Fixed Income, Currency & Commodities*
Usman Naeem, *Portfolio Manager, Global Fixed Income, Currency & Commodities*
Joel Ryzowy, *Portfolio Manager, Advisory and Core Beta Solutions*

IN BRIEF

- We raise our cash rate assumptions modestly, in line with this year's slightly higher inflation forecasts but not to exactly equal our inflation forecast upgrade; we expect central banks, in most cases, to maintain negative real rates while inflation rises.
- Our assumptions are little changed but for shortening the window for normalization; we see 10- and 30-year bond yields rising from the start. By rising faster than cash rates, the yield curve steepens for much of our forecast period.
- Central banks' differentiated inflation-targeting credibility influences our assumptions more strongly than usual, changing the speeds at which we expect different economies' cash rates and long bond yields to normalize.
- We expect real cash rates and real bond yields to remain depressed, relative to underlying economic growth, for much of our horizon, reflecting coordinated fiscal and monetary policy, as well as policies broadening to include social goals such as "greening" economies.
- We give a small lift to government bond returns. In credit, U.S. investment grade returns rise while high yield returns decrease, which reduces the relative attractiveness of high yield vs. other risk assets.

ADJUSTING FOR HIGHER INFLATION EXPECTATIONS

This year, our cycle-neutral assumptions at the long end of the yield curve are little changed. We expect 10- and 30-year global bond yields to rise right from the start of our forecast period. We also raise our U.S. cash rate assumptions modestly, from 1.6% last year to 1.8% over our 10- to 15-year forecast period, in line with slightly higher developed market (DM) inflation forecasts.[1]

We expect real cash rates and real bond yields to remain depressed, relative to underlying economic growth, for a prolonged portion of our assumptions horizon. Our forecast assumes better synchronized fiscal and monetary policies across developed economies will persist. It also reflects our expectations that in developed markets policies will broaden to include social goals, such as the "greening" of economies, raising the minimum wage and expanding central banks' definitions of maximum employment.

We expect long-end bond yields to rise ahead of cash rates, steepening the yield curve over much of our forecast horizon. Over our full Long-Term Capital Market Assumptions (LTCMA) time horizon, however, we expect higher cycle-neutral cash rates will mean flatter nominal yield curves than projected in past editions.

Our higher cash rate assumptions don't keep up with our upgrade in inflation assumptions. Our fixed income assumptions lag this year's higher inflation forecast: We expect central banks will, in most cases, maintain negative real rates while inflation rises. The impact on bond markets is clear: Artificially depressed bond yields, via easier than normal policies – particularly monetary policies – will be needed if central banks are to reflate inflation expectations and achieve their target inflation outcomes toward the end of our forecast horizon.

Our higher inflation expectations also imply that the band of uncertainty around our cash rate assumptions has widened relative to past years.

We also expect green bonds, issued to fund sustainable projects, to rise in prominence (see box, **GREEN BONDS: GROWING ATTENTION, RECOGNITION AND ADOPTION BY MAJOR CENTRAL BANKS**).

In the year leading up to this forecast, changes in the outlook for policy had created a roller-coaster ride for bonds, illustrating the market's, and our assumptions', sensitivity to beliefs about how policy will evolve in coming years. Global bond yields rose at the start of 2021 by over 40 basis points (bps), to 1% – as measured by the J.P. Morgan Global Bond Index – on news that economies would be reopening and with the prospect of massive U.S. fiscal spending. In the second half of the year, however, much of those gains had reversed. The index yield fell back to about 70bps, driven by spikes in Delta variant coronavirus infections, constrained U.S. fiscal spending and concerns that central banks might be less tolerant of higher inflation than expected.

At publishing time, the index yield had risen, back up to around 1%, reflecting renewed inflationary concerns and central banks' slightly more hawkish tilt.

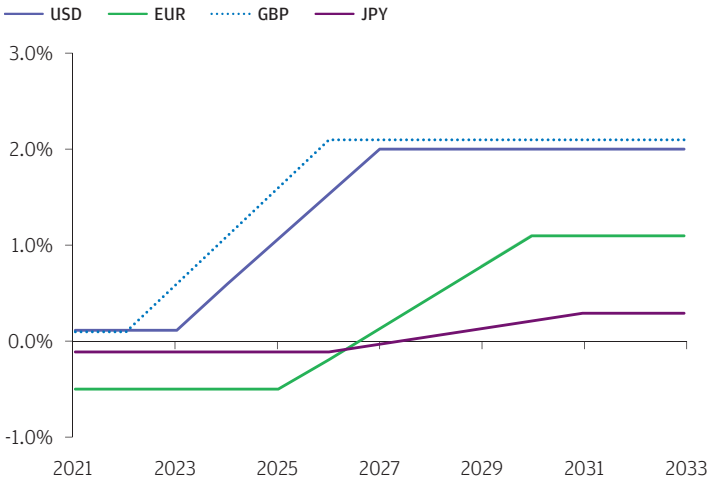
POLICY DIFFERENTIATION: GROUPING CENTRAL BANKS BY INFLATION-TARGETING CREDIBILITY

This year's fixed income assumptions are subject to a stronger than usual influence from countries' central banks' inflation-targeting credibility. This changes the speeds at which we expect economies' cash rates and long bond yields to normalize (**EXHIBIT 1**). We've grouped central banks according to their credibility and normalization speed, a further differentiation from our 2021 assumptions, in which we projected that a synchronized reset of the economic cycle would also align monetary policies.

We use central banks' historical track records of achieving inflation targets to differentiate among economies, producing three groupings: fast, medium and slow (**EXHIBIT 2**).

We see more differentiation in economies' cash rates pathways and normalization windows

EXHIBIT 1: FORECAST EVOLUTION OF DEVELOPED MARKET CASH RATES (%)



Source: Central banks, Bloomberg; data as of September 30, 2021.

[1] Cycle-neutral: The average yield (or rate) we expect after normalization. Our slightly higher inflation forecasts across major developed economies reflect output gaps quickly closing in the wake of the coronavirus recession, and fiscal and monetary policies working together, creating stickier than expected inflation in the pandemic's later stages. For our full set of macroeconomic assumptions, see Michael Hood and David Kelly, "Macroeconomic Assumptions: The new old normal: Inflation outlook moves up, but growth is still constrained," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021.

Our fixed income assumptions are influenced by central banks' differentiated inflation-targeting credibility

EXHIBIT 2: COUNTRIES, GROUPED BY SPEED OF POLICY NORMALIZATION

Group	Countries	Speed of policy normalization	Factors
No issue meeting inflation target	Canada, UK, Norway	Fast	Central banks have not had a persistent problem meeting their inflation mandates.
Apparent cyclical issues meeting inflation goal; addressed by changes to FAIT or YCC	U.S., Australia	Medium	Central banks have missed their inflation goals, but this may be due to cyclical factors.
Structurally unable to meet inflation goal	Euro area, Switzerland, Japan	Slow	Central banks are persistently missing their inflation goals; we see structural factors hampering the inflationary process.

Source: J.P. Morgan Asset Management. FAIT: flexible average inflation targeting; YCC: yield curve control.

U.S. RATES

We raise our cash rate assumption by 10bps, to 2%, to account for rising inflation and our view that the Federal Reserve (Fed) will meet its inflation goal, on average, over our forecast horizon. The real component of the cash rate, however, is lower than last year, in light of the Fed's need to maintain easy monetary policy conditions to reach its inflation target.

We expect cash rates to normalize over four years, starting in 2023. As noted, even with the Fed's adoption of flexible average inflation targeting, the start and pace of normalization should be faster than during the expansion that followed the global financial crisis, but still much slower than in the 1990s or early 2000s (**EXHIBIT 3**).

We keep our U.S. 10-year cycle-neutral yield assumption unchanged at 3% and shorten how long it takes to get there, again reflecting our view that the central bank should start tapering asset purchases in the next year and that bond yields will rise as the economy expands and output gaps close.

EURO AREA RATES

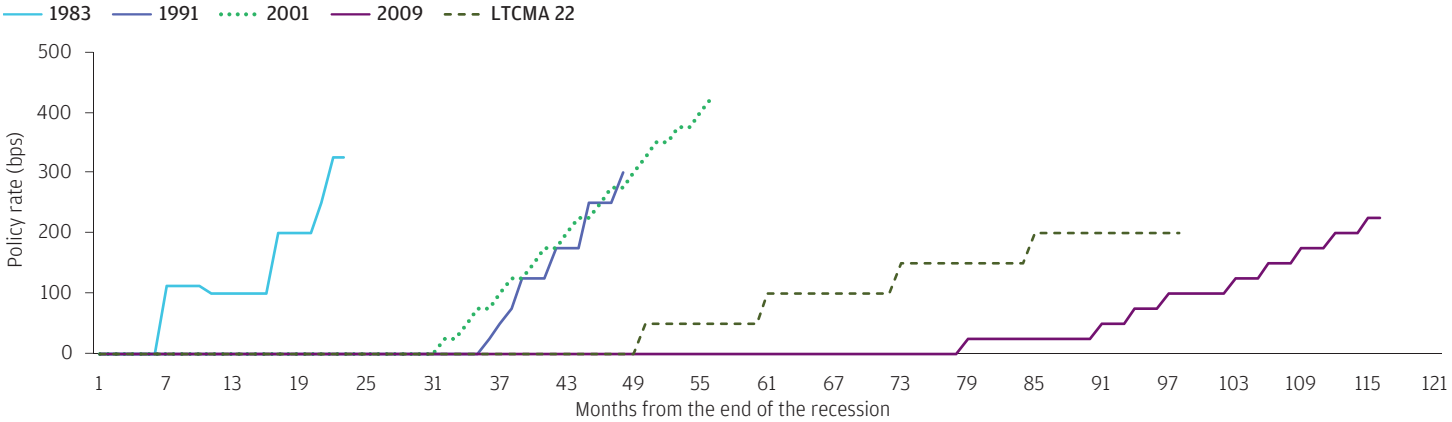
For the euro area, we raise our cycle-neutral cash rate assumption modestly, to 1.1%, adjusting for higher average inflation outcomes. We lengthen the window of normalization to account for our view that the euro area still faces challenges on inflation credibility. This leaves the average cash rate over our forecast horizon at 0.1%, lower than last year's assumption.

The European Central Bank (ECB), since its strategic review announcement in July 2021, now allows for a "symmetric" 2% inflation target.[2] The ECB's stronger commitment to keeping rates low while inflation is below target increases our confidence in the central bank's willingness to wait until inflation picks up to its target before raising rates, and lifts the chances the ECB will eventually reach its objective.

[2] The ECB removed from its mandate of "close to, but below, 2%" the "but below" portion – indicating it will tolerate periods of inflation above 2% in order to meet its inflation objective over the medium term.

We expect an earlier start and faster pace of normalization for U.S. rates than during the last expansion, but a much slower path than in the 1990s and early 2000s

EXHIBIT 3: RATE-HIKING PATH FROM ENDS OF RECESSIONS (YEARS)



Source: NBER, Bloomberg, J.P. Morgan Asset Management; data as of September 1, 2021.

We leave unchanged our 10-year cycle-neutral assumption, 2%, which we forecast will be reached in five years – slower than in the U.S.

JAPANESE RATES

Our cash and 10-year yield assumptions are unchanged for Japan, at 0.3% and 0.9%, respectively. The only change we make is to further lengthen the period until we expect normalization to begin, at both ends of Japan's yield curve. Our Japanese government bonds return assumption increases marginally since last year.

UK RATES

We raise the UK cycle-neutral cash rate to 2.1%, from 2% last year, due to a 20bps rise in expected average UK inflation. We also adjust our 10-year yield assumption modestly higher, to reflect our small upgrade to real growth expected in the UK. The bigger change this year comes in the normalization pathway for both cash and the 10-year Gilt. The UK sits in our first group of countries, which do not face the issue of having undershot their inflation target. We therefore believe the Bank of England (BoE) will be one of the first central banks to raise rates in this new cycle due to inflation. Ongoing uncertainty about the future relationship between the European Union and the UK poses a risk to this view, but given persistently high inflation expectations, the BoE may feel compelled to raise rates.

Our UK government bond return assumption rises significantly this year as a function of much higher starting yields. At publishing time, 10-year Gilt yields were at 1.0%, up significantly from 0.4% a year earlier (**EXHIBIT 4**).

OTHER DEVELOPED MARKETS

We upgrade our cash rates to account for higher expected inflation – in Canada, in line with the U.S., and in European periphery countries, including Sweden and Denmark, in line with the euro area. Cash rates in Canada are on a more aggressive normalization pathway than U.S. rates, as Canada does not engage in average inflation targeting and does not face the same likelihood of falling short of its inflation targets (as some other DM economies do), and thus should see a faster rate of normalization than other economies, including the U.S.

The one place where we reduce cash rates is Australia, by 20bps, to 2.6%, based on its economy's stubborn undershoot in inflation and inflation expectations. We expect that undershoot to translate into relatively more dovish policy in this cycle.

Inflation expectations influence our 2022 assumptions

EXHIBIT 4: STANDARD G4, IG, HY AND EMD FIXED INCOME RETURN PROJECTIONS

	USD		GBP		EUR		JPY	
	Cycle-neutral yield (%)	Return	Cycle-neutral yield (%)	Return	Cycle-neutral yield (%)	Return	Cycle-neutral yield (%)	Return
Inflation	2.3%		2.2%		1.5%		0.7%	
Cash	2.0%	1.3%	2.1%	1.5%	1.1%	0.1%	0.3%	0.0%
10-year bond	3.0%	2.4%	2.5%	1.7%	2.0%	1.3%	0.9%	0.6%
Long-maturity government bonds	3.4%	1.7%	2.7%	0.4%	2.3%	0.1%	0.9%	0.7%
Investment grade credit	4.6%	2.8%	4.2%	2.3%	3.0%	1.5%	1.2%	0.7%
High yield	7.4%	3.9%			5.7%	2.9%		
Emerging market debt	6.7%	5.2%						

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

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.

INFLATION-LINKED BONDS

Across developed markets, our cycle-neutral *real cash* rates have fallen this year, as our inflation forecasts have risen more than those for nominal cash rates. Higher inflation and lower real cash rates are consistent with structurally easier monetary policy. Even with our higher inflation forecasts, the risks around our base case are to the upside for a second year, but less pronounced. This leads us to reduce the inflation risk premia embedded in our breakeven forecasts for all major regions.

The impact of these changes is that our 2022 cycle-neutral breakeven curve assumption is flatter, reflecting our forecast that central banks will consistently meet their targets after normalization. But our real yield curves are actually steeper – a reflection of easier monetary policy depressing the front end and structurally easier fiscal policy putting upward pressure on longer-dated real yields.

As an illustration, our U.S. real cash rate assumption (using CPI for inflation) falls from -10bps to -30bps, and the 10-year implicit real yield declines from 60bps to 50bps, leading to a 10bps steepening in the real yield curve.

CREDIT

Our credit assumptions are little changed from last year, as we continue to believe companies will issue long-maturity debt, be comfortable with their credit ratings (especially BBB and BB) and benefit from the overall low yield environment. While the past year has seen yields rise across developed investment grade (IG) credit markets, yields remain historically low and we forecast that they will remain low for the next decade. While IG returns rise due to higher starting yields, high yield (HY) returns fall slightly because of the significant spread tightening over the past 12 months. That reduces HY bonds' appeal, lowering their position on the stock-bond frontier.

In the past year, credit volatility subsided after a volatile 2020–21; both IG and HY companies' balance sheets strengthened, leading companies to organically de-lever, further tightening spreads. In some markets, central banks' continued purchasing of corporate bonds compressed spreads further.

Investment grade

Our forecast for corporate spreads is little changed from last year. We continue to expect firms to prefer issuing long-term debt over the coming 10 to 15 years. We have introduced some regional differences between the euro area and the U.S. to reflect our expectations of a more active ECB.

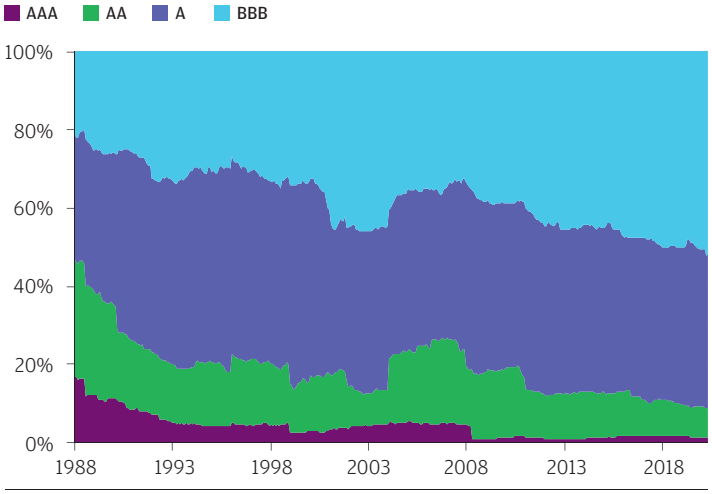
We expect leverage to fall over our forecast period. We believe leverage metrics have peaked and should return to the more normal levels last seen five years ago as a natural result of the recovery in corporate earnings and revenues. While funding conditions are accommodative, we also expect companies will continue to issue debt at the longer end of the curve, keeping the duration of benchmark indices similar to today's. We see the pace of issuance in 2021 continuing, given the historically low cost of funding. Even if corporate ratings don't rise, corporate balance sheets should still benefit from locking in low cost funding for long periods.

As noted, while the Fed has ended its bond purchasing program, the ECB continues to buy investment grade debt, which should continue to anchor spreads in the euro area, albeit at tight levels.

We expect BBB rated credits to continue to dominate the market. Since 2008, BBBs' share of the index has grown steadily; as 3Q 2021 began, it stood at 53% of the Bloomberg IG index (**EXHIBIT 5**). Downgrades fed the increase. Companies also increasingly see BBB and BB as a sweet spot because low yields have lessened the benefit of being higher rated. In the short term, increased balance sheet strength has allowed firms to de-lever; however, we expect pressure in the form of shareholder returns and/or acquisition opportunities will keep ratings stable. Given a strong recovery in profits, we expect companies will have a choice over the coming years: whether to operate with more leverage as BB or to move back into the investment grade universe.

BBB rated credits continue to dominate the investment grade market

EXHIBIT 5: COMPOSITION OF U.S. INVESTMENT GRADE CORPORATE BOND MARKET (%) BY RATING

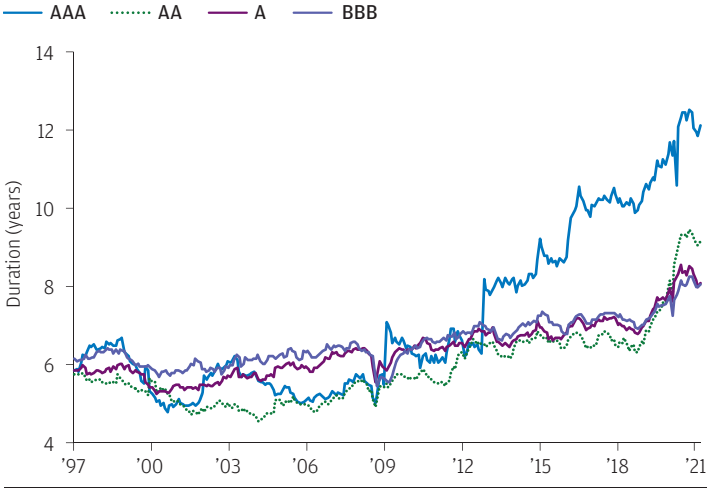


Source: BofA Securities, Bloomberg; data as of April 2021.

Our LTCMAs see low yields for the immediate future, even as companies continue issuing longer-maturity debt, as they've become increasingly comfortable doing over the past decade (**EXHIBIT 6**). The benchmark global index duration was 8.7 years at publication time, vs. 6.7 years, on average, in 2012. Our outlook is for yields to remain low by historical standards, which will keep corporates comfortable issuing longer-term debt.

Duration has risen steadily over the past decade, a lasting change in market composition

EXHIBIT 6: DURATION HAS STEADILY BEEN RISING OVER THE PAST DECADE



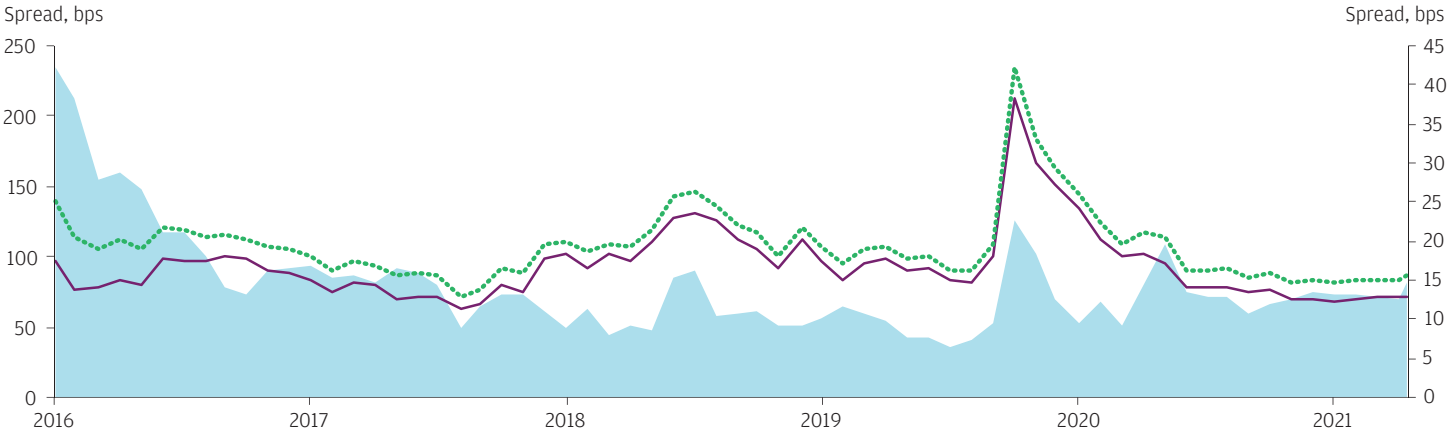
Source: BofA Securities, Bloomberg; data as of April 2021.

Debt levels, which rose as companies issued bonds to raise cash during the sharp 2020 recession (U.S. companies' net debt-to-earnings ratios rose to 2.4x in 4Q 2020), should return to more normal historical levels – a decline that began in the first half of 2021. With economies in various stages of reopening and companies having issued longer-term debt, companies are better equipped to handle any additional COVID-19-related setbacks, and many are now deleveraging.

As noted above, while the Fed's intervention in the IG market has ended, the ECB's has not. In June 2021, the Fed started to unwind its USD 13.5 billion Secondary Market Corporate Credit Facility, launched with a narrowly focused size and time frame to restore liquidity during a period of extreme market stress. Not so the ECB's Corporate Sector Purchase Programme (CSPP), dating to June 2016.[3] We believe the ECB will continue to have an impact on corporate spreads, through explicit buying and/or as markets price in eligible purchases (**EXHIBIT 7**). We reflect this important distinction in our EUR corporate bond spread assumptions, where we believe the fair value spread will be 5bps tighter than it would have been otherwise. We arrive at this estimate based on the average historical spread differential between bonds eligible for ECB purchases and those that are not eligible, of around 15bps – and after adjusting for the proportion of eligible bonds in the overall market. We do not incorporate Fed purchases into our USD bond assumptions because we do not believe the Fed will become a permanent presence in corporate debt markets.

ECB intervention in the IG market is set to continue

EXHIBIT 7: HISTORICAL SPREAD DIFFERENTIAL BETWEEN BONDS ELIGIBLE AND INELIGIBLE FOR CSPP



Source: Bloomberg; data as of September 30, 2021.

[3] The ECB has so far bought EUR 285.3 billion in bonds (equivalent to USD 340 billion at today's exchange rate).

High yield

Our high yield spread assumptions are unchanged for Europe and only modestly decline in the U.S. We leave our default and recovery rate expectations unchanged from last year, at close to, but slightly below, historical averages.

High yield spreads narrowed significantly in 2021 on lower default rates and stable recovery rates – trends we expect to continue in the near term, and which contrast with the unusually low recovery rate of prior years, mostly due to a large number of defaults of highly leveraged energy companies. We do not believe that either recent period is a good predictor for what to expect over the long run. As such, we keep both default and recovery rates close to their long-term historical averages. We do acknowledge that more lenient loan covenants, combined with the rising use of debt to restructure liabilities (now that private equity firms are an important factor in the market) may adversely impact future recovery rates, at the margin.

We also expect the large share of BB rated bonds in the benchmark to continue; as noted, we have incorporated this into our spread assumptions for some time.

The next few years are likely to see lower than normal default rates as revenue and EBITDA growth rebound and financing conditions remain easy. Default rates stayed relatively low during the short recession, thanks to government and central bank support (including to the most vulnerable sectors); we believe this period will mark a low, with default rates returning to near-historical averages over time after topping out at just 6.25% of high yield bonds defaulting in 4Q 2020.

EMERGING MARKET DEBT

In emerging market (EM) hard currency debt, we keep our cycle-neutral spread assumption at 375bps and leave the expected credit loss rate for the index at 0.75%. COVID-19 has been especially challenging for EM economies. Benchmark-weighted credit ratings, which had improved in 2019, have deteriorated since the pandemic began. As a result, an elevated share of issuers continue to have negative outlooks from the major credit rating agencies.

EM countries' budget deficits have ballooned in aggregate, due largely to greater spending on health care and unemployment benefits. Meanwhile, tax revenues have fallen amid weaker activity. While the budget effects should be relatively short-lived, it will take longer for EM countries to meaningfully unwind their debt burdens, accumulated over the last few years and exacerbated by the pandemic recession. Growing pockets of illiberalism and an increasingly protectionist world are likely to be additional headwinds. As a result, we do not expect the average index-level credit rating to exceed pre-pandemic levels over our assumptions horizon.

The benchmark hard currency emerging market debt (EMD) index's starting yield spreads are broadly in line with our long-term fair value assumptions – but some of the apparent value owes to an elevated share of bonds trading at distressed levels. Lebanon is notable: Struggling before the pandemic, the country defaulted in 2020 and now accounts for a tangible share of index spread. As a result, hard currency EMD valuations appear more attractive, on a relative basis, because most other credit assets are trading at spread levels well below our long-term assumptions. As a result, our hard currency EMD return assumption of 5.24% – middling by historical standards – is a fixed income standout this year.

EM local debt

Our overall assumption for EM local bond yield is unchanged at 6.75%, with some underlying regional distinctions: In Asia-Pacific, we make no changes except for China, where we lower our 10-year bond yield assumption, to 3.8%, and our 30-year bond yield assumption by 20bps, to 4.3%. We believe China's bond market liquidity is poised to continue benefiting from inclusion in the benchmark local currency bond indices.[4] Although political headwinds may somewhat limit interest and participation in this market in the future, index inclusion should nonetheless bring additional international investment flows that are likely lower yields somewhat over time. Investors have sought exposure to China's high quality debt for its attractive yields compared with other bond markets of similar credit quality.

In Latin America, we expect yields to fall only gradually from their currently elevated levels, given the headwinds associated with an increase in COVID-19-related government spending, a rise in inflationary pressures and an upswing in political volatility.

In EM corporates, less has fundamentally changed, and we keep our spread assumptions unchanged from last year, at 400bps, after an adjustment in the last edition to incorporate high yield bonds' growing share of the JPM Corporate Emerging Market Bond Investment Grade (CEMBIG) index. Their share has stabilized at close to 45% of the index (up from less than 20%, on average, before 2008).

[4] China was added to the Bloomberg Global Aggregate Index as of April 2019 and to the J.P. Morgan Global Bond Index – Emerging Market (JPM GBI EM) as of April 2020. China's current weight in the JPM GBI EM, 10%, is the maximum weight for an individual country.

GREEN BONDS: GROWING ATTENTION, RECOGNITION AND ADOPTION BY MAJOR CENTRAL BANKS

Milestones have been reached quickly in the rapidly expanding market for green bonds, a market defined by the issuers' commitment to use funds raised for sustainable projects.* One landmark: USD 240 billion in green bonds were issued globally in 2021 (through September), after USD 260 billion issued globally in 2020. These bond sales had vaulted the overall market value of green bonds outstanding over the USD 1 trillion threshold, at publication time.** As green bonds attract increasing attention and institutional adoption, central banks are also leaning in to purchase green securities, offering support to this politically important market.

European Central Bank President Christine Lagarde used the institution's 2021 strategic review to push for more inclusion of green bonds in the ECB's mandate. The Bank of Japan announced in July 2021 its first foray into the space with a green lending plan. We believe central bank involvement is a crucial step in the market's development for two reasons. Central bank purchases:

INTRODUCE A SIZABLE SET OF BUYERS THAT ARE NOT PRICE SENSITIVE, LIKELY ADDING A SPREAD DISCOUNT

The consensus finding of many studies is that corporate green bonds have an associated spread discount of 5bps–10bps.† We believe this is fair and should hold true in the future; the discount could even increase if central bank purchases grow. The effect of ECB purchases of European corporate bonds since 2016 may be a useful analogy. The spread between corporates eligible for ECB purchase and those that are not has persistently remained 10bps–15bps for over five years. We believe it is not unreasonable to expect a similar dynamic to play out with green bonds.

SEND AN IMPORTANT SIGNAL TO THE FINANCIAL COMMUNITY AS A WHOLE

This indirect effect, while harder to quantify, could be just as impactful. Climate change has become ever more present in our lives, bringing with it a rise in investor awareness of environmental – and social – issues. The announcements from central banks around the world in support of green bonds are steps along this road that could spur further green and social bond†† adoption through new regulation, innovation in financial products – and simply greater understanding as market participants read more articles like this one.

The social issues (like essential workers' vulnerability and the rekindling of movements for justice) highlighted during the pandemic, and the indelible images of the largest forest fires ever, among other events in recent years, have brought home for investors the need to incorporate nonfinancial risks into their investment decision-making process. Green and social bonds could be one part of the solution.

---

* While a uniform, international definition of a green bond does not exist, as a general principle they are issued to finance sustainable or environmentally sound projects.

** Bloomberg, September 9, 2021.

† For example, work by J.P. Morgan Securities, 2021.

†† Social bonds are a small but growing area of finance where bond payments are linked to social outcomes.

Better through-cycle returns, challenging starting point

Tim Lintern, CFA, *Global Strategist, Multi-Asset Solutions*
Stephen Parker, *Head of Advisory Solutions, J.P. Morgan Private Bank*
Nandini Ramakrishnan, *Macro Strategist, Emerging Markets and Asia Pacific Equities*
Mallika Saran, *Investment Research and Design, Advisory and Core Beta Solutions*
Christopher Sediqzad, CFA, *Research Analyst, Multi-Asset Solutions*
Sylvia Sheng, Ph.D., *Global Strategist, Multi-Asset Solutions*
Patrik Schöwitz, CFA, *Global Strategist, Multi-Asset Solutions*
Raj Tanna, *Portfolio Manager, International Equities*

IN BRIEF

- Our long-term equity return assumptions are only mildly lower, despite a year of strong equity market performance.
- Our continuing research into equilibrium margin and valuation assumptions leads us to upgrade our fair value estimates, further reflecting the impact of sector composition, leverage, shareholder returns and the rate environment.
- This supports the equilibrium component of our equity return forecasts. The cyclical component of our forward-looking returns, however, becomes a bigger drag, as margins have spiked higher, and are expected to fall from here.
- Emerging market stocks retain their return premium in our forecasts, mainly due to their superior revenue growth prospects. However, that premium has narrowed, and EAFE equities offer a superior Sharpe ratio.

ONLY MODEST CHANGE

Our expected equity return assumptions are mildly lower compared with last year's assumptions. Our modeling of the equity market continues to reflect five key themes:

- **Moderate returns**: We forecast mid-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 challenging starting point**: In many markets, current valuations and profit margins are higher than our long-term estimates of fair value.
- **The importance of shareholder returns**: Anticipating modest earnings growth, we expect a significant portion of returns will come from buybacks in developed markets and from dividends in emerging markets, particularly given the corporate sector remains well capitalized coming out of the pandemic.
- **International premium**: Once again, we assume that non-U.S. equities will outperform the U.S. market. To a great extent, this is driven by the valuations of U.S. stocks – a substantial headwind even relative to our raised equilibrium valuation assumption. Looking past the cyclical elements of our return forecasts, our equilibrium return forecasts for developed and emerging market stocks are closer.
- **The impact of foreign exchange**: In a world of mid-single digit equity market returns, currency is a key consideration. We expect the USD to weaken relative to key developed market currencies, making markets outside the U.S. even more attractive to U.S. dollar-based investors.

Valuations continue to depress our forecasted equity returns. At the time of writing, the 12-month forward P/E ratio for MSCI AC World equity was 18.0x, significantly above the long-term average of 15.8x. Price-to-book ratios are similarly extended, with 12-month forward multiples of 2.7x, vs. a long-run average of 2.0x. Elevated valuations are most prominent in U.S. equity markets, but the phenomenon is present elsewhere, too, even after a move lower in valuations in the middle of 2021. Investors are faced with a puzzle: Will valuations "mean revert" over time, and, if so, what will that do to equity market returns? In the past, starting from levels equivalent to today's valuation levels has resulted in unspectacular returns in equity markets (**EXHIBIT 1**).

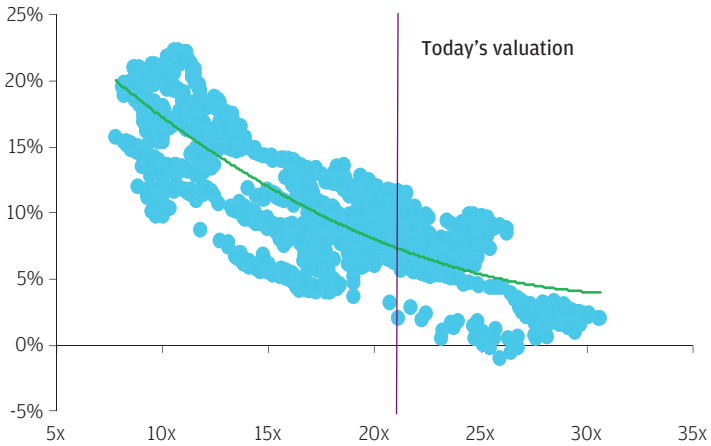
Reasons for optimism

We see several causes for optimism.

First, in relative terms, equities look attractively valued when they are compared with other asset classes, especially fixed income. Global equities currently offer a 5% free cash flow yield, which we expect to grow over time. As such, the opportunity to compound attractive returns from the equity market over the longer term remains intact, particularly given the prospects for increasing shareholder returns.

History suggests that starting from today's valuation levels usually results in subpar equity returns

EXHIBIT 1: DEVELOPED MARKET EQUITIES, 10-YEAR RETURNS (ANNUALIZED) VS. STARTING VALUATIONS, 1973–2011



Source: Datastream, J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 30, 2021.

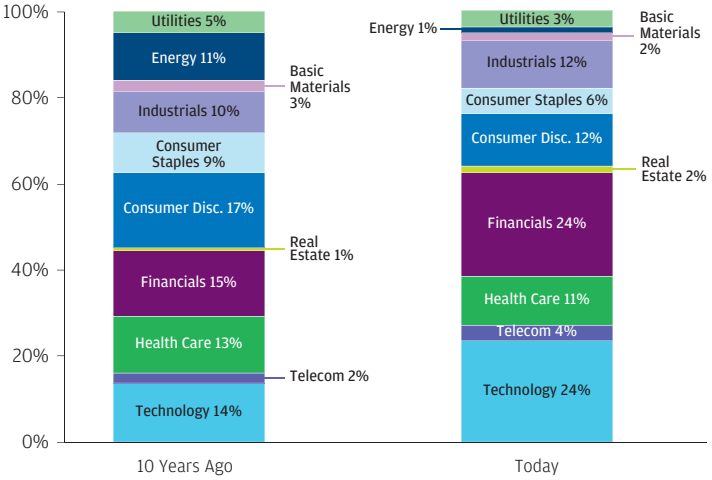
Second, we believe that equity markets can sustain equilibrium P/E ratios (and margins) that are higher than they were in the past. We expect this outcome for several reasons:

- **Sector composition**: Over time, equity markets have become less exposed to cyclical sectors. This reduces the volatility of earnings, which may lead investors to pay a higher premium for those earnings. The growing significance of higher quality "secular growth" sectors, often in technology and consumer products and services, supports our fair value P/E as well as margin assumptions, which are higher than historical averages (**EXHIBITS 2A** and **2B**).
- **Shareholder returns**: Equities are paying more to shareholders (in dividends and buybacks), which may support higher fair value P/E ratios. We expect this to remain an important dynamic, especially in light of the current strength of corporate balance sheets as we come out of the pandemic. We estimate U.S. and European companies have a year's worth of EBITDA in gross cash that they are able to distribute or spend on accretive M&A.
- **Rates**: Our Long-Term Capital Market Assumptions (LTCMAs) forecast interest rates that are higher but still below historical averages. This may support fair value P/E ratios by flattering the cash flows offered by equities relative to bonds.[1]

[1] Historically, the inverse relationship between bond yields and equity market valuations has been less clear outside of the U.S. This may partly reflect the fact that equity markets outside the U.S. are more asset-heavy, meaning that they rely on a lot of capital assets, such as plant and machinery, and generally offer fewer structural growth qualities.

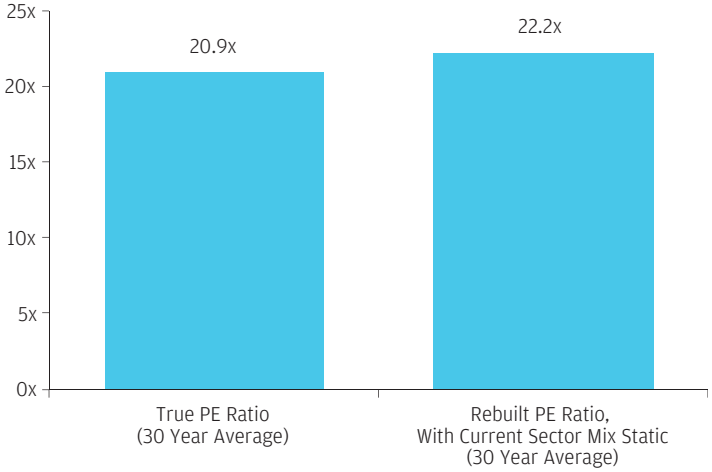
Technology stocks account for a much larger earnings weight than in the past, which may support higher fair value P/E ratios and margins

EXHIBIT 2A: EARNINGS WEIGHT OF U.S. STOCKS BY SECTOR



Simply adjusting historical U.S. P/E ratios for today's sector mix adds 1.3 points to historical average valuations

EXHIBIT 2B: U.S. TRAILING P/E RATIOS, REALIZED AND ADJUSTED FOR SECTOR COMPOSITION CHANGES



Source: Datastream, J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 30, 2021.

- Leverage and capital structure: The use of leverage has been a tailwind to margin sustainability, with interest expense relative to revenue falling in conjunction with a significant extension of the duration of the corporate investment grade bond market.

In aggregate, we make a 0.5x upgrade to our fair value P/E and a 0.4% upgrade to our margin assumptions for MSCI AC World equity. This year marks the most significant upgrade that we have made to our assumptions of equilibrium margins and valuations for a number of years.

U.S. equities

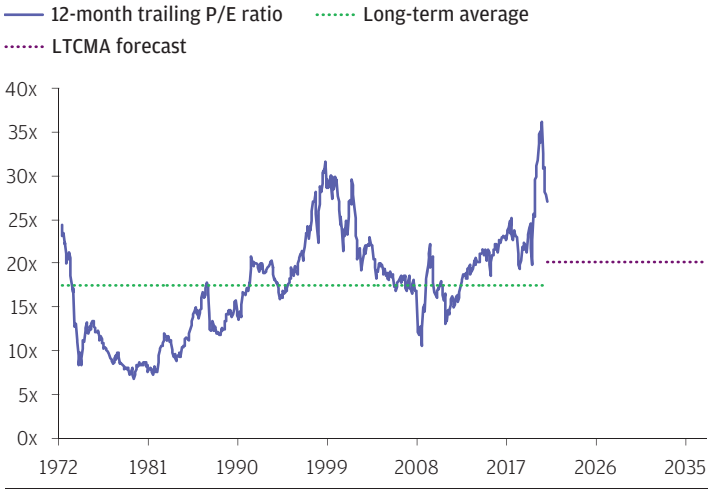
Our expected return for U.S. equities is unchanged at 4.1%, despite a significant rally from last year. This is for two main reasons. First, though the market has rallied, valuations have actually moved lower, reflecting particularly strong earnings growth. Second, by applying a more thoughtful approach to fair value valuations and margins – reflecting the present and likely future composition of the U.S. market – we land on a more optimistic view of U.S. equity returns. Earnings growth, buybacks and dividends continue to contribute a significant proportion of expected return, while margins and valuations continue to drag on performance.

As discussed, we make significant upgrades to our equilibrium assumptions for margins and P/E ratios (**EXHIBIT 3**). The resiliency of corporate profitability for U.S. large caps during the depths of the coronavirus recession in 2020 reaffirmed our conviction that our estimates for higher equilibrium margin assumptions are justified. Moreover, ongoing digitalization across U.S. industries should provide further support. With a backdrop of stable cash flows and dividends, investors are likely to pay a higher multiple for a market with reduced overall cyclicality and inherently less volatility in operating results.

There is a significant difference between the sector breakdowns of the key stock market indices in the U.S. In the new economy U.S. large cap index, the technology sector accounts for 28% of market capitalization, vs. just 13% for small cap indices. We note as well that the growth of private capital formation has allowed companies to stay private longer. Some of the best companies of the coming decade may go public as mid or large cap stocks. As a result, we assign a smaller premium to small caps relative to prior LTCMAs. We upgrade the equilibrium assumptions for mid cap in line with large cap.

For most markets, our forecast for P/E ratios is significantly higher than long-term averages

EXHIBIT 3: U.S. LARGE CAP VALUATIONS AND LTCMA FORECAST



Source: Datastream, J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 30, 2021.

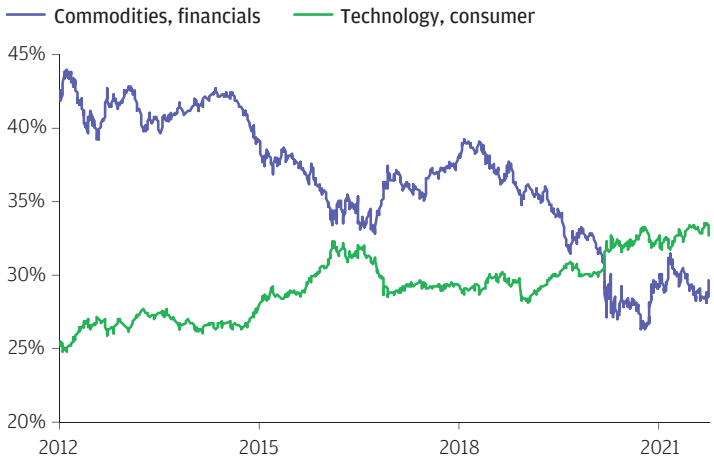
Europe, UK and Japan equities

We make a significant upgrade to our eurozone equity assumptions, from 5.2% to 5.8% in local currency terms.

All in all, we're optimistic about the prospects for European equities. The market's exposure to the tech and luxury goods sectors has increased, and though the quality of European companies tends to be worse than U.S. peers, we see scope for improvement. Both sectors have a secular growth quality that will likely garner high valuations. At the same time, the market's exposure to the commodity and financial sectors has decreased (**EXHIBIT 4**). As a result, the type of economic activity capitalized in the European stock markets is likely to be less cyclical than in the past, and in our view warrants a more elevated multiple. Over the past decade, eurozone markets confronted political crises and a double-dip recession. Today, Europe has taken meaningful steps toward collective fiscal policy. The market looks well positioned to capitalize on growth in environmental technology, such as wind farming. As in other markets, valuations are less of a headwind relative to last year.

Europe's stock market is now more geared to technology and consumer sectors than to commodities and financials

EXHIBIT 4: MSCI EUROPE, SECTOR WEIGHTS



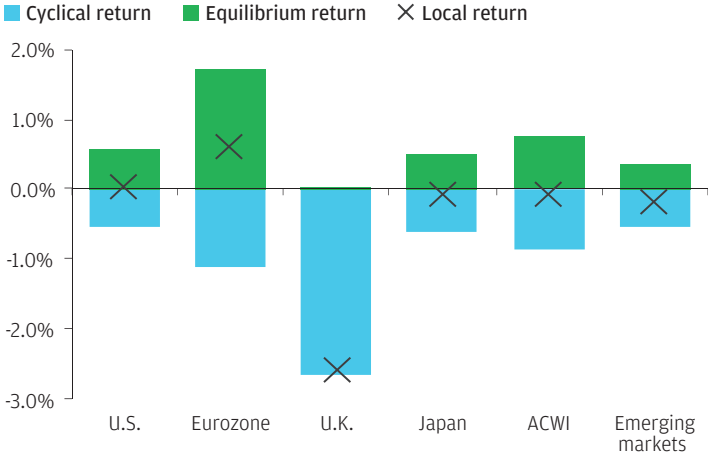
Source: Datastream, J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 30, 2021.

Conversely, our expected returns for UK equities fall precipitously from 6.7% to 4.1%. Year-on-year, the biggest driver comes from the impact of margins. Profit margins were very low in September 2020, still reflecting issues stemming from the COVID-19 pandemic. Today, they are sharply higher, now sitting above our long-term estimates. Unlike markets such as the U.S. and Europe, the UK has not benefited from our closer look at the impact of sector composition on valuations and margins. As such, while the cyclical component of our forward-looking return for the UK has moved lower, there has been no pickup in our equilibrium return for this market (**EXHIBIT 5**). Given the region's weighting toward energy and materials companies, the UK large cap market may struggle to garner investor interest as the financial community continues to focus on climate policy. We are more positive about UK small caps. A number of these companies are benefiting from a combination of secular trends, such as the structural underbuild of UK housing. They also benefit from growth into overseas markets, which is a common strategy for retail companies.

Our return assumption for Japanese equities falls from 5.1% to 5.0% in local currency terms. After upgrading our fair valuation assumptions as part of our new methodology, we now see the Japanese market as fairly valued. Margins remain a key detractor, though. While we are optimistic about the prospect for profit margins to stay well above historical averages, today's starting point is elevated.

Most markets receive significant upgrades to their equilibrium returns this year: the UK is a notable exception

EXHIBIT 5: CHANGE IN LTCMA EQUITY RETURNS, 2022 VS. 2021, IN CYCLICAL AND EQUILIBRIUM COMPONENTS



Source: Datastream, J.P. Morgan Asset Management Multi-Asset Solutions; data as of September 30, 2021.

Emerging market equities

Our expected return for emerging market (EM) equities ticks down, to 6.60% from 6.80% in local currency terms. In USD terms, it falls to 6.90% from 7.20%. The return premium we expect from emerging markets relative to developed markets drops only marginally, to 210 basis points (bps) in USD from last year's 230bps (**EXHIBIT 6**).

Over the past year, EM equities once again underperformed developed market (DM) equities. A key driver of this was the Chinese equity market, which accounts for 30% of the EM equity universe. Chinese equities peaked in early 2021 amid concerns about economic growth and increased corporate regulation.

Declining economic growth forecasts for a number of EM economies – reflecting a variety of factors – weigh on return forecasts. We make notable GDP growth downgrades in India due to disappointing progress on structural reforms and a likely persistent overhang

from a weakened financial sector, and in Brazil due to policy instability. However, growth potential in EM economies still surpasses their DM counterparts, thanks mostly to the prospects for improved productivity and – outside of parts of East Asia – more favorable demographics.

Translating economic growth into emerging market equity returns is a nuanced process that investors need to consider as they determine their allocations. We once again caution that data history in emerging economies is generally shorter and data quality less robust, so confidence in the resulting assumptions is naturally somewhat lower than for developed markets.

We continue to note the dispersion among returns in individual emerging markets. Variations in market structure, sectoral composition, corporate governance and external exposure all contribute to the spread among individual EM market returns.

We derive our aggregate EM equity assumption by applying the same methodology we use for DM equity assumptions to nine large emerging markets and aggregating by market capitalization weight. The countries we include account for more than 80% of the market capitalization of the MSCI Emerging Markets Index.

We highlight a few changes in our EM regional return assumptions. EM EMEA return assumptions are now 20bps lower than last year, at 8.40%. This reflects lower shareholder dilution in Russia and bigger margin headwinds in both Russia and South Africa. For Latin American markets, return assumptions rise by 110bps, to 9.1%, due to a positive valuation impact, mostly in Brazil and somewhat in Mexico. EM Asia return assumptions decline modestly, by 30bps, to 6.2%. This reflects downgrades to a number of markets, notably Taiwan due to an expected normalization of elevated margins and MSCI China due to increased valuation and dilution headwinds amid greater uncertainty.

Our 2022 equity return assumptions decline across most regions

EXHIBIT 6A: SELECTED DEVELOPED MARKET EQUITY LONG-TERM RETURN ASSUMPTIONS AND BUILDING BLOCKS

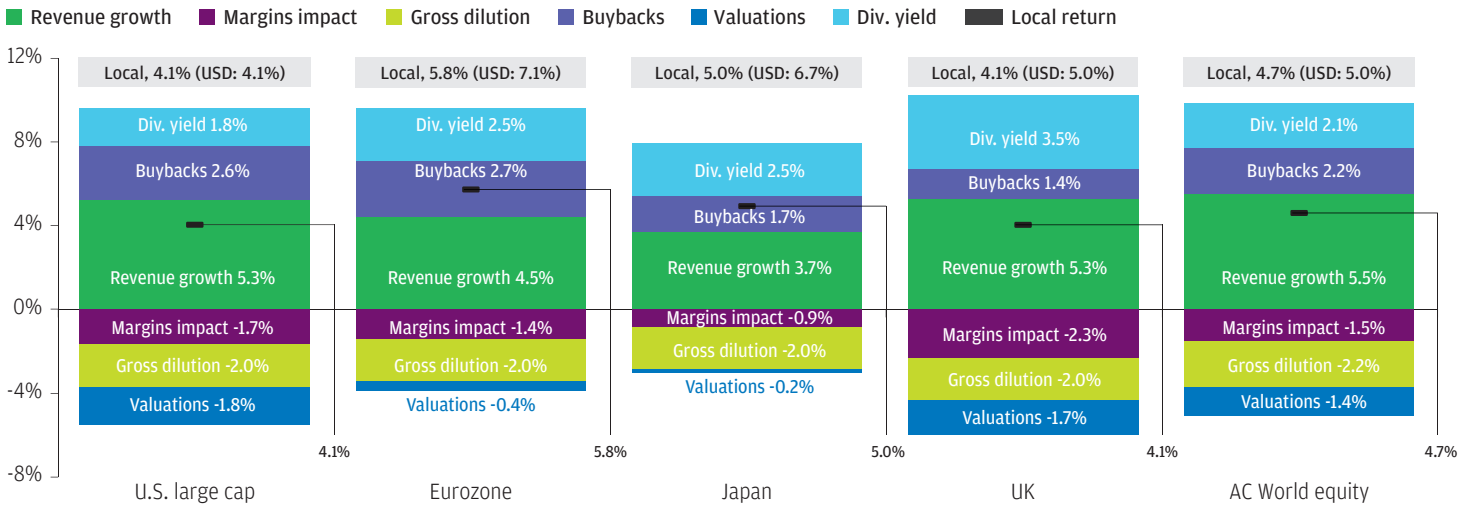
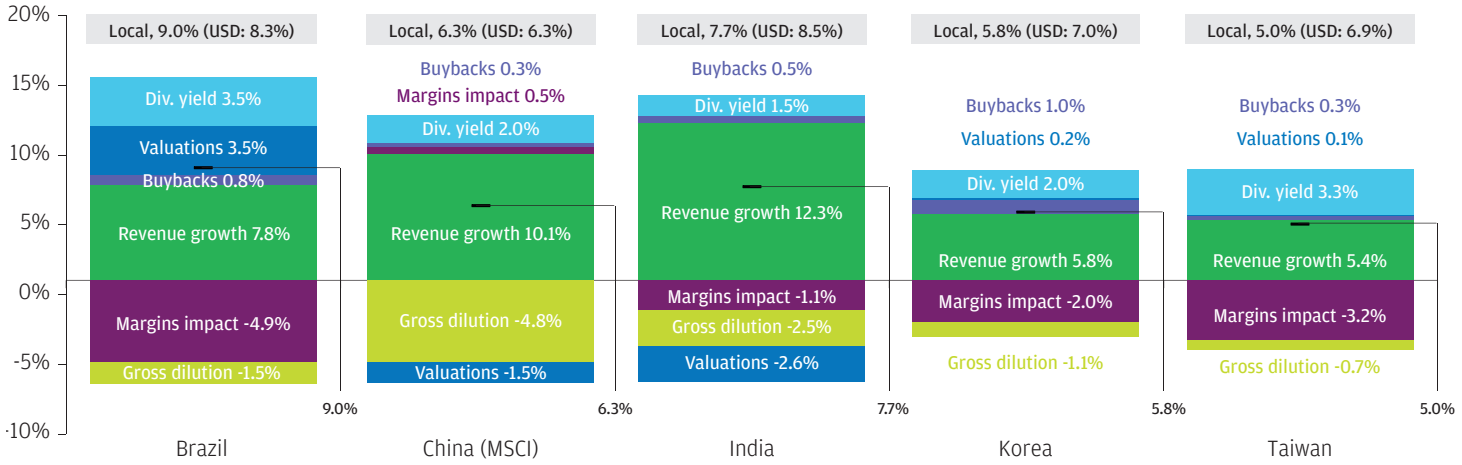


EXHIBIT 6B: SELECTED EMERGING MARKET EQUITY LONG-TERM RETURN ASSUMPTIONS AND BUILDING BLOCKS



Source: J.P. Morgan Asset Management; estimates as of September 30, 2020, and September 30, 2021. Components may not add up to totals due to rounding.

EQUITY FACTORS

Joe Staines, *Portfolio Manager and Research Analyst, Quantitative Solutions*
Garrett Norman, *Investment Specialist, Asset Management Solutions*

EQUITY FACTOR ASSUMPTIONS

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 1** and **2**).

METHODOLOGY

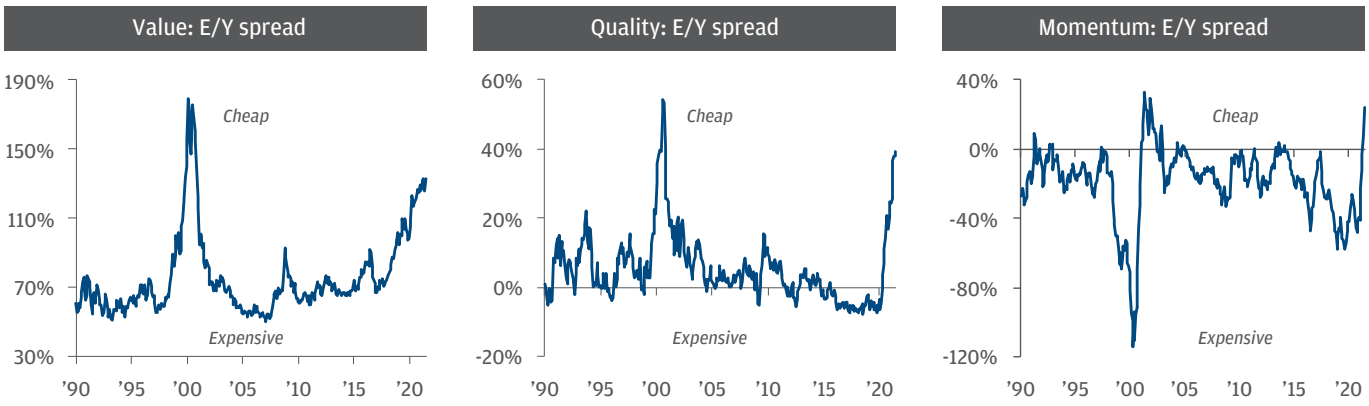
We determine our long-term assumptions by examining properties of two index suites, designed by J.P. Morgan Asset Management and calculated by FTSE Russell. The J.P. Morgan Diversified Factor Suite describes the performance of stocks chosen for their characteristics across multiple factors; the J.P. 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 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 both factors are as cheap as they have been since the dot-com bubble. 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.

Valuations suggest significant excess returns vs. passive U.S. large cap equity exposures

EXHIBIT 1: FACTOR VALUATIONS, 1990-2021



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 as a result of composition shifts among top-ranked and bottom-ranked momentum stocks rather than price action.

EXHIBIT 2: RETURN ESTIMATES

		U.S.					
		DIVERSIFIED	VALUE	QUALITY	MOMENTUM	DIVIDEND	MIN VOL
Equity market beta	(1)	0.9	1.0	0.9	1.1	1.0	0.8
Market return contribution	(2)	3.7%	4.1%	3.8%	4.4%	4.0%	3.4%
Factor return contribution	(3)	1.6%	1.5%	0.9%	0.3%	1.2%	1.2%
Long-only factor strategy return assumption (2022)	**(2)+(3)=(4)**	**5.3%**	**5.6%**	**4.7%**	**4.7%**	**5.2%**	**4.6%**

CONVERTIBLE BONDS

Winnie Liu, *Portfolio Manager, International Equities*

Convertible bonds are corporate debt securities that the holder can convert into equity in the future under certain conditions. Like a debt security, convertibles are issued with a coupon, maturity date and redemption value. However, they also come with an embedded call option, allowing the holder to exchange them for a certain number of shares of the issuer's equity at a predetermined price.

The hybrid nature of convertible securities allows for modest income from the coupon, downside protection due to the bond element and potential for upside equity participation from the option component. As such, convertibles can be used by equity investors as a more defensive alternative, as well as by fixed income investors.

Convertibles 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. As such, 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 our existing LTCMA projections for equity and fixed income, along with convertibles' equity sensitivity, credit quality, option premium and the underlying stocks' unique characteristics. 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. Thus, our convertible bond assumptions estimate regional betas based on a historical regression and apply that to our regional weight and delta assumptions, and the existing regional equity return LTCMA numbers.

In our view, the current trend of more issuance coming from the Americas and Asia-Pacific ex-Japan will continue. We believe the delta of the convertible bonds will continue to move higher as more growth 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. In our view, there will be greater high yield issuance as a result of higher growth companies issuing convertibles. This year, our global convertible bond and global credit-sensitive convertible bond assumptions (hedged into USD) are 5.5% and 4.6%, respectively.* Credit-sensitive convertibles are securities whose underlying stock trades significantly below the conversion price, resulting in behavior more akin to debt than equity.

* The jump in Asian high yield returns this year has boosted returns for the global convertible aggregate by around 60bps.

Is the U.S. dollar unassailable as the premier reserve currency?

Michael Feser, CFA, *Portfolio Manager, Multi-Asset Solutions*
Thushka Maharaj, D.Phil., CFA, *Global Strategist, Multi-Asset Solutions*
Michael Akinyele, *Global Strategist, Multi-Asset Solutions*

IN BRIEF

- During the pandemic-induced global recession, the USD was a more resilient safe haven than other currencies; today, it remains well behaved while demand rebounds. We continue to view the currency as overvalued but have some reservations about forecasting the magnitude and timing of its depreciation.
- A narrowing in global yield differentials as relative growth tilts in favor of economies outside the U.S. suggests an erosion of the USD's secular strength.
- As in last year's projection, we think that a weaker starting point for the U.S. economy in this cycle can act as the catalyst for our long-held expectation of secular USD depreciation; however, we do not see an imminent catalyst.
- Vs. the USD, we expect that:
  - the eurozone's strong external account, union-wide fiscal risk-sharing and robust fundamentals will drive the euro's appreciation;
  - the pound sterling will appreciate as the end of uncertainty over Brexit outweighs the still-adverse reality of a narrow Brexit that is hurting export growth;
  - the Japanese yen, whose purchasing power has reached a half-century low, will appreciate at least nominally;
  - although the Chinese renminbi enjoys strong secular support, it will not become a premier reserve currency in the near term, and geopolitical tensions will limit its appreciation to less than fundamentals alone would imply.
- Our methodology for estimating the purchasing power parity of developed market currencies has been refined: We now systematically remove housing inflation from our calculations.

OUR CONVICTION ON U.S. DOLLAR DEPRECIATION HOLDS – WITH SOME RESERVATIONS

We maintain our conviction that the USD is due for a secular decline, but several recent developments temper what we expect to be the magnitude and timing of that decline (**EXHIBIT 1**).

Demand for the USD over other reserve currencies remained reliably resilient throughout the severe, sharp global recession induced by the COVID-19 pandemic. Once again, the dollar asserted its historical safe haven characteristics. Since growth began recovering aggressively, the U.S. dollar has continued to perform remarkably evenly within a narrow range. Even while exposed to an unprecedented mix of macroeconomic, geopolitical and monetary and fiscal conditions, the USD has experienced relatively tame volatility. What's noteworthy amid the growth recovery is the narrowing of yield differentials among global economies as relative growth differentials begin to tilt in favor of economies outside of the U.S.

Looking ahead as the cycle unfolds, how do we reconcile the tension between the forces that favor a stronger U.S. dollar and those that indicate weakening? On the one hand, we expect that even in the post-recession regime the U.S. dollar's position as the premier global trading and reserve currency will remain unassailable. On the other hand, the reduced relative global growth differentials and narrowing bond yield differentials indicate that U.S. exceptionalism in cyclical economic performance has been eroded. On balance, this should allow the U.S. dollar to remain resilient but over time to become less overvalued than is currently the case.

The structural forces favoring a relatively stronger USD have limited impact on our currency assumptions from year to year, as these factors have been in place for quite some time and are not expected to change significantly over the Long-Term Capital Market Assumptions (LTCMA) horizon. We maintain our view from last year that the U.S. dollar has remained significantly overvalued in purchasing power parity (PPP) terms when compared with a broad basket of other currencies, and the inflation differentials we project are likely to eventually exacerbate this overvaluation over our assumption horizon.

We therefore continue to expect a secular decline of the U.S. dollar, although we expect the magnitude of the decline to be marginally less than what we had assumed previously. We also expect that a successful rotation of growth leadership away from the U.S. toward other regions of the global economy is a prerequisite.

DIVERGENT CENTRAL BANK POLICIES; UNCERTAIN CONSEQUENCES

Our currency assumptions are contingent on a successful reflation of the global economy as a whole rather than a successful reflation of just the U.S. economy. While the initial signs are encouraging, there remain considerable uncertainties in the form of ongoing global supply chain issues, geopolitical tensions, the meandering path of COVID-19 infection rates and the pace of vaccination campaigns around the world.

Valuations, albeit with less vigor, continue to signal dollar depreciation

EXHIBIT 1: ASSUMPTIONS FOR CHANGES IN SELECTED CURRENCY EXCHANGE RATES VS. USD, NOMINAL AND REAL

	NOMINAL			REAL			FORECAST LEVEL (CONVENTIONAL)			
	2022	2021	Chg	2022	2021	Chg	2022	2021	Chg	Chg %
Australian dollar	0.20%	-0.10%	0.30%	0.10%	0.20%	-0.10%	0.74	0.71	0.03	4.23%
Brazilian real	-0.70%	1.00%	-1.70%	1.00%	3.50%	-2.50%	5.96	4.97	0.99	19.92%
Canadian dollar	0.50%	0.80%	-0.30%	0.10%	0.60%	-0.50%	1.19	1.21	-0.02	-1.65%
Swiss franc	1.60%	1.10%	0.50%	-0.10%	-0.40%	0.30%	0.76	0.80	-0.04	-5.00%
Chinese renminbi	1.60%	1.20%	0.40%	-0.40%	0.10%	-0.50%	5.29	5.85	-0.56	-9.57%
Euro	1.30%	1.40%	-0.10%	0.50%	0.70%	-0.20%	1.36	1.39	-0.03	-2.16%
British pound	0.90%	0.80%	0.10%	0.80%	0.80%	0.00%	1.51	1.43	0.08	5.59%
Japanese yen	1.70%	1.40%	0.30%	0.10%	0.10%	0.00%	90.13	88.63	1.50	1.69%
Mexican peso	-1.90%	0.00%	-1.90%	-0.35%	1.90%	-2.25%	26.18	22.04	4.14	18.78%
Swedish krona	1.40%	1.50%	-0.10%	0.90%	1.10%	-0.20%	7.37	7.43	-0.06	-0.81%

Source: J.P. Morgan Asset Management; data as of September 30, 2020 and September 30, 2021.

Global monetary policy at the time of writing is extraordinarily easy, but developed market (DM) central bank policy biases have become increasingly differentiated. This differentiation is a consequence of central banks' varied past experiences achieving their stated policy objectives, and the lessons they have drawn for future policy. The lessons primarily impact their policy objectives and their policy reaction functions. Based on these, central banks can be sorted broadly into four groups: leaders, experimenters, laggards and the undecided.

THE LEADERS: Leaders in monetary normalization are the central banks whose policymakers are content with their track records and have neither shifted their policy objectives nor their reaction function materially following the COVID-19 recession. In those countries, inflation expectations are credibly at or approaching target. The Bank of Canada, the Bank of England and Sweden's Riksbank, among them, consider current conditions adequate to allow for a tapering of support in the near future. Within the LTCMA framework, we find that these economies' FX rates are already fairly close to fair value, and we do not project much widening in their inflation differentials vs. the U.S.

THE EXPERIMENTERS: These central banks' policies have become more experimental, as they failed to achieve their objectives in the past. They have adjusted their objectives and/or policy frameworks, implying a much slower withdrawal of monetary support than before. The Federal Reserve (Fed) headlines this subset. Fed policy communication has emphasized within its reaction functions prioritizing targets apart from inflation, such as sustainable employment. Also central to the Fed's new policy frameworks: a willingness to persistently overshoot the inflation target for some time, at least in the initial stages of an economic cycle.

There's also an experimental tone to the Reserve Bank of Australia's (RBA's) dovish lurch, which pushes back heavily on market pricing of monetary policy normalization. At this point, however, the RBA's change in stance seems to reflect Australia's severe undershoot of the inflation target just before the pandemic more than the kind of change in policy that informed the Fed's shift.

The experimenters' shift away from orthodox policy increases the uncertainty about the consequences of these policy innovations over time. Our 2022 LTCMA inflation forecasts, of 2.3% for the U.S. and 2.2% for Australia, reflect our "in dubio pro reo" (roughly, "innocent until proven guilty") approach, but the range of plausible outcomes has certainly widened compared with the past.

THE LAGGARDS: In this category is a central bank whose inflation track record is essentially unanchored from its policy target: the Bank of Japan (BoJ), which has not even come close to achieving its inflation target in decades. Here, even experimental policies will not suffice to achieve the central bank's policy objective, and the onus rests on increased monetary and fiscal policy coordination. Given the scale and complexity of the task, even the LTCMAs' long time horizon is likely too short for a full convergence of the Japanese yen toward its PPP-implied fair value. As such, we adjust our assumption to reflect our expectation that JPY will not reach its fundamental fair value over our forecast horizon.

THE UNDECIDED, notably absent from the above groups, are led by the European Central Bank (ECB). PPP fair value signals a significant valuation tailwind for the euro (as for the yen), and, like the BoJ, the ECB failed in the prior cycle to achieve its inflation objective. Grouping the eurozone with Japan is therefore inviting, but we don't. As it stands, the ECB fails to fit neatly into any single group. It remains to be seen whether the ECB, after some further soul-searching, comes to sit with the experimenters or with Japan.

Our LTCMA inflation forecast for the euro area of 1.5% increases from last year but remains well below the ECB's revised 2% inflation target. (The target now is to realize 2% over time; before, it was defined as "close to, but below, 2%," suggesting a realized midpoint below 2% over time). The ECB will have to decide whether to settle for less, like the BoJ, or be willing to experiment more with policy, like the U.S., in order to achieve its target.

METHODOLOGY

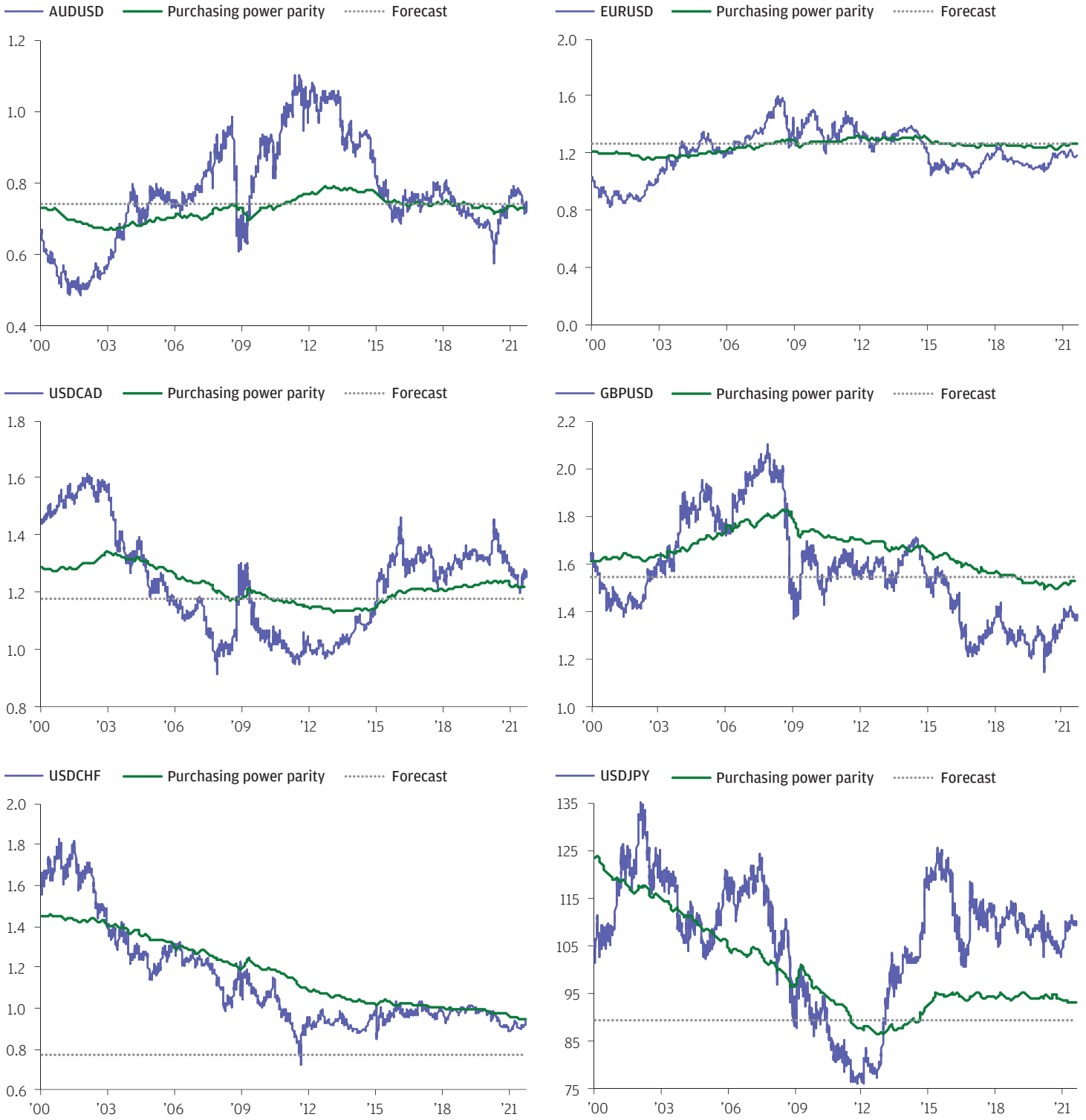
As in prior years, we continue to rely on PPP as the basis of our approach for determining today's fair value exchange rates. While the underlying concept of PPP is simple enough, there is a significant level of complexity in empirically measuring price levels and comparing data series across countries, given differences in the methodologies used by national statistical agencies. To better address one of the more notable differences, we extended our previous LTCMA methodology and now systematically strip out housing-related inflation from national price series data in our calculations of present-day fair value (**EXHIBIT 2**).

To arrive at a given exchange rate projection over our assumption horizon, which we also refer to as future fair value, we adjust today's fair value exchange rate using the LTCMAs' underlying macroeconomic assumptions, as follows: For developed market currencies, we reflect the expected change in a country's terms of trade over the assumptions horizon by adjusting today's fair value for the projected inflation rate differential between the two countries. For emerging markets, we make an additional adjustment for the expected differential in GDP growth per capita.[1]

[1] For a more detailed explanation of the approach, please see Roger Hallam, Nigel Rayment and Neil Weller, "Currency valuation methodologies," J.P. Morgan Asset Management, June 23, 2021.

Relative to recent history across DM currencies, the deviation between spot exchange rate to USD and PPP fair valuation is extremely narrow

EXHIBIT 2: : PPP FAIR VALUE AND SPOT EXCHANGE RATES RELATIVE TO OUR 2022 LTCMAS FOR SELECTED CURRENCIES



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

MAJOR CURRENCY PAIRS

The euro

Underpinning our euro assumption is the region's impressive external account position. As we discuss in our LTCMA Fixed Income Assumptions, we expect absolute short-term rates and their differentials to be historically muted this cycle. Amid collapsed interest rate differentials, the yield-seeking private capital outflows necessary to recycle the euro's current account surplus will likely be limited. This should over time create a cyclical catalyst to allow the euro's strong structural fundamentals to drive its appreciation.

Further supportive of the euro's external account surpluses are foreign investment flows into European equities. By avoiding another double-dip recession experience – a sharp contrast with the beginning of the last cycle – European risk assets' performance, particularly equities, has kept much better pace with their U.S. counterparts. What has likely played a role in this change of fortune is a chastened European Union (EU), now avoiding sovereign debt default risk and instead leveraging the economic distress from COVID-19 to introduce fiscal risk-sharing and investment-focused fiscal stimulus across the union through the EU Recovery Fund.

Long-term cross-border flows into the euro area look likely to be supported both by the progress toward further political integration and what we expect will be improved equity market returns as a result of a more vigorous cyclical recovery. Both cyclical and secular drivers have begun to align favorably for an appreciation of the euro.

The above impact is partially offset by our change in methodology for determining the euro's PPP-based fair value. The inconsistent treatment of imputed housing rental costs notably exacerbated the eurozone's persistent inflation deficit vs. the U.S. When we systematically correct this effect by excluding housing sector inflation from our PPP-derived fair value, it suggests that the euro is, in fact, less undervalued vs. the U.S. dollar today than hitherto estimated.

On balance, the impact of a widening U.S. vs. eurozone inflation differential is largely canceled out by the reduced undervaluation of the euro vs. the U.S. dollar on a PPP basis.

Reflecting these dynamics in our assumption, we expect the euro to appreciate by 1.3% per annum (p.a.), a small reduction from 1.4% per annum in last year's edition, with a fair value exchange rate at the end of the LTCMA horizon of 1.36.

Pound sterling

We have long noted the uncertainty premium overhanging sterling due to Brexit. At long last, a free trade agreement between the UK and the eurozone now exists in the EU-UK Trade and Cooperation Agreement. Admittedly, while the deal falls short of the economic integration that existed when the UK was an EU member state, it does provide the foundation for preserving bilateral cooperation. Naturally, our expectations for the sterling's fair value need no longer reflect an uncertainty premium associated with a no-deal Brexit outcome. Rather, our focus has moved to quantifying the adverse economic reality of a narrow deal.

Notably, the UK's surplus in trade of services to the EU has already begun to narrow as export growth lags – a medium-term downside risk to GBP fundamentals. Compounding this, supply chains in Northern Ireland have already shown an early indication of movement away from the rest of the UK, skewing further negative the outcomes for foreign direct investment inflows. As these and other consequences of what was de facto a fairly "hard Brexit" unfold, we have raised our target for sterling, but by less than what it would have been using the pre-Brexit path. In sum, we expect the sterling to appreciate by 0.9% per annum, up from last year's Brexit-uncertainty discounted 0.8% p.a., implying an exchange rate at the end of the LTCMA horizon of 1.51.

The yen

In an acknowledgment of Japan's stubbornly low rates of inflation, we have excluded the region from our broad upgrade to DM LTCMA inflation forecasts. All else equal, this widens the projected inflation differential vs. the U.S. such that the yen would have to appreciate even further on the path toward future fair value. As with the euro, our systematic removal of housing inflation from fair value calculations serves to partially offset this.

Japan's current account surplus and attractive long-term valuations together continue to imply a substantial nominal appreciation of the yen vs. the U.S. dollar. While these conditions have been present for some time, the absence of trend yen strength at the same time is noteworthy. Instead, the yen's purchasing power has fallen to levels not seen since 1973, when the country transitioned to a floating exchange rate regime.

Likely contributing to the yen's persistent undervaluation is the continued acceleration of net outbound capital investment, a direct result of the efforts of the Bank of Japan to reflate the economy through ultra-accommodative interest rate policy. As interest rates have collapsed and converged globally, we expect this dynamic to moderate. We expect these reflationary policies to be required for quite some time, limiting our enthusiasm about a vigorous appreciation of the yen.

Pulling this together in our assumption, we see the yen appreciating by 1.7% per annum, up from last year's 1.4%, and an exchange rate at the end of the LTCMA horizon of 90.13.

The Chinese renminbi

At least in the initial stages of this cycle, China's desire to attract investment flows and support its exports' competitiveness will limit the renminbi's near-term appreciation potential. Also, though Sino-U.S. geopolitical tensions have receded from the fore, the likely persistence of the two countries' strategic rivalry is a further structural headwind to the renminbi's appreciation over time.

Longer term, China's opening and transition to a more balanced growth model is central to the administration's goals and offers strong secular support for the renminbi's further appreciation. As such, we do not expect the risk premium for international investors for participating in Chinese markets to normalize fully in the near term. We also caution against expecting a swift ascent of the renminbi to a premier reserve currency status and therefore continue to reflect a somewhat smaller amount of appreciation than a full convergence to our PPP fair value would imply.

These dynamics are reflected in our assumption, with the Chinese currency appreciating by 1.7% per annum, up from last year's 1.2%, and an exchange rate at the end of the LTCMA horizon of 5.29.

Reaching investment objectives when traditional assets may not be enough

Anthony Werley, *Chief Investment Officer, Endowments & Foundations Group*
Pulkit Sharma, CFA, CAIA, *Head of Alternatives Investment Strategy and Solutions*
Nicolas Aguirre, CFA, *Head of Portfolio Construction & Risk, Endowments & Foundations Group*
Shay Chen, CFA, CAIA, *Alternatives Strategist, Alternatives Investment Strategy and Solutions*

IN BRIEF

A fertile environment for alpha generation drives our estimates for financial alternatives. Real asset assumptions are flat to slightly lower than last year's, due in part to a more advanced economic recovery. Our return assumptions are for the median manager; due diligence is key to realizing the full potential of an allocation.

- **Private equity (PE):** Return assumptions increase slightly. Continuing innovation and transformation, expanding PE markets globally and new, potentially return-enhancing investment tools energize alpha.
- **Direct lending:** Return estimates are stable year on year, even as underwriting disciplines and yield premiums vs. public debt hold steady and asset growth rises.
- **Hedge funds:** Assumptions are raised for most major strategies on expectations for an alpha upturn. Our outlook anticipates reductions in fees, asset flows and competition, along with rising rates, volatility, return dispersion and allocations to private investments.
- **Real estate:** Return estimates decline slightly across regions, given lower or flat starting yields partially offset by stronger net cash flow growth. We expect continued performance dispersion among sectors and improvement in rental rates. **REITs** returns are also down, reflecting less upside potential following their recent strong recovery.
- **Infrastructure:** Return estimates are unchanged. We expect stronger GDP growth, inflation and accommodating fiscal policy to support stable, income-driven returns from these essential assets.
- **Transport:** Return projections are down slightly, but our outlook remains strong, driven near term by positive supply/demand conditions and longer term by these assets' vital role in global economic growth.
- **Commodities:** Return assumptions increase despite the past year's substantial rise in commodity prices. We project a premium above inflation, on average, over the remainder of the cycle, yielding a strong full-cycle return. The return premium for **gold** vs. broad commodities narrows.

OVERVIEW

The past year's significant equity outperformance and continued low rate environment, despite a strengthening economic cycle and heightened inflation expectations, reinforce the essential and expanded role we see for alternatives in a diversified multi-asset portfolio. **EXHIBIT 1** summarizes our 2022 and 2021 return assumptions for median managers across selected alternative strategies. As always, thoughtful allocation and prudent selection of top-tier managers remain critical in realizing the potential for alpha, income and diversification that alternative investing can provide.

EXHIBIT 1: SELECTED ALTERNATIVE STRATEGIES – RETURN ASSUMPTIONS (LEVERED,* NET OF FEES, %)

FINANCIAL ALTERNATIVES	2022	2021
PRIVATE EQUITY (USD)		
Cap-weighted composite**	8.10	7.80
Small cap	7.40	7.30
Mid cap	7.60	7.40
Large/mega cap	8.40	8.00
PRIVATE DEBT (USD)		
Direct lending†	6.90	6.80
HEDGE FUNDS (USD)		
Equity long bias	3.30	3.40
Event-driven	3.20	3.10
Relative value	3.80	3.60
Macro	2.70	2.20
Diversified††	3.60	3.30
Conservative††	3.30	3.10

REAL ASSETS	2022	2021
REAL ESTATE – DIRECT (LOCAL CURRENCY)		
U.S. core‡	5.80	5.90
U.S. value-added	7.70	8.10
European core‡‡,◊	4.80	5.00
European value-added◊	6.80	7.70
Asia-Pacific core‡‡	6.50	6.60
REITS (LOCAL CURRENCY)		
U.S. REITs	5.70	6.50
European REITs◊◊	5.10	5.90
Asia-Pacific REITs^	5.00	6.40
Global REITs^^	5.40	6.40
INFRASTRUCTURE (USD)		
Global core	6.10	6.10
TRANSPORT (USD)		
Global core	7.40	7.60
COMMODITIES (USD)		
Broad commodities	2.60	2.30
Gold	3.00	2.90

Source: J.P. Morgan Asset Management; estimates as of September 30, 2020, and September 30, 2021.

* 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.

† Direct lending assumptions for 2022 and 2021 are not directly comparable. See footnotes in direct lending section for a detailed explanation.

†† 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.

‡ U.S. core real estate in our assumptions comprises 90% prime high quality real estate assets and 10% value-added development assets. This exposure is consistent with the composition of the benchmark NFI-ODCE Index.

‡‡ Our 2022 assumptions are not directly comparable to our 2021 assumptions due to a change in methodology: For our 2022 estimates, to improve consistency across regions, we match the composition of European and Asia-Pacific core real estate to that of the U.S. (90% prime core and 10% value-added risk exposure). Previously, our European and Asia-Pacific core real estate assumptions included only prime core exposure.

◊ This year, we combine previously separate assumptions, for European ex-UK and the UK, into our European assumptions for both core and value-added real estate.

◊◊ As with core real estate, in 2022 we have combined two previously separate assumptions, European ex-UK and UK REITs, into a single European REITs assumption.

^ Asia-Pacific REITs follow a developed market construct and cover a slightly different geographic exposure from that of Asia-Pacific core real estate.

^^ The global composite is built assuming the following weights: roughly 60% U.S., 20% Europe and 20% Asia-Pacific.

FINANCIAL ALTERNATIVES: AN IMPROVING ALPHA OUTLOOK

We anticipate improving opportunities for alpha generation within private equity and hedge funds, and continuing yield premiums for direct lending over public markets.

*In the case of **private equity**, digital transformation extending well beyond new economy sectors; changing consumer preferences; and environmental, social and governance (ESG) mandates draw some parallels to other periods of substantial change that resulted in intervals of elevated alpha. For **hedge funds**, as the financial cycle matures, the opportunity for greater dispersion within equity and credit markets increases, driving the alpha outlook even as the potential portfolio risk-return benefits of allocating to hedge funds likely improve on the margin. In **direct lending**, underwriting discipline, declining defaults and steady yield premiums vs. public credit markets bode well for delaying the expected decline in private to public market return spreads.*

No financial strategies outlook is complete without highlighting the wide dispersion in manager performance around our median industry return projections, especially within the private equity space.

PRIVATE EQUITY – ACCELERATING INNOVATION, DISRUPTION AND CO-INVESTMENTS DRIVE THE ALPHA OUTLOOK HIGHER

Our 2022 private equity (PE) return assumptions rise slightly from last year's (**EXHIBIT 2**). The public market return component declines but is offset by a boost to our alpha expectations – to 3.00% for a median manager, applied to all fund sizes. Our higher alpha projections are driven by what we believe will be a rising tide of innovation and disruption in the decade ahead, which represents a prime opportunity for effective PE sponsors to generate incremental alpha. Investors may, however, experience a wide dispersion of outcomes.

Private equity assumptions are slightly higher, with expectations for lower public market returns offset by a rise in alpha

EXHIBIT 2: PRIVATE EQUITY RETURN ASSUMPTIONS (USD, %)

	2022	2021
Small PE (<USD 1bn)	7.40	7.30
Mid PE (USD 1bn–USD 5bn)	7.60	7.40
Large/mega PE (>USD 5bn)	8.40	8.00
Cap-weighted*,**	8.10	7.80

Source: J.P. Morgan Asset Management; estimates as of September 30, 2020, and September 30, 2021.

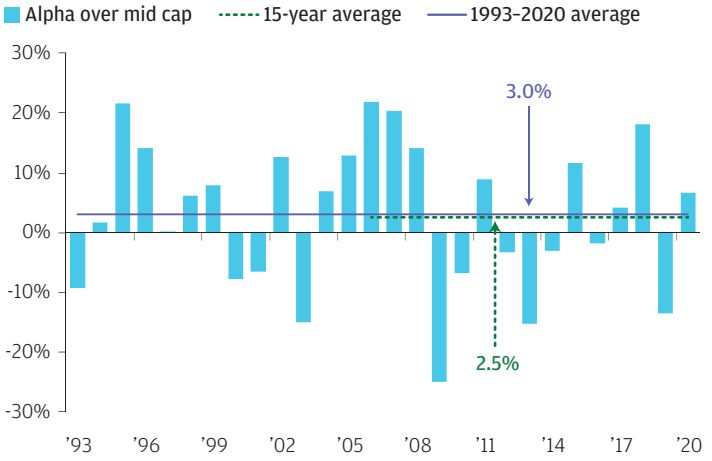
* The private equity composite is AUM-weighted: 65% large cap and mega cap, 25% mid cap and 10% small cap. Capitalization size categories refer to the size of the asset pool, which has a direct correlation to the size of companies acquired, except in the case of mega cap. ** The regional weights for the capitalization-weighted PE composite are: U.S.: 65%; Europe: 20%; Japan: 5%; Asia ex-Japan: 10%.

Conversations with participants in private equity paint a robust picture; many are even ebullient in their assessment of conditions for generating returns above those of public markets. Yet headwinds to meeting the rate of return investors require for leveraged and illiquid investments are also formidable: Conditions like today's elevated purchase price multiples, resurgence of fundraising after a down 2020 and larger fund sizes (on top of already significant levels of dry powder) have historically been precursors to periods of alpha stagnation or decline.

However, with what appears to be another decade of innovation and transformation ahead, and new investment tools to enhance returns, we believe the PE outlook is healthy enough to generate adequate returns above the public markets (**EXHIBIT 3**).

Our 3% alpha assumption is above the trailing 15-year average but in line with the longer-term trend

EXHIBIT 3: HISTORICAL PREMIUM OF PE TO U.S. MID CAP EQUITY (1993–2020)*,**



Source: Bloomberg, Burgiss Private iQ, J.P. Morgan Asset Management; data as of June 30, 2021.

* 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.

"All sectors are game on"

Our assumptions are premised on increasing innovation and disruption across many sectors, not simply those that are part of the new economy. Just as the private equity industry helped bring about the sectoral transformations of public markets toward technology and communication services over the past 10 to 15 years, we expect it to continue to act as a change agent, helping to enable growth and operational efficiency in many areas of the economy.

While technology and health care generate most of the transformation and growth headlines, PE-driven change is also occurring in sectors such as retail and industrials. A breadth of deal activity and an enthusiastic tone prevail across the economy. In the words of one market participant, while software deals at 20x price-to-EBITDA[1] are still easier to get done than industrials at 8x, "All sectors are game on."

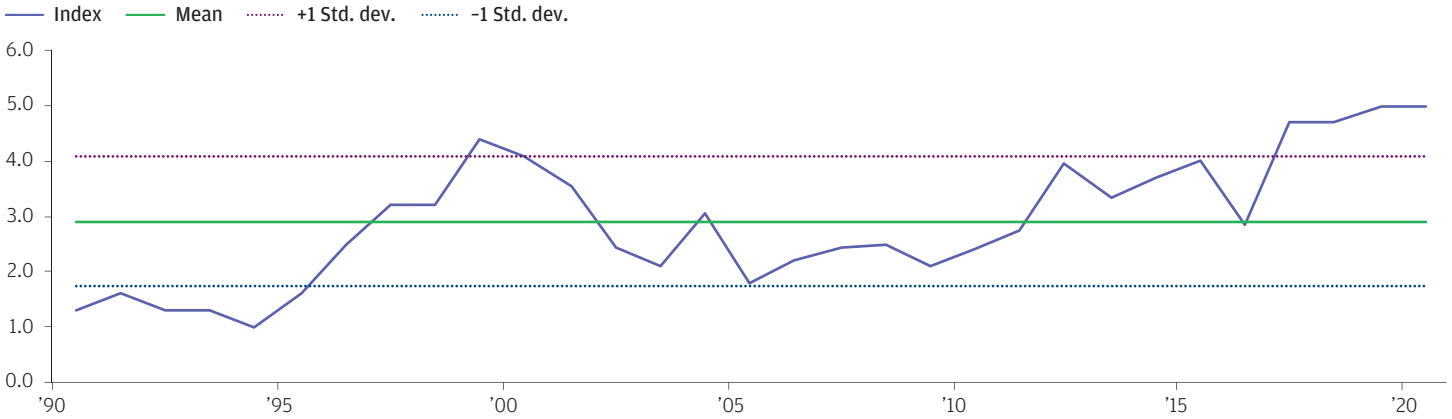
Comparing excess returns to the 1990s' period of change and transformation

In the 1990s, a transformative economic regime coincided with an elevated period of private equity alpha – a concurrence we see as reasonably consistent with the PE industry's contributions of value-additive capital, flexible operational strategies and long-term focus on corporate value creation. Is a similar situation likely now? Conditions for the private equity industry were materially different then in key ways, including lower levels of dry powder – absolutely and relative to the size of the economy. But there were also similarities, such as elevated valuations in the public and private equity markets.

We constructed a generalized innovation index covering the past 30 years that, while simple in composition, gives a reasonable macro perspective on the magnitude of economic change taking place. Conditions in the 1990s stand out as the closest to what we expect over our 10- to 15-year assumption horizon (**EXHIBIT 4**).

A likely tide of innovation and disruption ahead, similar in many ways to the 1990s, supports our constructive alpha outlook

EXHIBIT 4: THE INNOVATION INDEX



Index components	Weight
Software, intellectual property and processing equipment capex as a % of potential GDP	30%
U.S. FDA drug approvals	30%
Information technology weight in the S&P 500	30%
Pharma and biotech R&D as a % of sales	5%
New U.S. patents (inventions)	5%

Source: U.S. Bureau of Economic Analysis, Congressional Budget Office, Empirical Research Partners, Standard & Poor's, U.S. Food and Drug Administration, U.S. Patent Office, J.P. Morgan Asset Management; data as of June 30, 2021.

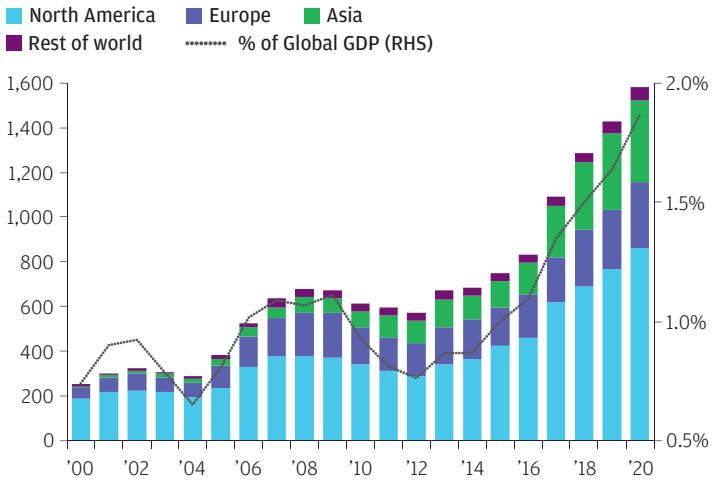
[1] Earnings before interest, tax, depreciation and amortization.

Alpha potentially rises with geographic diversification, co-investments and subscription LoCs

Geographic investment diversification beyond the U.S. – in particular, in Asia ex-Japan – is playing an increasingly important role in driving our PE return assumptions (**EXHIBIT 5**). Another important driver of our outlook is the growing presence of co-investments in private equity allocations. According to a proprietary J.P. Morgan study, these direct investments have net median internal rates of return (IRRs) that are approximately 4% higher than for primary funds.[2] Assuming a 10% weight in PE portfolios, these investments may translate to 0.40% of incremental alpha. Finally, while not embedded in our PE assumptions, the use of subscription lines of credit (LoCs) are increasingly commonplace throughout the industry and may also support returns.

Greater overseas participation in private equity helps drive our 2022 return assumptions

EXHIBIT 5: DRY POWDER BY PRIMARY GEOGRAPHIC FOCUS (USD BN)



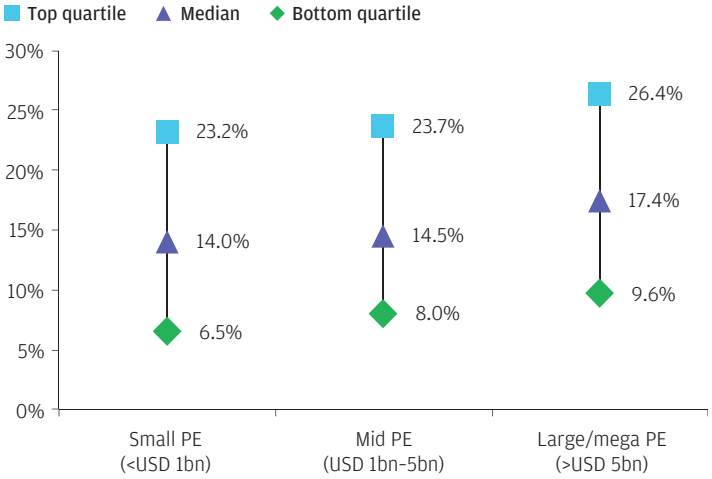
Source: International Monetary Fund, Preqin; data as of December 31, 2020.

Dispersion of manager returns and execution strategies potentially widen outcomes

With historically wide dispersion in manager performance, an inherent factor in private equity investing has been the ability to identify and access above-average managers. Recently, peer group dispersion has compressed somewhat, but manager selection remains a crucial element in achieving an adequate return premium (**EXHIBIT 6**).

Manager selection remains critical to realizing the full potential of a private equity allocation

EXHIBIT 6: HISTORICAL RETURNS BY MANAGER PERCENTILE RANKING (IRR, USD)*



Source: Burgiss Private iQ, J.P. Morgan Asset Management; data as of June 30, 2021.
* Includes buyout and expansion capital funds for vintages 2005–19.

[2] Michael Cembalest, "Food Fight: An update on private equity performance vs public equity markets," *Eye on the Market*, J.P. Morgan Asset Management, June 2021. Direct investment return premiums are partially discounted in our assumptions.

DIRECT LENDING – DEMONSTRATING RESILIENCE THROUGH THE ECONOMIC CYCLE

Our 2022 long-term levered return estimate for direct lending is 6.90%, down from 7.39% in 2021[3] but still considerably above estimates for public fixed income markets, including U.S. high yield at 3.90%.

The reduction reflects our view that weighted-average coupon spreads are likely to decline as competition within the direct lending space continues to increase, evidenced by new market entrants and sizable capital inflows.[4] The lower return assumption also anticipates an increase in the cost of financing as the risk-free base rate rises.

A reassuring response to the pandemic

While the long-term influence of the COVID-19 crisis on the direct lending market is still playing out, the strategy has proven to be resilient despite short-term dislocations caused by the pandemic. Signs of that resiliency include:

- Unrealized gains across portfolios through 2Q 2021 that have offset and reversed an early 2020 spike in unrealized credit losses[5]
- A healthy liquidity premium of approximately 130 basis points (bps) over public debt and broadly syndicated loans[6]
- Stronger credit protections in loan documentation vs. loans originated prior to the pandemic
- A tick downward from 2020 highs in nonaccruals[7] as the U.S. economy continues to recover and companies take advantage of lower 2021 borrowing costs to refinance debt and accelerate repayments to direct lenders

DEAL FLOW has been strong and is projected to increase as middle market deal volumes rebound from 2020 lows and business development companies (the main drivers of direct lending activity) continue to grow their total assets. Several sectors – notably health care and tech – have demonstrated continued strength and are driving both new loan origination and private equity sponsor deal flow (another key growth engine for direct lending). Private equity sponsors remain optimistic and have resumed fundraising, thus increasing their dry powder for buyout and portfolio company mergers and acquisitions activity. Finally, a significant volume of outstanding loans in the S&P Leveraged Loan Index will mature in 2025, which is likely to drive future refinancing deal flow for upper middle market direct lenders that compete with the broadly syndicated loan market.

PORTFOLIO PERFORMANCE has relied heavily on sector exposure, asset seniority within the capital structure (evidenced by many managers choosing to originate a larger percentage of transactions as *senior* secured first lien debt) and the ability to select assets with business models that are inherently resilient to the knock-on effects of the COVID-19 virus.

Direct lending has begun to show its potential as a resilient asset class. We expect both assets under management and direct lending deal flow to grow as investors continue to search for yield and as the asset class evolves from a core holding in most institutional portfolios to a core staple of insurance and retail investment portfolios as well.

[3] The LTCMA methodology for direct lending has been enhanced; credit cost and subsequent charges are applied to levered yield. Using this methodology to derive the 2021 levered return assumption yields an 8.19% return, which is approximately 139 basis points (bps) higher than the previously published 2021 levered return assumption of 6.80%. In addition, the 2022 estimate for cost of financing uses the current cost of debt for direct lending managers, adjusted for the expected increase in cash rates between the current three-month LIBOR rate and the future LTCMA cash rate. If the methodology used to derive the 2022 estimate for cost of financing were used in 2021, the 2021 levered return assumption would have been 7.39%, roughly 59bps higher than the previously published 2021 levered return assumption of 6.80%.

[4] Over USD 72 billion of new capital was raised in the first half of 2021, in line with the USD 151 billion raised in all of 2020 (PitchBook Global Private Debt Report; data as of June 30, 2021).

[5] J.P. Morgan Asset Management, based on S&P industry data, Wells Fargo Business Development Company Index and Cliffwater Direct Lending Index; data as of June 30, 2021.

[6] S&P LCD Q2 2021 Middle Market Review; data as of June 30, 2021. References yield spread of institutional middle market loans over large corporate loans.

[7] Nonaccruals are typically defined as cash-interest bearing loans with payments 90 days or more overdue.

HEDGE FUNDS – A STABLE OUTLOOK WITH POTENTIAL FOR ENHANCED ALPHA OPPORTUNITIES

Our hedge fund assumptions are raised modestly from last year's across most major strategy groups. Estimates are bounded by our assumptions for public market beta but strengthened by our outlook for invigorated alpha. Expectations for rising market volatility and inter- and intramarket dispersion, coupled with the increasing role of private and niche strategies, inform our view (**EXHIBIT 7**).

The market conditions and performance of 2020, while unlikely to recur with great frequency, illustrate the potential for at least periodically strong hedge fund returns. Our multi-asset class risk and return assumptions call for a diversified hedge fund strategy to be additive from a portfolio optimization perspective, if not stellar on an absolute return basis.

An improving environment for alpha boosts our assumptions

EXHIBIT 7: HEDGE FUND RETURN ASSUMPTIONS (USD, %)

STRATEGY	2022	2021
Equity long bias	3.30	3.40
Event-driven	3.20	3.10
Relative value	3.80	3.60
Macro	2.70	2.20
Diversified*	3.60	3.30
Conservative**	3.30	3.10

Source: J.P. Morgan Asset Management; estimates as of September 30, 2020, and September 30, 2021.

* 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.

Short- and long-term contributors to the alpha outlook

Our historical trend analysis suggests alpha may have bottomed and is showing signs of a potential upturn (**EXHIBIT 8**). Additionally, several sets of factors support our expectations for improving alpha conditions over the long term:

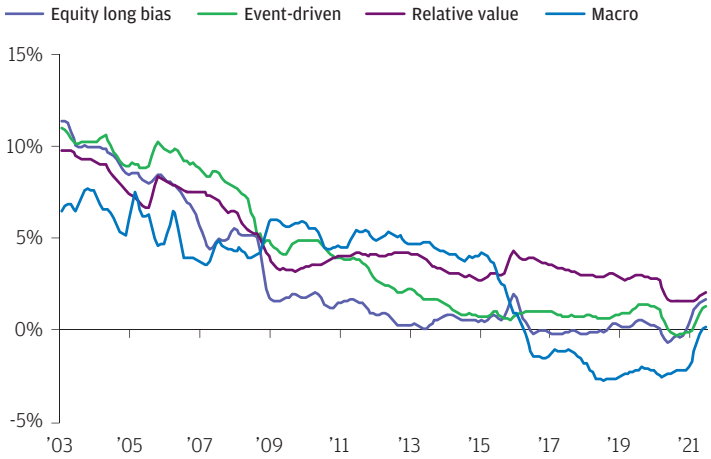
BETTER INVESTOR CONDITIONS: We expect further decreases in average fees on both the management and the performance sides, muted flows and a continued reduction in the number of managers competing for still-scarce alpha (**EXHIBIT 9**).

IMPROVING INVESTMENT CONDITIONS: Our assumptions call for rising interest rates, volatility and dispersion of returns – basic longer-term building blocks of the alpha outlook.

INCREASING ALLOCATION TO PRIVATE OR HYBRID INVESTMENTS: We expect these allocations to continue to increase steadily and, over the course of our evaluation time frame, to exceed the low to mid single-digit allocations estimated last year. We believe private investments have the potential to generate a return profile superior to the base case hedge fund outlook and more in line with our average manager private debt and equity projections of 6.9% and 8.10%, respectively.

Alpha trends appear to have troughed

EXHIBIT 8: MODEL-ESTIMATED, ANNUALIZED ALPHA*

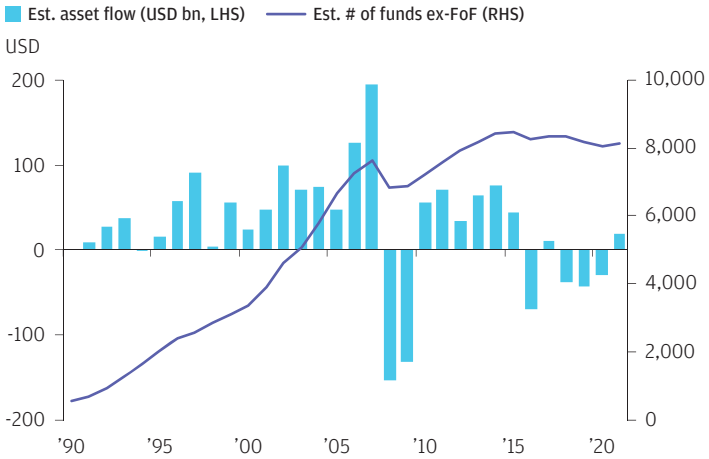


Source: J.P. Morgan Asset and Wealth Management; estimates as of June 30, 2021.

* The annualized alpha estimates are based on the unexplained residuals from a proprietary monthly multi-factor regression model used to derive the betas that guide our forecasts.

Industry trends are supportive of enhanced alpha generation

EXHIBIT 9: HEDGE FUND NET ASSET FLOW AND NUMBER OF FUNDS



Source: HFR; data as of June 30, 2021.

In the short term, SPACs, IPOs and other capital markets activities can enhance the environment for alpha generation, but we believe they represent somewhat ephemeral windows of opportunity vs. long-term alpha trends.[8] Niche strategies (such as statistical and convertible arbitrage and equity capital markets trading) able to capture these short-term opportunities may be capable of generating returns above the average outlook for relative value and event-driven strategies, for example.

Macro and relative value outlooks marginally improved vs. the average strategy

Macro returns are modestly upgraded from last year's assumption, consistent with our Long-Term Capital Market Assumptions (LTCMA) outlook for a number of return drivers. Those drivers include rising volatility vs. trailing longer-term averages; a rising rate outlook for the next three to seven years, depending on the region and investment tenor; and a continuation of the upward price phase of the commodity cycle for another few years, based on average cycles. Other likely contributors to improved macro returns: an upgrade to the outlook for some cross-asset factor returns, intra-asset opportunities – particularly within foreign exchange – and, to a limited extent, value spreads generally.

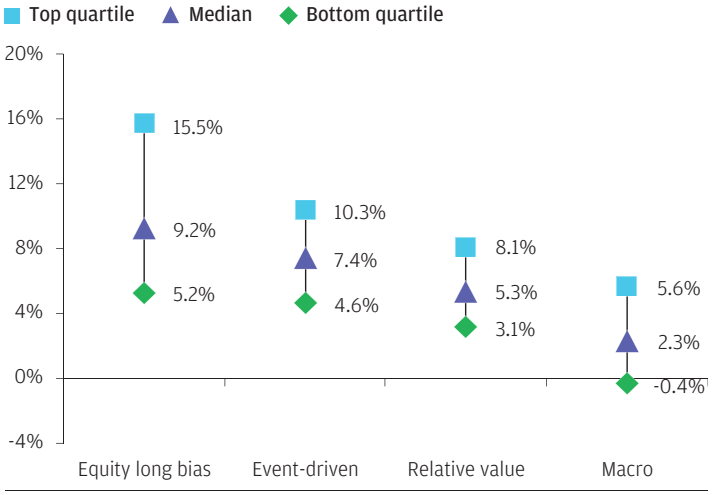
The outlooks for many of the core strategies within relative value are lackluster, based on the projections for investment grade and high yield markets. As previously noted, however, the significantly above-public market return outlook for private debt, well captured within the relative value space, adds to our return assessment of the broad strategy class.

Hedge funds in a portfolio context and the importance of dispersion in determining an allocation

On an absolute basis, the diversified strategy return assumption of 3.60% compares favorably with the outlooks for both core global fixed income and U.S. fixed income, and is equivalent to that of a 55/45 global stock-bond mix or a 50/50 U.S. mix. More importantly, our return, volatility and correlation projections, used within an optimization framework, suggest hedge funds can play an additive role in full spectrum investing.[9] This potential may be materially augmented when hedge fund strategies can be executed above the median returns modeled in our assumptions (**EXHIBIT 10**).

Manager selection is vital to achieving the potential benefits of a hedge fund allocation

EXHIBIT 10: DISPERSION OF ANNUALIZED MANAGER RETURNS (%), JULY 2016 TO JUNE 2021*



Source: HFR, J.P. Morgan Asset Management; data as of June 30, 2021.
* Returns adjusted for survivorship bias.

[8] A special purpose acquisition company (SPAC) is essentially a shell company that is established to raise capital in an initial public offering (IPO) with the purpose of using the proceeds to acquire an existing company sometime in the next two years. Being acquired by a SPAC is a way for a private company to go public and access liquidity without going through the more traditional IPO process.

[9] Jared Gross, Paul Kennedy and Grace Koo, "Portfolio Implications: Portfolio construction – Moving toward a new architecture," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021.

REAL ASSETS: ATTRACTIVE INCOME-DRIVEN RETURNS IN A CHALLENGING PUBLIC MARKET ENVIRONMENT

Our long-term assumptions for real asset returns have declined slightly from last year's assumptions, as the economic recovery has advanced to a more mature stage. However, our risk-adjusted return estimates remain attractive in the context of the outlook for most traditional assets.

Relative to other asset classes, core real assets have exhibited resilience during the pandemic, with many sectors generating stable income and downside protection through their exposure to long-dated contractual cash flows. In the post-pandemic recovery, we expect continued resilience from tech and COVID-19-enabled sectors such as industrial, logistics, single/multi-family and residential within real estate; renewables and utilities within infrastructure; and energy logistics and maritime within transport. The recovery of sectors negatively impacted by the pandemic, such as retail and aircraft, may find renewed support as the reopening advances and the movement of people and goods picks up.

Real assets are well positioned for a potential rise in inflation, since many sectors have implicit or explicit inflation linkage characteristics. Other attributes of real assets that may support their performance in an inflationary environment include an inherently slow supply response, accretive leverage in a low interest rate environment, the potential for rising replacement costs and improved rental/lease rates.

Finally, we expect ESG considerations to become an increasingly integral component of asset management, creating opportunities for value improvement in real assets through sustainable investments.

GLOBAL REAL ESTATE – RETURNS DECLINE MODESTLY AS THE CYCLE PROCEEDS; SECTOR DISPERSION CONTINUES

Our 2022 assumptions for core and value-added real estate decline slightly across regions, given flat or lower starting yields, partially offset by stronger net cash flows (**EXHIBIT 11**). We expect continued divergence in sector performance in the near to medium term. As noted below, we have implemented a few changes to our methodology this year to improve the consistency of core asset definitions across geographies.

Our 2022 assumptions for core and value-added real estate are lowered slightly across regions

EXHIBIT 11: REAL ESTATE RETURN ASSUMPTIONS (LOCAL CURRENCY, %)

REAL ESTATE – DIRECT	2022	2021
U.S. core*	5.80	5.90
U.S. value-added	7.70	8.10
European core**,†	4.80	5.00
European value-added†	6.80	7.70
Asia-Pacific core**	6.50	6.60

Source: J.P. Morgan Asset Management; estimates as of September 30, 2020, and September 30, 2021.

* U.S. core real estate in our assumptions comprises 90% prime high quality real estate assets and 10% value-added development assets. This exposure is consistent with the composition of the benchmark NFI-ODCE Index.

** Our 2022 assumptions are not directly comparable to our 2021 assumptions due to a change in methodology: For our 2022 estimates, to improve consistency across regions, we match the composition of European and Asia-Pacific core real estate to that of the U.S. (90% prime core and 10% value-added risk exposure). Previously, our European and Asia-Pacific core real estate assumptions included only prime core exposure.

† This year, we combine previously separate assumptions, for European ex-UK and the UK, into our European assumptions for both core and value-added real estate.

U.S. real estate

Our return assumption for U.S. core real estate declines slightly, to 5.80% from 5.90% last year, reflecting a higher starting point due to a reversal of the dislocation at the height of the COVID-19 pandemic. The net operating income (NOI) yield[10] is lower vs. last year, given the tightening of lending rate spreads and improved liquidity for borrowers seeking loans. However, the lower yield is partially offset by expected faster net cash flow growth over the next 10 to 15 years, driven by underlying supply shortages in industrial and residential real estate, a shift in sector composition (toward faster-growing sectors) and higher inflation expectations.

Our assumption for value-added real estate also declines slightly vs. last year. Value-added real estate's spreads over core have narrowed moderately from their levels immediately after the sharp pandemic recession in 2020.

We expect tenant demand for warehouse space to remain elevated in the coming years, as tenants' extraordinary and growing space requirements have been accelerated by the surge in e-commerce. The U.S. residential market is also experiencing significant supply shortages, for both sale and rental properties, that are not expected to be mitigated by new construction for years.

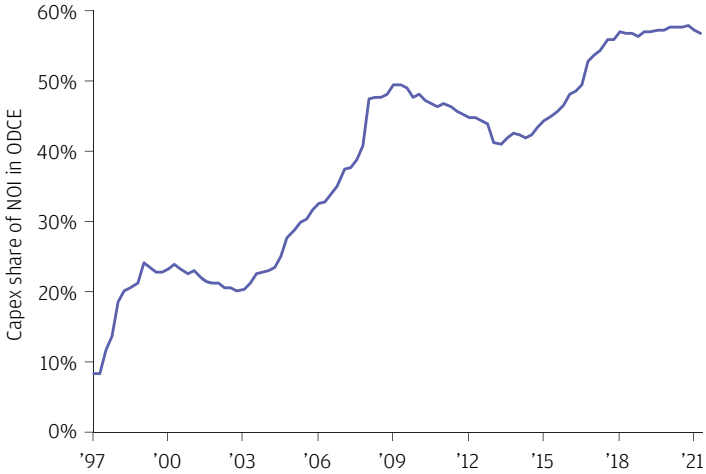
[10] Net operating income yield refers to estimated net operating income/asset value at the start of our 10- to 15-year projection period.

Retail and office sectors present mixed pictures: We continue to see lower quality enclosed malls facing existential problems – 25% of all malls could potentially be shuttered in the next 10 to 15 years. The persistence of work from home will likely be a chronic headwind for offices, joining other chronic issues, such as employee densification to save space and a decline in leasing by traditional tenants, including law and financial firms. However, new economy tenants, such as tech companies and creative industries, are stepping in, continuing to take up a larger share of leases than they have historically. In sum, we expect the office sector to underperform industrial and residential but to outperform retail.

Weightings in the benchmark NFI-ODCE Index have been shifting toward sectors with faster NOI growth – that is, value-added sectors such as the increasingly diverse logistics industry and lab space. This expected shift in sector mix is a tailwind for the return outlook. Over the decades, we have also seen capital expenditures rise as a share of NOI (**EXHIBIT 12**), a trend we expect to continue, suggesting more risk capital in the benchmark and therefore higher expected returns.

Core real estate's benchmark index composition is shifting toward riskier capital, supported by two decades of rising capital expenditure

EXHIBIT 12: EVIDENCE OF RISING VALUE-ADDED SECTORS IN NFI-ODCE



Source: NCREIF, J.P. Morgan Asset Management; data as of June 30, 2021.

European real estate

Our 2022 European core real estate return assumption declines slightly from last year. While we make only a smaller downward adjustment to exit yield,[11] it is offset by a lower benefit from leverage (as borrowing costs have risen since our 2021 projections) and by lower starting yields vs. last year. Value-added properties' risk premium over core properties shrinks slightly as the European real estate market moves further into the cycle.

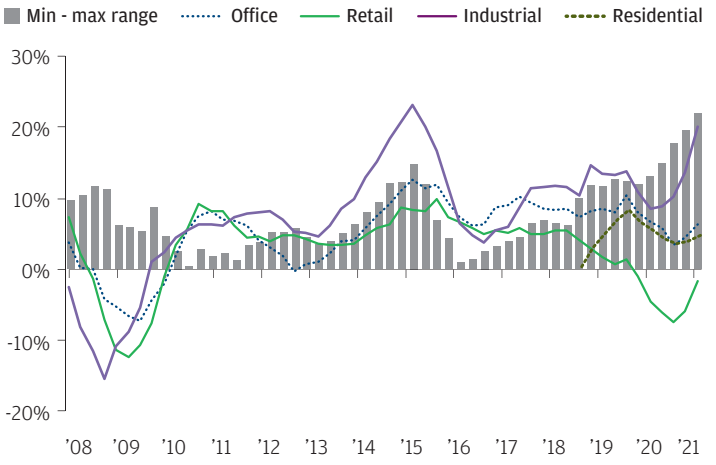
European real estate returns continue to see dispersion among sectors (**EXHIBIT 13**). Retail's weakness has persisted with the growth of e-commerce, leading it to underperform other real estate sectors. Ongoing strength in the industrial and logistics sectors, amid strong demand for warehouse space, has led to higher returns in those sectors. This polarization in returns – industrial outperformance vs. retail weakness – became more pronounced during the pandemic; however, we anticipate return dispersion among sectors to narrow toward the end of our forecast period.

While we anticipate return dispersion among sectors narrowing, the growth of e-commerce should continue to hurt retail in the near term, particularly in continental Europe. Meanwhile, retail properties' accelerated obsolescence will likely undermine rental and capital values. The industrial sector's outlook is more favorable: While industrial yields have fallen materially, tightening supply should support rental income growth and property appreciation.

In contrast, we expect long-term office and residential returns to stay close to the European all-sector historical average. While the office sector will likely feel the impact of the shift to a hybrid working model, that shift should disproportionately affect poorer quality assets in marginal locations. We expect strong investor demand for residential assets largely because they provide portfolio diversification; however, returns will likely be constrained by low yields and policy-based restrictions on rental income growth.

Return dispersion by sector in European real estate is unprecedented

EXHIBIT 13: EUROPEAN REAL ESTATE QUARTERLY ANNUALIZED RETURNS BY SECTOR, 2008–21



Source: MSCI, J.P. Morgan Asset Management; data as of June 30, 2021.

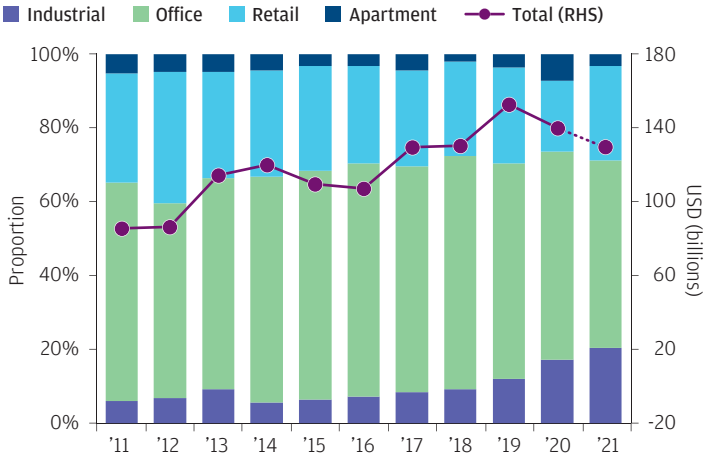
[11] Exit yield is measured as the net operating income at the end of the projection period (10–15 years) divided by the sale price.

Asia-Pacific real estate

Our Asia-Pacific core real estate return assumption decreases slightly from last year but again outpaces the U.S. and Europe. Through much of 2021, Asia-Pacific core real estate yields were largely stable year-over-year, with the exception of yield compression in the industrial sector and, in Japan, in multi-family residential. Over our forecast period, we expect strengthening cash flow growth as Asia-Pacific office and retail rents begin to rebound. We anticipate compression of exit yields due to the secular rise in demand from investors willing to invest at a lower risk premium, despite real estate's illiquidity as an asset class. Investor confidence was resilient as the pandemic stretched into a second year: Transaction volumes have decreased by only about 7% since our last edition (**EXHIBIT 14**).

Confidence among Asia-Pacific real estate investors has been resilient into the pandemic's second year

EXHIBIT 14: ASIA-PACIFIC REAL ESTATE TRANSACTION VOLUME



Source: Real Capital Analytics; data as of July 31, 2021. The 2021 value is shown as an annualized estimate. Asia-Pacific transaction volumes comprise office, industrial (manufacturing, R&D, refrigerated and distribution, tech/telecom/data), retail and mid and high rise residential apartments valued at over USD 10 million.

Dispersion among sectors continues. We anticipate attractive risk-adjusted returns for the industrial sector across the region as it benefits from ongoing migration into gateway cities,[12] and strength in Japan's multi-family residential sector. We expect both will be important contributors to Asia-Pacific real estate returns. Meanwhile, headwinds persist in retail.

REAL ESTATE INVESTMENT TRUSTS (REITS) – PRICED AT A SLIGHT PREMIUM ACROSS REGIONS

Our global REITs return projection is reduced from last year, with reductions across all regions (**EXHIBIT 15**). The decline reflects less upside potential following the strong recovery in REITs since the onset of the pandemic. With this year's assumptions, we expand our universe to account for all listed real estate companies, not only REITs, as not all countries have adopted REITs vehicles.

REITs are now priced at a premium, after trading at a discount to underlying real estate last year. During the pandemic, REITs exhibited extreme price volatility. The initial and significant REITs market drawdown in the first quarter of 2020 was followed by a swift recovery; this contrasts with much less dramatic swings in private market valuations. As a result, REITs are generally slightly to modestly expensive relative to the underlying real estate.

Our estimate for U.S. REITs takes into account better cash flow growth for extended sectors (e.g., towers and data centers) that are not captured in our private core real estate underlying returns, the starting point for our REITs projections. European and Asia-Pacific REITs are relatively more expensive than last year, in part reflecting improved growth dynamics, but we expect at least a partial reversion to long-term average valuations. Across markets, REITs returns should continue to benefit from accretive leverage over the near term. Overall, the regional aggregation masks wide sectoral dispersion, with logistics/industrial and other extended sectors more highly priced than more traditional assets, such as offices and retail properties.

Assumptions reflect less upside potential vs. prior year estimates, given a strong REITs rebound

EXHIBIT 15: REITS RETURN ASSUMPTIONS (LOCAL CURRENCY, %)

REITS	2022	2021
U.S.	5.70	6.50
European*	5.10	5.90
Asia-Pacific**	5.00	6.40
Global†	5.40	6.40

Source: J.P. Morgan Asset Management; estimates as of September 30, 2020, and September 30, 2021.

* As with core real estate, this year we have combined two previously separate assumptions, European ex-UK and UK REITs, into a single European REITs assumption.

** Asia-Pacific REITs follow a developed market construct and cover a slightly different geographic exposure from that of Asia-Pacific core real estate.

† The global composite is built assuming the following weights: roughly 60% U.S., 20% Europe and 20% Asia-Pacific.

[12] Gateway cities are urban metro areas that serve as economic and industrial hubs for a state, region or country.

GLOBAL CORE INFRASTRUCTURE – STEADY RETURNS AND STRONG INVESTOR INFLOWS

Our 2022 global core infrastructure long-term return projection is 6.10%, matching last year's estimate.

Reflecting the essential nature of the services core infrastructure provides, we expect continued relatively stable returns over the next decade, with a high proportion of returns derived from operating yield. Operating yield – the percentage of return coming from income – has declined marginally vs. last year.[13] The decline in this estimate reflects price appreciation in the asset class from COVID-19 lows and continued strong investor demand for the high current yield and diversification benefits these assets can potentially provide. Given our expectations for stronger GDP growth, inflation and supportive fiscal policy in the U.S. and Europe, we look for improved cash flow growth and enhanced valuations. However, while we have raised the cash flow growth rate component of our return estimate relative to last year, we have lowered our expectations for annual appreciation over the next decade to reflect that some of this increase in value has already been realized.

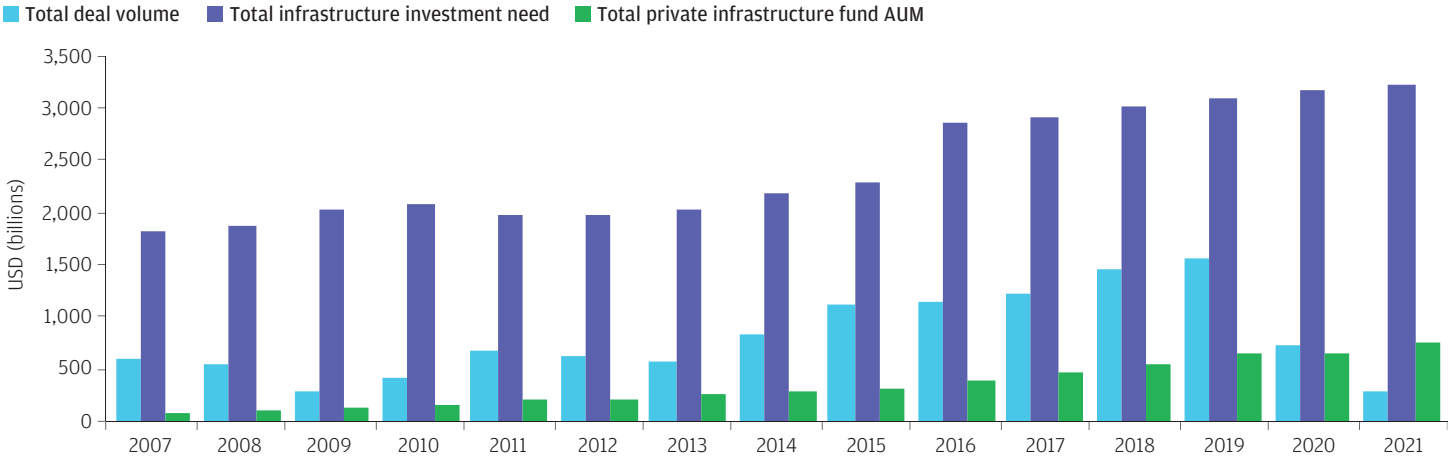
We expect ample opportunities to invest in this space, given the historical underinvestment in infrastructure globally (**EXHIBIT 16**). The ongoing transition to a low carbon economy has created a pressing need for investments to drive renewable energy adoption and continued provisioning of essential services like water and power. The ability of infrastructure assets to directly contribute to ESG efforts also informs our positive outlook for the asset class.

Manager challenges as the asset class grows

Over the long run, among the greatest challenges managers are likely to face – as competition for core assets grows – will be to maintain underwriting discipline and avoid having the definition of "core infrastructure" expand to encompass investments the category was never intended to include. Those that can deploy capital without taking on undue risk or making aggressive growth assumptions are more likely to deliver attractive cash yields and uncorrelated returns, resulting in strong multiples on invested capital (MOIC).[14] Although the performance of the overall asset class is expected to be stable, specific or idiosyncratic operational, regulatory and/or counterparty risks can exist at the asset level. Prudent management with active oversight of the drivers of return and risk is essential to achieving the expected performance.

Investor demand remains strong, and investment need far exceeds current deal volume

EXHIBIT 16: TOTAL INFRASTRUCTURE DEAL VOLUME, INVESTMENT NEED AND AUM



Source: OECD, Preqin, J.P. Morgan Asset Management; data as of September 30, 2021. Infrastructure deal data includes both primary and secondary deals.

[13] Operating yield refers to estimated operating income/asset value at the start of our 10- to 15-year projection period.

[14] Multiple on invested capital is 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.

GLOBAL CORE TRANSPORT – AN INCOME STORY SUPPORTED BY GROWTH TAILWINDS

Our 2022 long-term return projection for global transport is 7.40%, down from 7.60% last year. Increased operating yields boost the outlook while rising maintenance and depreciation costs detract. Overall, the sector is supported by stable income expectations with continued growth.

In core transportation, long-term lease rates have risen, most notably in the maritime sector, where COVID-19 disruptions, port congestion and a low orderbook for new vessels have contributed to favorable supply/demand dynamics. Although meaningful in the near term, these dynamics will moderate over time. Tempering our estimates, we see an increased focus on de-carbonization leading to higher maintenance costs and shorter useful lives of assets as new emissions regulations come into play.

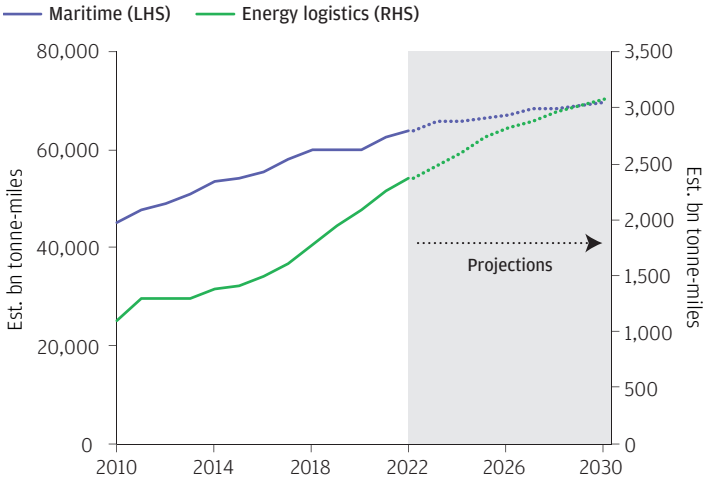
Essential to and driven by global growth

The essential nature of the asset class informs our outlook. The demand for assets such as ships, aircraft, energy logistics vessels, railcars and vehicles is reinforced by long-term secular trends in economic growth, global trade and the transition to renewable energy. Whether they are moving consumer goods, commodities or passengers, transportation assets are critical components of global trade and consumption. These assets are vital to a thriving global supply chain and integral to a sustainable model of economic growth. In addition, the transportation sector will continue to evolve and adapt as the world's economy transitions to a more sustainable model of energy efficiency.

While the impact of COVID-19 has varied across transportation sectors, a positive long-term growth outlook appears to remain intact. Maritime and energy logistics have been relatively resilient, with global tonne-mile trade down only 1.6% in 2020 and growth expected to strengthen through 2021 as well as in subsequent years (**EXHIBIT 17A**). The pandemic created headwinds in the aviation sector as passenger volumes declined precipitously. These challenges persist in long-haul international markets but have begun to wane in domestic markets as passenger volumes exhibit signs of recovery (**EXHIBIT 17B**).

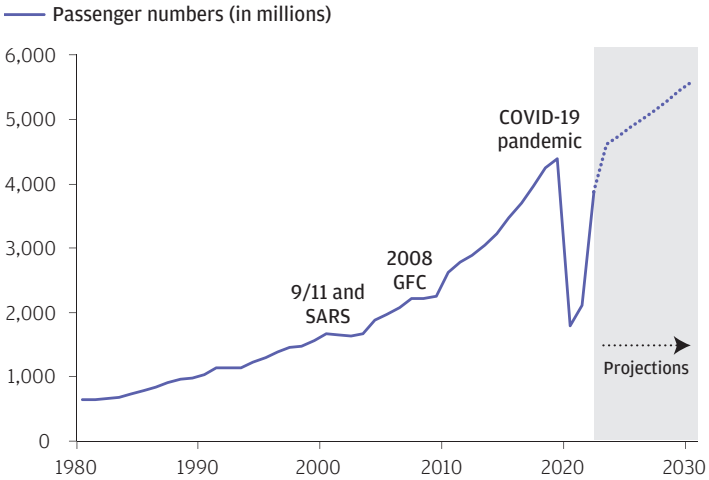
There is a fundamental, expanding need to move people, products and commodities

EXHIBIT 17A: TOTAL SEABORNE MARITIME & ENERGY LOGISTICS TRADE OUTLOOK



Source: Clarkson Research, MSI, J.P. Morgan Asset Management; data as of September 30, 2021.

EXHIBIT 17B: TOTAL AIR TRAFFIC GROWTH OUTLOOK



Source: World Bank, IATA, J.P. Morgan Asset Management; data as of September 30, 2021.

COMMODITIES – A STRONG IF NOT SUPER CYCLE WITH A GROWING CONSENSUS AROUND ESG CONSIDERATIONS

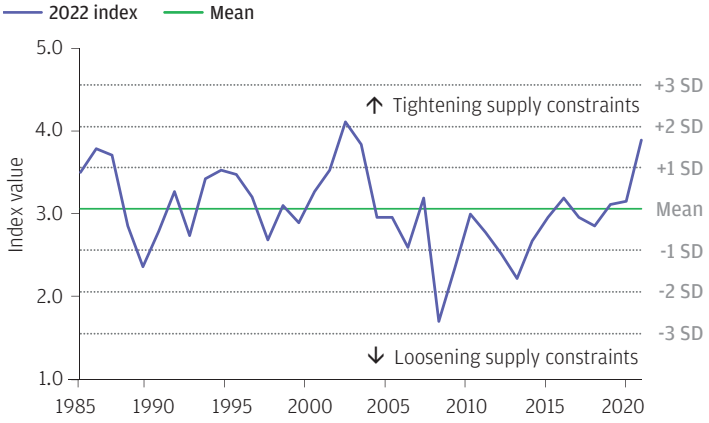
Our long-term broad-basket commodity assumption is increased to 2.60%, up from 2.30% last year and marginally above our estimate for U.S. inflation.

The increase is despite a higher starting point for this year's estimate; the Bloomberg Commodity Total Return Index has seen a roughly 42% rise in the year since September 30, 2020. We see two impactful forces supporting returns through the next few years of this already advanced commodity cycle:

- Consistent with decreasing capital expenditures in the energy and mining sectors as well as the supply constraint estimate embedded in our Commodity Event Index (**EXHIBIT 18**), we anticipate a strong through-the-cycle return, above the average for post-1982 cycles.
- We believe a growing consensus around the importance of ESG considerations and climate policies will both constrain supply in the front half and eventually reduce demand in the back half of our evaluation time frame.

Our Commodity Event Index attempts to capture producers' supply constraints and sentiment

EXHIBIT 18: THE COMMODITY EVENT INDEX



INDEX COMPONENT	COMPONENT WEIGHT (%)
Credit ratings	11.1
Age of capital stock	11.1
Financial leverage	11.1
Volume of bankruptcies, takeovers, debt-for-equity swaps	11.1
Capital expenditure to sales	18.5
Oil rig count	18.5
CEO turnover	18.5

Source: Baker Hughes, Bloomberg, FactSet, U.S. Bureau of Economic Analysis, J.P. Morgan Asset Management; data as of June 30, 2021. Components may not sum to 100% due to rounding.

Capex starvation is likely to constrain commodity supply

Investors are increasingly unwilling to provide expansion capital to the energy and mining sectors, their confidence shaken by subpar corporate governance and financial performance. But access to capital markets is just one of several forces constraining supply and shaping the commodity cycle. Legal action on carbon emissions, as in the case of Shell; shareholder proposals related to climate change, as in the case of ExxonMobil; or corporations' own assessments of the long-term sustainability of business models, as in the case of Ørsted,[15] will weigh on near-term supply even as demand likely continues to grow over the next several years. This downward pressure on production is likely to support oil prices in the near term, as evidenced by the recent rise in energy prices. Beyond the next five years, however, we would expect reductions in demand to match or exceed reductions in supply; that is likely to depress prices. This reduced demand may be driven by increases in the efficiency of renewable energy sources and more aggressive environmental policies.

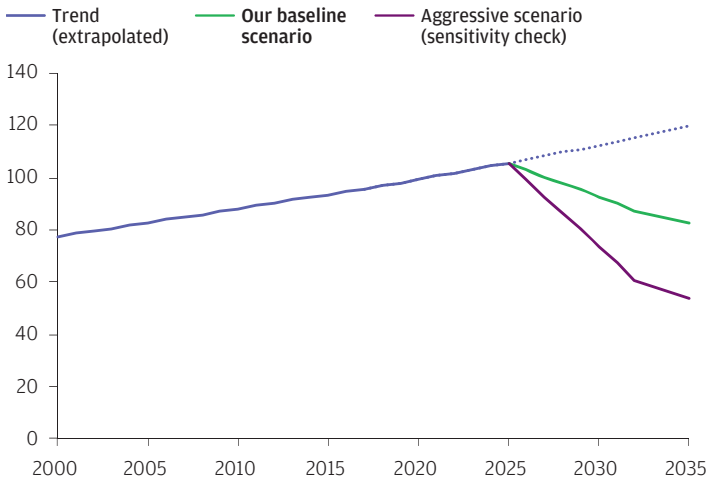
Environmental uncertainty

There is a wide range of paths that oil demand could take over the next 10 to 15 years, given ambitious emission reduction targets but lackluster progress thus far. Ahead of the 26th U.N. Climate Change Conference of the Parties (COP26) in Glasgow in November 2021, countries representing over 50% of global GDP announced ambitious environmental targets consistent with limiting global warming to 1.5ºC above pre-industrial levels. However, most of those countries are not even on track to meet their less ambitious 2ºC target, formulated under the Paris Agreement. Evaluating the impact on oil demand of environmental policies and their enforcement may therefore be best served by modeling outcomes under a range of scenarios rather than relying on a specific single-point estimate (**EXHIBIT 19**).

[15] In May 2021, the District Court in the Hague delivered its ruling in the climate change case filed against Royal Dutch Shell plc ("Shell") by Milieudefensie (Friends of the Earth Netherlands), other nongovernmental organizations and a group of private individuals; the court ruled that Shell must reduce the carbon emissions of Shell group operations and energy-carrying products sold by 45% (net) by the end of 2030 compared with its emissions in 2019. In June 2021, an environmentally driven investment firm engaged in a proxy war to obtain seats on the board of ExxonMobil and steer the company's long-term strategy away from fossil fuels. In 2012, Denmark's biggest energy company, Danish Oil and Natural Gas, slid into financial crisis as the price of natural gas plunged and its credit rating was downgraded; the board hired a new CEO, who renamed the company Ørsted and led a transformation that shifted the company's core business from fossil fuels to green energy.

Estimating the range of outcomes in light of the Paris Agreement

EXHIBIT 19: OIL DEMAND IN MILLION BARRELS PER DAY UNDER DIFFERENT STYLIZED SCENARIOS



Source: J.P. Morgan Asset Management; data as of June 30, 2021.

Our analysis looks at oil demand increasing along an extrapolated historical trend line (Trend) and two additional scenarios: adherence to environmental targets consistent with limiting global warming to 2ºC above pre-industrial levels (Baseline) and 1.5ºC above pre-industrial levels (Aggressive), assuming a meaningful difference in demand from 2026 forward in both cases. Most forecasts from international organizations and the private sector, even when assuming a faster pace of energy transition, still project oil demand in 2035–40 will not be that different from today's.

GOLD

Our 2022 gold assumption is 3.00%. Continued central bank accumulation and high per capita gold consumption in India and China drive the gold premium to broad commodities.

Our assumption for this premium, however, is reduced to 40bps from 50bps last year to reflect cryptocurrencies' modest structural siphoning of demand away from gold.

Stable forecast in a dislocated world: Risk outlook little changed, uncertainty rising

Grace Koo, Ph.D., *Quantitative Analyst and Portfolio Manager, Multi-Asset Solutions*
Paul Kennedy, Ph.D., MRICS, *Head of Strategy and Portfolio Manager, Real Estate Europe*
Xiao Xiao, CFA, *Quantitative Analyst, Multi-Asset Solutions*
Michael Akinyele, *Global Strategist, Multi-Asset Solutions*

IN BRIEF

- The atypical market conditions created by central banks' rescue interventions may increase the likelihood of extreme events and create sharp, short-term reversals in asset class correlations, adding greater uncertainty to our forecasts.
- Other than greater uncertainty, and greater risk of volatility spikes, our baseline volatility and correlation forecasts are broadly unchanged.
- Negative stock-bond correlations have been the norm over the past 20 years, and while we forecast a modestly negative correlation, we see less stability in this relationship, making it ever more important to consider other dimensions of portfolio risk – and to reduce reliance on fixed income as a portfolio hedge.
- This year, we explore an improved approach to forecasting private market volatility, an area in which proper measurement has long been controversial and subject to private markets' lack of timely data, among other difficulties. We find that an approach that considers optionality offers insights and points to a partial solution.

RISK FORECAST REMAINS LITTLE CHANGED FOR NOW; UNCERTAINTY RISES AROUND VOLATILITY FORECASTS

As economies make progress in healing, central banks' and policymakers' strong interventions to protect the global economy continue to affect our risk outlook by creating more uncertainty around what are otherwise broadly unchanged volatility and correlation forecasts.

Central bank interventions have stabilized current monetary conditions, but the long-term impacts of their actions lurk beneath the surface in two ways:

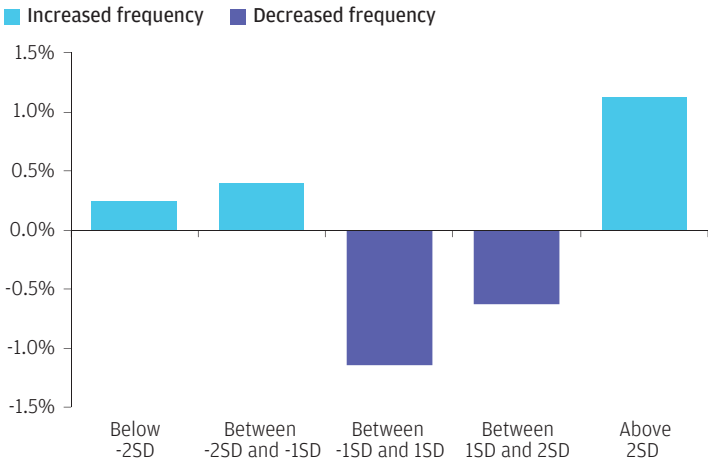
1. POTENTIALLY INCREASING THE FREQUENCY OF EXTREME EVENTS: Volatility – which captures movements around the average – is only one of many measures of risk. It does not capture other aspects of risk, such as extreme (or "tail") events, in which markets or assets move up or down 2 or more standard deviations.[1] We expect atypical market conditions over our forecast period to increase the likelihood of tail events rather than necessarily increasing our volatility forecasts.

For example, U.S. Treasury bond volatility has been relatively stable over a long horizon, at around 4.5% annually. The bond sell-off of early 2021 was an outsize event in an otherwise well-behaved market. Such sudden, sharp sell-offs have been rare historically, but their frequency has risen recently (**EXHIBIT 1**). The lasting imprint of extraordinary policies suggests that such extreme events may become more common. It has long been recognized that normal distribution assumptions fail to fully capture observations of extreme tails.

[1] 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.

The likelihood of large moves may be edging slightly higher

EXHIBIT 1: CHANGES IN RETURN DISTRIBUTION OF U.S. TREASURY BONDS, 2006–19 VS. 2020–21



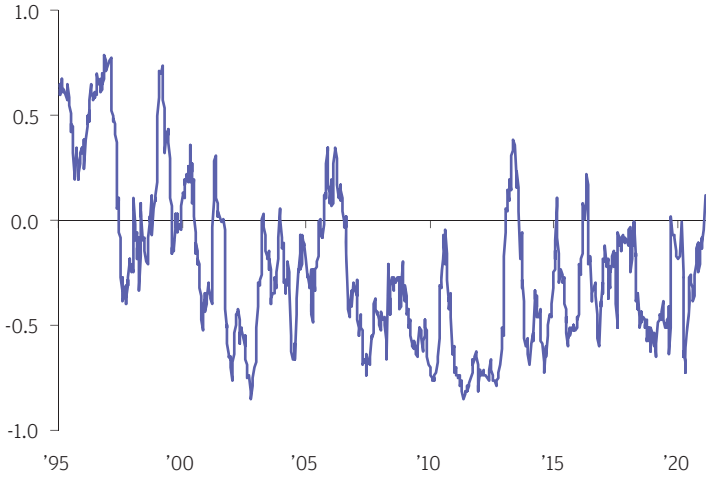
Source: Bloomberg, J.P. Morgan Asset Management; data as of August 30, 2021. Chart compares the difference between the probability distributions of 2006–19 and 2020–21. SD: standard deviation.

2. POTENTIALLY RAISING STOCK-BOND CORRELATIONS AND CHANGING CORRELATION DYNAMICS WITH OTHER ASSET CLASSES: Treasuries are a relatively low risk source of yield for many investors and also serve as potential hedges to risky assets. The popularity of the 60/40 stock-bond portfolio hinges on this implicit diversification effect – Treasuries' negative correlation should lessen the pain when riskier assets sell off. However, as **EXHIBIT 2A** and **2B** highlight, while negative correlations have persisted over the last 20 years, prior data suggest a positive correlation.

Negative stock-bond correlations are not set in stone

EXHIBIT 2A: ROLLING 10-YEAR STOCK-BOND CORRELATION

EXHIBIT 2B: ROLLING 6-MONTH STOCK-BOND CORRELATION



Source: Bloomberg, J.P. Morgan Asset Management; data as of August 30, 2021. Stock-bond correlations computed based on S&P 500 returns and U.S. Treasury returns.

We continue to see the diversification benefits of holding stocks and bonds within a balanced portfolio, and forecast a modestly negative correlation of -0.3. But given current monetary policies, the potential for sharp, short-term reversals of this modestly negative relationship may be increasing. The instability of this correlation, along with the high price for this portfolio "insurance," suggests a need to investigate alternatives to the standard 60/40 allocation – a topic discussed in this year's portfolio implications chapter.[2]

Overall, we see higher uncertainty around the volatility forecasts (or, more technically, we see an increase in the volatility of volatility) and perhaps an increase in the likelihood of historically rare events. We continue to keep a close eye on these risks and for now hold our forecasted risk at a level similar to prior years.

STRUCTURAL CHANGES IMPACT OUR VOLATILITY FORECASTS

Structural developments in markets and economies impact our long-run volatility projections for the asset classes that we cover. These anticipated changes explain why our volatility estimates deviate from the volatility estimates implied by long-run data:

FIXED INCOME

The key adjustments are to credit quality and issuance trends. Over the past 15 years, U.S. corporate bond issuers have migrated toward lower quality credit; today, the majority of U.S. investment grade bonds are BBB rated.

This quality shift has changed the risk profile of credit assets, including U.S. and European corporate bonds. We adjust our volatility forecasts accordingly to reflect more risk in lower quality sectors (and vice versa for sectors with improved credit quality).

EQUITIES

Typically, full-cycle long-term volatility forecasts should be representative of the risk that equity holders face. Projections draw on, among other things, historical long-term risk. This year, our equity discussion underwent an important update. As other chapters highlight,[3] the composition of benchmark indices has clearly shifted – for example, away from energy and toward technology. In light of those changes, we revisit the typical approach for equities, examining whether the change in index composition leads our forecasts to deviate sizably (**EXHIBIT 3**).

Our analysis shows that despite this change in sector exposure, long-run equity volatility still remains in line with our forecasts. Using historical S&P 500 returns and hypothetical simulated returns using current sector weightings, both volatility forecasts yielded the same estimate. Much of the risk variation appears to be captured by our 15-year forecast window.

In the near term, however, given high starting valuations, equities may be vulnerable to correction and thus an increase in short-term volatility.

ALTERNATIVES

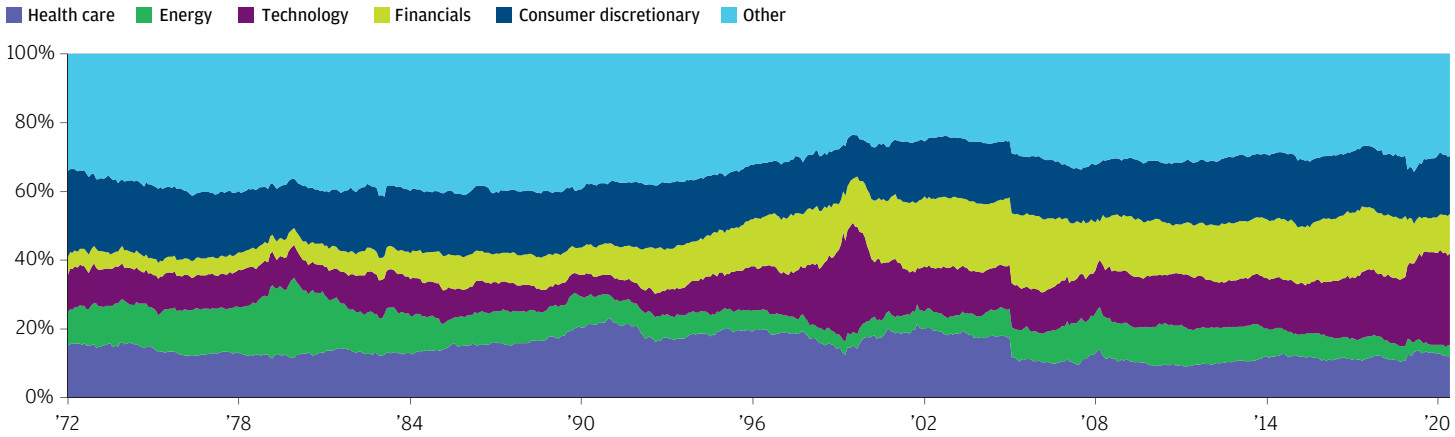
Our 2022 volatility forecast for alternatives is in line with prior years. As we describe in the next section, we take a deep dive into risk within this asset class.

[2] Jared Gross, Paul Kennedy and Grace Koo, "Portfolio Implications: Portfolio construction: Moving toward a new architecture," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021.

[3] Tim Lintern, Stephen Parker, Nandini Ramakrishnan et al., "Equity Assumptions: Better through-cycle returns, challenging starting point," *2022 Long-Term Capital Market Assumptions*, J.P. Morgan Asset Management, November 2021.

Structural changes in equity sector exposure have had a limited impact on long-run equity risk thus far

EXHIBIT 3: S&P 500 SECTOR WEIGHTING OVER TIME



Source: Bloomberg, J.P. Morgan Asset Management; data as of August 30, 2021.

We have long accepted that for private market assets, both accounting volatility estimates (computed based on reported net asset values [NAVs], sometimes called observed volatility) and de-smoothed volatility estimates (discussed below) are flawed approaches. For our Long-Term Capital Market Assumptions (LTCMA) volatility forecast calculations, we seek to reflect the underlying economic risk of owning the asset. We think accounting volatility underestimates true risk – something that has been widely discussed in the literature – but also expect de-smoothed estimates to ignore some of the volatility-reducing options embedded in private market assets. In the following section, we propose a novel approach to enhance the way we evaluate private market volatility.

PRIVATE MARKET ASSET VOLATILITY: ADDING INSIGHTS FROM PUBLIC MARKETS

Private market return volatility estimates have long been a source of controversy. The metric normally in use to estimate volatility is observed volatility, also known as accounting volatility, which is based on valuations. That is understandable because publicly listed securities are marked to market, often in real time. But in private markets, by contrast, appraisals might occur as infrequently as quarterly or biannually. This lack of timely data depresses observed volatility and impairs the comparability of private and public market data.[4] In turn, this forces asset allocators seeking private market volatility estimates to rely on returns that have been de-smoothed.[5] De-smoothing seeks to estimate underlying volatility for private assets by removing the serial correlation between return estimates associated with the use of valuations.

This is a credible approach in a multi-asset investing context, but it is also an imperfect one that suffers from a number of limitations. First, de-smoothing is a purely statistical technique. It is impossible to assess the accuracy of de-smoothed volatility vs. the true economic risk of owning the asset (which is unobservable), as private markets use different pricing mechanisms from public markets. In addition, while de-smoothing can "correct" volatility levels, it doesn't adjust for the impact of smoothing on co-movement.[6]

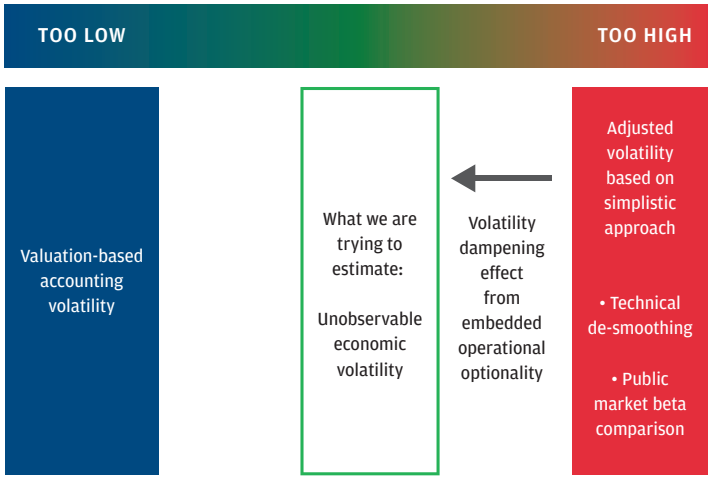
Second, the results of de-smoothing techniques are typically validated by measuring whether private market volatility estimates align with estimates for listed markets. This implies that risk drivers are similar in comparable private and public markets. This assertion is often challenged by private market investors, who believe their direct control over cash flows, and their ability to escape the scrutiny and short-term reporting focus of public markets, give them scope for enhanced risk management and reduced volatility. It has been suggested that the enhanced opportunities to make operational decisions inherent to private market investing create optionality – i.e, nonlinear impacts on asset returns. (These are similar, in a way, to how a call option reflects a nonlinear return profile of the underlying equity.) A simple comparison with comparable public markets may miss this important aspect.

If true, this would mean that traditional approaches to computing private asset volatilities may overestimate volatility and, by extension, underestimate the potential role and suitability of a private asset allocation. While we have long recognized that the differences between private and public markets, and the operational optionality of private assets, help dampen volatility, it has been challenging to find empirical support for this assertion. The valuation-based reporting data required to support the assertion simply doesn't exist.

To sum our key points so far: To better gauge private market assets' volatility, simple de-smoothing is a flawed approach, one that likely overstates volatility; we seek an approach reflecting the unique characteristics of private market assets – including what we call optionality (**EXHIBIT 4**).

Naive volatility adjustments for private assets overstate true risks

EXHIBIT 4: WE USE A MIDDLE WAY – ECONOMIC VOLATILITY LIKELY LIES BETWEEN ACCOUNTING AND DE-SMOOTHED VOLATILITY



Source: J.P. Morgan Asset Management. For illustrative purposes only.

[4] Private markets rely on infrequent valuations that use irregular and often idiosyncratic transactions to estimate likely trading prices. Unlike in liquid markets, real-time price estimates are not available. This difference means that short- and medium-term fluctuations in prices that are readily observable in public markets are typically "smoothed" away by the use of pricing evidence often taken over an extended time period. In turn, this process reduces measured volatility and creates an impression of risk that is lower than, and not directly comparable to, liquid market measures.

[5] For a summary of the literature on real estate return de-smoothing, see: Jean-Christophe Delfim and Martin Hoesli, "Robust desmoothed real estate returns," *Real Estate Economics* 49, 75-105, 2021.

[6] Co-movement is the correlated or similar movement of two or more entities. "True" volatility and co-movement are unobservable; as such, any estimate is, by definition, only an approximation of the likely underlying volatility, the accuracy of which can be asserted but neither proved nor disproved.

Using convertible bond data for insights into the volatility-dampening effects of optionality

Public market data can offer some insights. While no data are directly relevant to private markets, some listed markets offer support for the thesis that assets combining exposure to underlying markets (or beta) with optionality (or unique characteristics) are likely to be less volatile than assets with exposure to beta alone.

One such source of support is the convertible bond market. Convertible bonds are publicly traded liquid assets. What this market has in common with private markets is not tradability but the optionality embedded within the assets. The optionality in convertible bonds is set at issuance. Convertible bonds embed returns from a corporate bond along with optionality on the upside.[7] Private assets embed optionality operationally, as we've discussed. The question at hand is if optionality matters for return volatility, and convertible bond data provide some insights here. We demonstrate this by constructing a hypothetical replicating portfolio of bond and equity exposures (beta), aligned with the characteristics of the convertible bond.[8] We purposefully ignored the optionality, or convexity impact, in this replicating portfolio. Comparing the volatility of the beta replicating portfolio with the actual convertible bonds[9] suggests that the volatility of the second series is between 75% and 85% of the first.

It seems likely that the extent of the volatility dampening will be a function of the scale of the optionality. In our analysis, the options embedded in convertible bonds created a volatility dampening factor in the range of 15%–25%, on average. As such, assets whose returns are dominated by the exercise of management options (e.g., private equity) should be expected to benefit from greater volatility control than assets whose returns are likely dominated by market beta (e.g., core real estate). The correct volatility dampening factor should vary by asset class.

As noted, we have long accepted that both accounting volatility estimates and de-smoothed private market volatility estimates are flawed for the purpose of LTCMA calculations. More specifically, we have long recognized the need to reflect optionality in our private market volatility estimates and have utilized our own, subjectively derived parameters. While our convertibles analysis doesn't provide a complete quantitative solution to this challenge, it does offer some factual support for this element of our approach.

[7] Convertible bonds embed an equity call option on the underlying issuer at a pre-defined strike price. This provides convertible bondholders with upside return potential if the underlying equity rallies.

[8] Calculated as the beta (delta adjusted) return from common stock plus the return from rating-adjusted corporate bonds, all capital weighted.

[9] Data provided by Refinitiv (ticker: UCBIFX39 Index for the U.S. and UCBIFX09 Index for the euro area).

Portfolio construction: Moving toward a new architecture

Jared Gross, *Head of Institutional Portfolio Strategy*
Paul Kennedy, Ph.D., MRICS, *Head of Strategy and Portfolio Manager, Real Estate Europe*
Grace Koo, Ph.D., *Quantitative Analyst and Portfolio Manager, Multi-Asset Solutions*

IN BRIEF

- Expected low returns from a 60/40 portfolio call into question the efficacy of traditional approaches to asset allocation. In particular, the inability of fixed income to provide either compelling returns or diversification suggests that investors need a fresh approach to portfolio construction.
- Instead of a traditional "barbell" strategy built with high volatility equity and low volatility, negatively correlated bonds, we recommend a "full spectrum" approach to uncover alternative sources of return.
- In the full spectrum approach, investors move into a range of nontraditional investment strategies (fixed income-focused, mid risk and equity-focused) and adjust their risk management to address higher levels of complexity and illiquidity.
- In addition to capturing higher beta returns, a full spectrum approach offers higher alpha potential for appropriately skilled and resourced investors.
- While diversification will remain central to asset allocation, the management of liquidity will become an increasingly important tool.

A NEW ARCHITECTURE FOR ASSET ALLOCATION

The basic approach to portfolio construction has changed remarkably little over the past several decades. Equities provide returns and risk; bonds provide protection. This, in a nutshell, is the simplified model that has served investors well for many years.

But it's not working anymore. Market portfolios will likely deliver returns far below both historical levels and investor targets. We expect a 60/40 portfolio[1] to return just 4.3% a year over a 10- to 15-year horizon. Reliance on diversified market exposures to achieve a target level of return with an acceptable level of risk may no longer be possible. Equally critical, though perhaps less widely appreciated, is the impact that the limited downside protection available from fixed income strategies will have on constraining overall equity exposures, absent other types of hedges.

In short, investors need a new architecture for asset allocation – a fresh approach to portfolio construction that moves beyond traditional mean-variance optimization and reliance on backward-looking historical returns, volatilities and correlations. What might that look like? In this paper, we describe a forward-looking model built around the broadest possible investment opportunity set.

This approach also reflects a profound shift in the financial markets that has occurred in recent years: the broadening scope of private markets and alternative asset classes, with increasing granularity and improved accessibility to investment categories that were previously beyond the reach of most investors. An allocation that might have seemed radically tilted away from public markets a decade or two ago is now a better representation of the investment landscape.

Instead of a "barbell" strategy based on market risk and returns, built with high volatility equity and low volatility, negatively correlated bonds, we recommend a "full spectrum" approach to uncover alternative sources of return. This new architecture embraces a range of mid risk assets, such as real assets, mezzanine debt,[2] hedge funds and hedged equity, along with extension from traditional fixed income and equity into alternatives such as private credit and private equity. In the full spectrum approach, the dominant form of risk shifts from correlation to liquidity and complexity. In our view, a reconstituted 60/40 could potentially consist of up to 60% mid risk assets and nontraditional assets and 40% diversified liquid investments across stocks and bonds.

This would not be a simple shift. Investors would need to address the implementation challenges that come with illiquidity and new, sometimes esoteric, asset classes. But we believe a new approach is critical to meet the challenge of low expected returns across a wide range of asset markets.

[1] A 60/40 portfolio consisting of 60% MSCI ACWI, 40% Bloomberg US Aggregate.

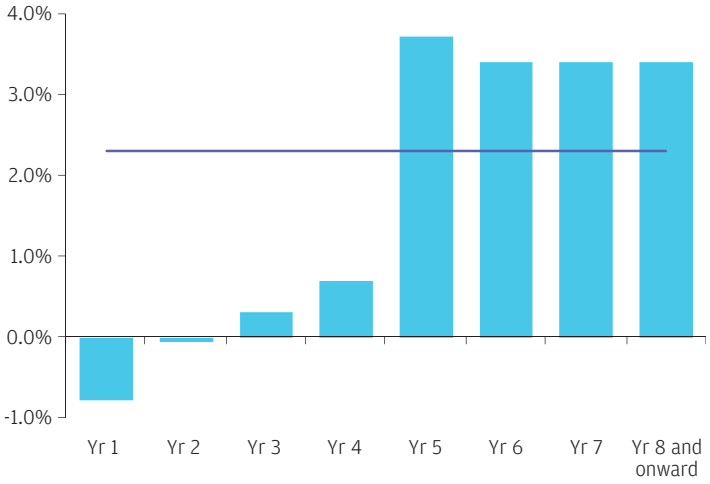
[2] Mezzanine debt is a hybrid of debt and equity financing that gives the lender the right (typically via warrants) to convert to an equity interest in the company in case of default.

WHAT IS THE FUTURE FOR FIXED INCOME?

In many ways, the challenge begins with the bleak outlook for fixed income – a projected 2.4% return for the 10-year U.S. Treasury (**EXHIBIT 1**) and a 2% return for hedged world government bonds. Factoring in inflation, real returns would be even lower, and quite possibly negative. One might well ask: Why own bonds at all?

We project just a 2.4% expected return for the 10-year U.S. Treasury over a 10- to 15-year investment horizon

EXHIBIT 1: FORECASTED RETURN FOR U.S. 10-YEAR TREASURIES (LINE REPRESENTS LTCMA INFLATION FORECASTS FOR THE U.S.)



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

In the past, investors would have justified owning traditional bond strategies in the face of low return expectations because fixed income provided a powerful source of risk diversification in a portfolio heavily weighted to equities.

But if bonds no longer protect portfolios against the volatility of equities as effectively as they once did, what then? Can investors still maintain large allocations to unhedged equity risk? Both strategic asset allocation and approaches to portfolio management need to adjust to this new environment.

RETURNS, RISK AND INSURANCE

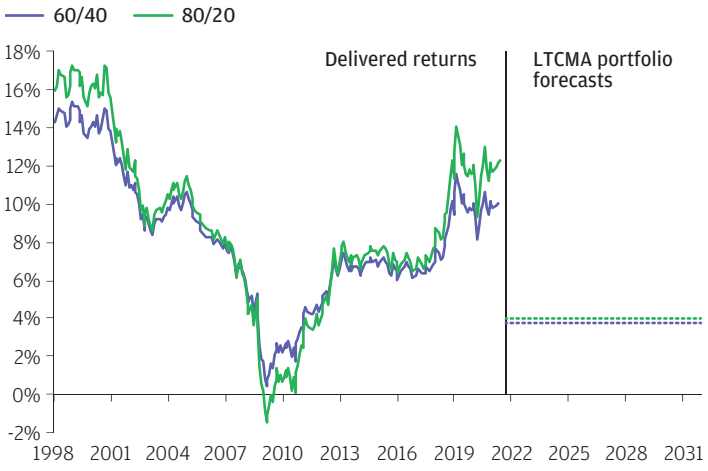
Over the past 40-odd years, investors have certainly been well compensated to take on equity risk (**EXHIBIT 2**). Since the early 1980s, equities have delivered strong and consistently positive returns, despite the occasional sharp drawdown. During those drawdowns, bonds delivered on their promise of risk diversification, dampening portfolio volatility while providing a valuable source of liquidity when it was most needed.

The traditional stock-bond relationship resembles insurance: An uncommon yet costly risk is identified, and protection against that risk is acquired. A homeowner, for instance, does not expect their home to burn down but recognizes that the prospect is so dire that it must be insured against. For investors, the uncommon costly risk is the rare but severe equity market sell-off. The insurance is government bonds, which usually rise in value during periods of market stress.

But unlike a homeowner who expects to pay a premium for insurance, investors have been spoiled by the bond bull market that began in the early 1980s. Since then, bonds have delivered both portfolio protection and strongly positive long-term returns. As a result, the classic 60/40 portfolio strategy has not borne the cost of the insurance provided by bonds even as it has enjoyed remarkably high returns, modest risk and exceptional liquidity.

We see a striking decline in expected return for a 60/40 stock-bond portfolio vs. its history

EXHIBIT 2: 10-YEAR ROLLING RETURN & LTCMA FORECAST, U.S. ASSETS



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

Going forward, however, bonds will provide much weaker portfolio protection. Low returns and uncertain correlation characteristics raise the cost and diminish the risk management benefits that bonds provide. In the absence of effective sources of risk diversification, investors looking to achieve their return targets will need alternative sources of return that have lower absolute volatility and do not require large fixed income holdings for protection.

FULL SPECTRUM INVESTING: MOVING BEYOND STOCKS AND BONDS

What might a replacement look like, and what are the implications for portfolio governance and the implementation of strategic asset allocation decisions?

Investors may no longer want to employ a barbell strategy based on market risk and returns with a focus on equity and bonds. Instead, they can turn to a full spectrum approach that makes use of a wider range of mid risk asset classes.[3] At the core of the full spectrum approach are strategies that exhibit more modest risk profiles and are less vulnerable to extreme market movements (put differently, they have less fat-tail risk).

What might qualify as a mid risk asset? These could include real assets, such as core real estate, core infrastructure and core transportation, as well as other assets, such as convertible bonds, hedge funds, mezzanine debt and hedged equity (**EXHIBIT 3**).

[3] Mid risk assets fall outside the traditional equity and fixed income definitions. They may have equity or fixed income features, or combinations of the two. They may offer correlation benefits vs. traditional listed market clusters.

Investors looking to achieve their return targets will need alternative sources of return

EXHIBIT 3: EXAMPLES OF NONTRADITIONAL INVESTMENT STRATEGIES

FIXED INCOME-FOCUSED	MID RISK	EQUITY-FOCUSED
Unconstrained fixed income	Structured credit (CLO/CDO)	Opportunistic real estate
Securitized credit	Hedge funds	SPAC
Multi-sector credit	Convertible bond	Special situations
Bank loans	Core/Core+ real estate	Growth equity
Private mortgages	Core transportation	PE co-investment
Private credit/Direct lending	Core infrastructure	Venture capital
	Timberland	
	Mezzanine debt	
	Preferred/Bank capital	
	Hedged equity	
	Equity income (call writing)	

Source: J.P. Morgan Asset Management. CLO: collateralized loan obligation; CDO: collateralized debt obligation; SPAC: special purpose acquisition company; PE: private equity.

The shift from a portfolio dominated by equities and bonds to one that employs a wider range of mid risk assets will pose a new set of portfolio management challenges and opportunities. Meeting these challenges can be viewed as the price of bridging the gap between returns available from 60/40 portfolios and investors' long-term return targets. In our view, the "new 60/40" portfolio might contain as much as 60% mid risk assets and 40% diversified liquid investments across traditional stocks and bonds. (We note this is just one example of what a full spectrum allocation model might look like; the exact application will be a function of investor-specific requirements and attributes.)

While the move to this "new 60/40" approach may seem an extreme shift, consider that the investment opportunity set is far more diverse today than ever before, with nontraditional categories playing a far larger role.

Using 6%–7% as a generic proxy for the range of investors' target returns, we look to identify a diverse set of nontraditional investment strategies with return expectations close to target. By their nature, most of these investment categories offer less liquidity and higher complexity than public markets. As such, the dominant form of risk management in the new asset allocation framework will migrate from managing correlations across market sectors to managing the total portfolio liquidity and maintaining a diverse mix of underlying return drivers across asset classes.

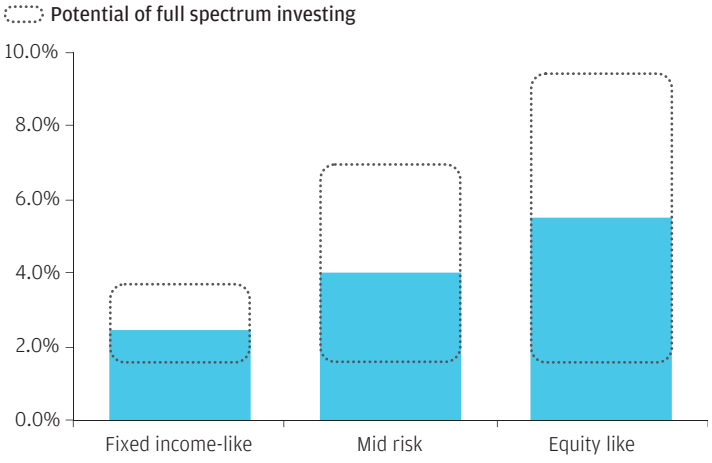
While a shift to full spectrum investing can be supported on the basis of our expectations for market beta, we find that the enhanced scope for alpha typically associated with these assets offers additional upside. Although our Long-Term Capital Market Assumptions (LTCMAs) do not forecast returns for all these assets, we attempt to capture the dispersion of return in these areas (**EXHIBIT 4**).

In a full spectrum approach, the breadth of the opportunity set is a key appeal. It provides an attractive level of internal diversification across the various strategies, as well as lower absolute volatility when compared with traditional equity-focused portfolios. This diminishes the need for negatively correlated assets to manage risk, not only volatility but also drawdown risk.

But even a well-diversified strategy built from a full spectrum approach will bear a key risk: illiquidity and, by extension, a new set of investment challenges.

Return potential increases as investors expand to full spectrum investing

EXHIBIT 4: EXPECTED RETURN RANGE FROM SIMPLE STOCK-BOND TO FULL SPECTRUM



Source: J.P. Morgan Asset Management; data as of September 30, 2021. For illustrative purposes only. Blue bars reflect the LTCMA forecasts for government bonds, a 60/40 stock-bond portfolio and U.S. equity, respectively. Dotted areas reflect the range of likely outcome of Fixed income-like, Mid risk and Equity-like assets shown in Exhibit 3.

LIQUIDITY RISK AS AN ALTERNATIVE RETURN LEVER

Think of liquidity and illiquidity on a spectrum rather than as a binary factor. Some assets, such as Treasury bills, are completely liquid, while others, such as private equity funds with a long lock-up, offer little to no liquidity. But many strategies exist somewhere in between. They might provide short-term liquidity at the cost of a high bid/offer spread (e.g., high yield bonds). Or they might require a longer time period, perhaps a few months or quarters, to redeem the investments (e.g., open-end core real estate funds).

Liquidity risk is nothing new, of course. But a full spectrum approach implies a deliberate and marked shift toward illiquidity in order to secure returns in excess of those available from a 60/40 portfolio. That is, liquidity risk becomes an alternative lever to help achieve investment goals. To be sure, a full spectrum portfolio has a markedly lower level of overall portfolio liquidity than its traditional counterpart. Thus, investors need to consider a portfolio's capacity to provide access to capital when needed. Institutions will need to assess their ongoing and contingent obligations to their sponsors and scale their liquid asset portfolios to best meet those obligations. We should highlight that obligations are both to sponsors (i.e., pension holders) and the providers of some investment products (e.g., private equity funds). The challenge is for investors to successfully balance these two obligations. Individual investors can follow a similar path, determining potential needs for access to capital and investing accordingly.

Investors can deploy the full range of public market assets for liquidity management – not just bonds. Equities, while volatile, are highly liquid and can certainly play a role in managing this risk. Actively managed fixed income and equity strategies can allow public market exposures to generate alpha while remaining liquid. Going a step further, multi-asset allocation strategies also remain highly liquid, while offering the potential to generate additional returns through the tactical movement of risk across market sectors. Vehicle choices may play a role as well, with ETFs (including active strategies and some mid risk categories, such as hedged equity) offering intraday liquidity.

Finally, we recognize that the ability of a portfolio to generate stable income across time is a powerful antidote to lower asset liquidity. Many of the strategies presented in Exhibit 3, and particularly the private mid risk approaches in the middle column, derive the majority of their total return from income (e.g., core real estate and infrastructure). Income and redemptions can also help to meet cash flow and operational needs, thereby reducing the need to liquidate assets to meet obligations.

THE NEW PORTFOLIO IN PRACTICE

But how could this work in practice? To illustrate a potential application, we use the LTCMAs as a starting point. Our example is based on a hypothetical investor shifting from a 60/40 stock-bond portfolio. The remainder of the portfolio is made up of a range of fixed income-focused, mid risk and equity-focused assets, taken from both private and public markets (**EXHIBIT 5**).

In our illustrative portfolio, for fixed income we shift from U.S. aggregate bonds to unconstrained bonds; publicly traded credit such as high yield bonds, loans and emerging market sovereign debt; and direct lending. We also enhance the bond-like features of the portfolio through exposures to mid risk assets such as convertible bonds and core real estate. Within equity, we shift from developed world equities to All-Country World equity, private equity and hedged equity. We use mezzanine debt and value-added real estate to provide both equity and debt characteristics.

A move toward real assets and mid risk strategies can achieve a better return outlook

EXHIBIT 5: AN ILLUSTRATIVE EXAMPLE OF A "FULL SPECTRUM" PORTFOLIO

	WEIGHT		LOADING		
	60/40	FULL SPECTRUM	BOND	EQUITY	REAL ECONOMY
U.S. aggregate bond	40%		Y		
Unconstrained fixed income		10.0%	Y		
Credit		10.0%	Y		
Convertible bonds		7.5%	Y	Y	
Direct lending		10.0%	Y		Y
Core real estate*		5.0%	Y		Y
Core transport*		7.5%	Y		Y
Core infrastructure*		7.5%	Y		Y
Mezzanine debt		7.5%	Y	Y	
Equity income (call writing)		5.0%	Y	Y	
Hedged equity		5.0%		Y	
Opportunistic real estate		5.0%		Y	
MSCI AC World*	60%	10%		Y	
Private equity		10%		Y	
Total	100%	100%			
Expected return (est)	4.3%	5.6%			
Potential added return		1%–2%			
Vol	9.7%	9.5%			

Source: J.P. Morgan Asset Management; estimates as of September 30, 2021. Expected return captures LTCMA asset classes' beta return expectation. Additional return potential captures elements such as added nonbeta return from unconstrained fixed income, asset allocation and strategy-specific return drivers beyond the beta loading. *Core real estate, core transport and core infrastructure are all global asset classes.

The majority of the traditional 60/40 portfolio shifts shifts to the full spectrum portfolio. Of course, none of these asset classes provides daily liquidity. By including more mid risk assets as part of a core diversified real asset basket, this new portfolio is well balanced among bond, equity and real economy risk exposure.

The full spectrum portfolio increases the 4.3% per annum (p.a.) return provided by the 60/40 portfolio to approximately 6% p.a. We estimate that, based on current market conditions, enhanced potential for alpha associated with some of the asset classes and strategies included in the full spectrum approach could add 1%–2% p.a. for appropriately skilled and resourced investors. Of course, given that some of the asset classes and strategies are small relative to liquid markets, it is reasonable to expect alpha potential to fall as investor interest increases.

Risk as defined by volatility is similar between the two portfolios, based on our LTCMA forecasts (9.7% vs. 9.5%). Of course, additional risk comes with the shift to illiquid assets. As a result, the incremental returns associated with the new model have a "price." Nevertheless, as the portfolio is fairly well balanced among equity, fixed income, rates and exposures to real assets, portfolio implementation could offer further diversification benefits driven by the idiosyncrasies that arise when implementing the target strategies, as well as enhanced scope for alpha.

As suggested above, the precise application of the full spectrum approach to asset allocation will depend on investor-specific requirements for return, risk, income and so forth, as well as each investor's ability to navigate the implementation challenges of the new asset allocation model. But as this simplified example shows, the full spectrum approach has the potential to offset the limitations associated with traditional 60/40 investing. Despite the disappointing outlook for most liquid assets, flexible investors can still achieve their goals. Of course, given the marked differences between traditional 60/40 anchored approaches to portfolio construction and the full spectrum approach, as well as the implications for governance, the changes suggested will likely be a journey rather than a single leap.

CONCLUSION

Investors face a clear choice. Traditional approaches to portfolio construction focused on liquid assets and mean-variance optimization will not satisfy their return requirements and may leave them exposed to higher levels of risk. From such a starting point, they can embrace change, or they can accept either higher risk or lower returns – possibly both. Embracing a full spectrum approach to asset allocation, and accepting the challenges associated with enhanced illiquidity, a more extended range of asset classes and enhanced nonnormality, can allow investors to bridge the gap between 60/40 returns and their own return targets and risk limits. While this shift will certainly present challenges, it also offers opportunities for flexible and thoughtful investors to deliver returns in excess of current targets while remaining within the boundaries of appropriate risk management.

GLOSSARY

AVERAGE INFLATION TARGETING A central bank framework taking past inflation levels into account in setting interest rates.

BLOCKCHAIN TECHNOLOGY Code that creates and maintains decentralized, distributed and immutable electronic ledgers recording transactions in digital assets.

CO_2 EMISSIONS INTENSITY PER UNIT OF GDP (CARBON INTENSITY) A metric that divides a country's economic output by total carbon dioxide (CO_2) emissions.

COP26 The 26th U.N. Climate Change Conference of the Parties in Glasgow, November 2021.

CRYPTOCURRENCIES Digital currencies protected from counterfeiting by cryptography, normally maintained on a blockchain network.

DRY POWDER In venture capital and private equity investing, capital in reserve not yet allocated.

FAT TAIL A distribution in which the probability of an extreme negative or positive outcome (e.g., high or low return) is greater than in a normal distribution.

FINANCIAL REPRESSION A set of conditions that artificially depress returns on savings, typically aiming to reduce the cost of borrowing for governments.

GREEN BONDS A market in which issuers are committed to use funds raised for sustainable projects or environmentally sound projects.

ILLIQUIDITY (LIQUIDITY) The state of an asset that cannot readily be sold or exchanged for cash without a substantial loss in value. Investors demand an illiquidity premium, or extra return, for holding an asset, such as private equity or real estate, that is less liquid than another. (Liquidity is the state of an asset readily convertible to cash.)

MULTIPLES ON INVESTED CAPITAL 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.

NORMALIZATION The idea that interest rates return to their historically higher levels after the current period in which benchmark short rates set by major developed market central banks have been near or below zero and long-term rates have been suppressed by bond-buying programs.

PRIVATE KEY A code generated by cryptography that allows a user to access their cryptocurrency.

SOCIAL IMPACT BONDS A financing mechanism for social services, through which a bond issuer, such as a government, raises funds from investors and passes them to a service-providing organization. Repayments are conditional on the achievement of agreed-upon targeted goals.

STABLECOINS A cryptocurrency that purports to offer a stable exchange rate relative to a fiat currency and is backed by reserve assets.

TAX LOSS HARVESTING When an investor sells a security that has underperformed expectations, creating a positive tax loss realization that is first used to offset any realized gains. Then any excess losses may be carried forward for use against subsequent-year gain realizations, and the security is replaced with a similar (proxy) security. IRS "wash sale" rules prohibit abusing the strategy by essentially swapping identical securities within 30 days to avoid recognition of net taxable gains without ever being effectively economically out of the position.

III Assumptions matrices

HOW TO USE THE NUMBERS

Our assumptions can be used to:

- Develop or review a strategic asset allocation
- Understand the risk and return trade-offs across and within asset classes and regions
- Assess the risk characteristics of a strategic asset allocation
- Review relative value allocation decisions

The assumptions are not designed to inform short-term tactical allocation decisions. Our assumptions process is carefully calibrated and constructed to aid investors with strategic asset allocation or policy-level decisions over a 10- to 15-year investment horizon.

		COMPOUND RETURN 2021 (%)	ANNUALIZED VOLATILITY (%)	ARITHMETIC RETURN 2022 (%)	COMPOUND RETURN 2022 (%)	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	2.30	2.31	1.39	2.00	1.00																					
	U.S. Cash	1.30	1.30	0.42	1.10	0.05	1.00																				
	U.S. Intermediate Treasuries	2.10	2.14	2.81	1.50	-0.21	0.22	1.00																			
	U.S. Long Treasuries	1.80	2.44	11.55	0.40	-0.17	0.07	0.82	1.00																		
	TIPS	2.10	2.23	5.16	1.50	0.08	0.07	0.57	0.53	1.00																	
	U.S. Aggregate Bonds	2.60	2.66	3.48	2.10	-0.17	0.10	0.78	0.82	0.72	1.00																
	U.S. Securitized	3.10	3.13	2.34	2.40	-0.17	0.15	0.75	0.68	0.64	0.89	1.00															
	U.S. Short Duration Government/Credit	2.10	2.11	1.50	1.70	-0.19	0.35	0.77	0.49	0.58	0.76	0.71	1.00														
	U.S. Long Duration Government/Credit	2.30	2.74	9.52	1.60	-0.17	0.01	0.66	0.88	0.63	0.93	0.72	0.55	1.00													
	U.S. Inv Grade Corporate Bonds	2.80	3.00	6.38	2.50	-0.10	-0.01	0.33	0.46	0.66	0.77	0.58	0.51	0.77	1.00												
	U.S. Long Corporate Bonds	2.40	2.93	10.47	2.10	-0.13	-0.03	0.34	0.56	0.60	0.79	0.57	0.43	0.87	0.96	1.00											
	U.S. High Yield Bonds	3.90	4.22	8.24	4.80	0.10	-0.12	-0.28	-0.23	0.34	0.20	0.15	0.11	0.16	0.58	0.50	1.00										
	U.S. Leveraged Loans	4.70	5.00	7.89	5.10	0.27	-0.15	-0.52	-0.41	0.12	-0.05	-0.09	-0.13	-0.06	0.37	0.29	0.81	1.00									
	World Government Bonds hedged	2.00	2.05	3.07	1.40	-0.25	0.12	0.82	0.86	0.50	0.82	0.69	0.62	0.80	0.49	0.55	-0.16	-0.38	1.00								
	World Government Bonds	2.30	2.49	6.17	1.80	-0.09	0.09	0.64	0.53	0.61	0.71	0.62	0.66	0.62	0.53	0.53	0.17	-0.13	0.60	1.00							
	World ex-U.S. Government Bonds hedged	2.00	2.05	3.06	1.30	-0.25	0.08	0.65	0.70	0.42	0.72	0.58	0.51	0.73	0.48	0.54	-0.07	-0.27	0.95	0.53	1.00						
	World ex-U.S. Government Bonds	2.40	2.69	7.69	1.80	-0.06	0.07	0.51	0.38	0.56	0.61	0.53	0.58	0.53	0.52	0.51	0.26	-0.03	0.48	0.98	0.45	1.00					
	Emerging Markets Sovereign Debt	5.20	5.57	8.92	5.20	0.03	-0.02	0.12	0.14	0.57	0.52	0.44	0.32	0.46	0.77	0.69	0.72	0.46	0.23	0.47	0.27	0.52	1.00				
	Emerging Markets Local Currency Debt	5.90	6.58	12.09	5.20	0.05	0.08	0.07	0.01	0.42	0.36	0.29	0.31	0.30	0.55	0.49	0.62	0.35	0.11	0.56	0.15	0.63	0.79	1.00			
	Emerging Markets Corporate Bonds	4.80	5.13	8.35	4.70	0.08	-0.05	0.00	0.03	0.52	0.43	0.35	0.31	0.38	0.78	0.68	0.75	0.59	0.10	0.36	0.15	0.40	0.89	0.71	1.00		
	U.S. Muni 1-15 Yr Blend	2.10	2.15	3.25	1.90	-0.08	0.02	0.38	0.38	0.49	0.59	0.55	0.39	0.51	0.56	0.51	0.27	0.12	0.45	0.39	0.45	0.36	0.52	0.27	0.36	1.00	
	U.S. Muni High Yield	2.90	3.18	7.60	4.60	0.31	-0.06	-0.08	0.05	0.36	0.19	0.16	-0.05	0.19	0.41	0.34	0.39	0.50	0.04	0.02	0.08	0.04	0.48	0.20	0.45	0.53	1.00
EQUITIES	U.S. Large Cap	4.10	5.16	15.02	4.10	0.04	-0.09	-0.34	-0.31	0.12	0.01	-0.03	-0.08	0.02	0.33	0.30	0.71	0.60	-0.24	0.12	-0.14	0.22	0.53	0.58	0.56	0.03	0.18
	U.S. Mid Cap	4.30	5.65	17.06	4.40	0.05	-0.10	-0.37	-0.31	0.13	0.02	-0.03	-0.08	0.02	0.36	0.32	0.76	0.64	-0.25	0.10	-0.16	0.19	0.54	0.58	0.58	0.05	0.20
	U.S. Small Cap	4.40	6.17	19.61	4.60	0.03	-0.11	-0.39	-0.36	0.04	-0.07	-0.09	-0.13	-0.06	0.25	0.22	0.68	0.56	-0.29	0.03	-0.20	0.13	0.45	0.52	0.48	-0.01	0.11
	Euro Area Large Cap	7.10	9.17	21.56	6.60	0.04	-0.02	-0.26	-0.28	0.16	0.08	0.04	0.05	0.05	0.38	0.33	0.70	0.53	-0.20	0.29	-0.13	0.38	0.62	0.70	0.61	0.09	0.19
	Japanese Equity	6.70	7.71	14.85	6.50	-0.01	-0.11	-0.30	-0.24	0.11	0.04	-0.01	-0.02	0.06	0.35	0.33	0.62	0.49	-0.22	0.14	-0.15	0.23	0.48	0.57	0.52	0.01	0.12
	Hong Kong Equity	6.90	8.71	20.11	7.60	0.00	-0.01	-0.22	-0.23	0.20	0.13	0.09	0.11	0.09	0.43	0.37	0.65	0.52	-0.18	0.21	-0.13	0.29	0.59	0.65	0.63	0.11	0.24
	UK Large Cap	5.00	6.40	17.42	7.50	0.08	-0.05	-0.35	-0.34	0.14	0.02	-0.01	-0.02	0.01	0.37	0.33	0.72	0.62	-0.28	0.20	-0.20	0.31	0.59	0.66	0.62	0.05	0.26
	EAFE Equity	6.50	7.82	17.04	6.50	0.04	-0.05	-0.29	-0.28	0.18	0.08	0.03	0.04	0.07	0.42	0.38	0.75	0.59	-0.22	0.28	-0.13	0.38	0.64	0.73	0.65	0.07	0.20
	Chinese Domestic Equity	8.20	11.98	29.84	7.50	-0.03	0.14	-0.19	-0.17	0.07	0.03	0.02	0.02	0.02	0.22	0.18	0.36	0.30	-0.11	0.06	-0.06	0.11	0.31	0.33	0.36	-0.03	0.09
	Emerging Markets Equity	6.90	8.86	20.92	7.20	0.06	0.01	-0.25	-0.24	0.26	0.12	0.07	0.10	0.10	0.45	0.39	0.74	0.57	-0.18	0.31	-0.11	0.40	0.67	0.79	0.68	0.08	0.25
	AC Asia ex-Japan Equity	7.00	8.86	20.41	7.10	0.01	0.01	-0.22	-0.20	0.25	0.14	0.09	0.11	0.12	0.46	0.41	0.72	0.54	-0.15	0.28	-0.09	0.37	0.64	0.74	0.66	0.08	0.25
	AC World Equity	5.00	6.17	15.91	5.10	0.05	-0.06	-0.32	-0.30	0.17	0.06	0.01	0.00	0.06	0.40	0.36	0.77	0.62	-0.23	0.23	-0.14	0.33	0.62	0.70	0.64	0.05	0.20
	U.S. Equity Value Factor	5.60	6.87	16.59	6.20	0.02	-0.12	-0.37	-0.35	0.07	-0.03	-0.05	-0.09	-0.03	0.30	0.26	0.71	0.58	-0.27	0.08	-0.16	0.18	0.49	0.57	0.53	0.00	0.14
	U.S. Equity Momentum Factor	4.70	5.78	15.24	4.10	0.07	-0.09	-0.34	-0.27	0.17	0.04	-0.02	-0.08	0.05	0.37	0.33	0.73	0.64	-0.23	0.11	-0.15	0.20	0.55	0.56	0.56	0.07	0.23
	U.S. Equity Quality Factor	4.70	5.57	13.68	4.30	0.04	-0.09	-0.32	-0.28	0.13	0.03	-0.02	-0.07	0.04	0.34	0.31	0.70	0.57	-0.21	0.13	-0.12	0.22	0.54	0.59	0.55	0.05	0.18
	U.S. Equity Minimum Volatility Factor	4.60	5.28	12.02	4.80	0.02	-0.09	-0.26	-0.19	0.16	0.10	0.05	-0.05	0.11	0.39	0.36	0.70	0.57	-0.10	0.17	0.00	0.25	0.57	0.60	0.55	0.11	0.22
	U.S. Equity Dividend Yield Factor	5.20	6.27	15.23	5.50	0.02	-0.11	-0.31	-0.26	0.15	0.06	0.03	-0.04	0.07	0.38	0.34	0.72	0.60	-0.18	0.14	-0.08	0.23	0.55	0.61	0.57	0.10	0.20
	U.S. Equity Diversified Factor	5.30	6.20	13.92	5.60	0.05	-0.11	-0.34	-0.29	0.14	0.03	-0.02	-0.08	0.03	0.35	0.32	0.73	0.61	-0.22	0.12	-0.11	0.22	0.55	0.60	0.57	0.07	0.20
	U.S. Convertible Bond	4.50	5.15	11.77	5.00	0.04	-0.11	-0.31	-0.26	0.23	0.12	0.05	0.03	0.10	0.48	0.41	0.80	0.68	-0.20	0.15	-0.11	0.25	0.61	0.57	0.65	0.16	0.29
	Global Convertible Bond hedged	5.50	5.99	10.22	4.60	0.00	-0.09	-0.33	-0.27	0.20	0.12	0.05	0.05	0.11	0.50	0.43	0.81	0.70	-0.20	0.14	-0.11	0.23	0.64	0.60	0.70	0.14	0.28
	Global Credit Sensitive Convertible hedged	4.60	4.83	7.03	4.20	0.17	-0.06	-0.19	-0.20	0.09	0.01	-0.13	-0.07	0.06	0.28	0.27	0.36	0.41	-0.10	0.07	-0.01	0.13	0.27	0.26	0.36	0.02	0.28
ALTERNATIVES	Private Equity	8.10	9.66	18.68	7.80	0.16	0.00	-0.51	-0.57	0.09	-0.19	-0.21	-0.14	-0.24	0.30	0.17	0.72	0.69	-0.46	-0.01	-0.34	0.13	0.58	0.60	0.63	0.02	0.36
	U.S. Core Real Estate	5.80	6.32	10.58	5.90	0.36	-0.08	-0.37	-0.30	0.01	-0.22	-0.15	-0.28	-0.21	0.01	-0.04	0.44	0.51	-0.35	-0.20	-0.31	-0.14	0.20	0.22	0.30	-0.21	0.43
	U.S. Value-Added Real Estate	7.70	8.95	16.65	8.10	0.36	-0.08	-0.37	-0.30	0.01	-0.22	-0.15	-0.28	-0.21	0.01	-0.04	0.43	0.51	-0.35	-0.20	-0.31	-0.14	0.20	0.22	0.30	-0.21	0.43
	European Core Real Estate	6.10	6.81	12.38	6.40	0.31	0.00	-0.51	-0.56	0.05	-0.28	-0.25	-0.18	-0.32	0.15	0.03	0.63	0.60	-0.54	0.03	-0.47	0.16	0.42	0.53	0.50	-0.08	0.33
	Asia Pacific Core Real Estate	7.50	8.44	14.38	6.60	0.32	-0.06	-0.37	-0.30	0.17	-0.06	-0.04	-0.16	-0.06	0.28	0.23	0.62	0.62	-0.35	0.07	-0.30	0.16	0.44	0.47	0.51	0.02	0.45
	U.S. REITs	5.70	6.75	15.11	6.50	0.01	-0.06	-0.06	0.02	0.26	0.26	0.23	0.05	0.27	0.46	0.45	0.64	0.42	0.08	0.26	0.14	0.30	0.56	0.57	0.50	0.21	0.27
	Global Core Infrastructure	6.10	6.64	10.74	6.10	0.19	-0.04	-0.30	-0.34	0.21	-0.02	-0.03	0.00	-0.07	0.31	0.22	0.57	0.56	-0.26	0.21	-0.19	0.32	0.51	0.55	0.53	0.09	0.29
	Global Core Transport	7.40	8.21	13.31	7.60	0.31	0.07	-0.06	-0.07	0.02	-0.10	-0.05	-0.09	-0.13	-0.14	-0.15	0.06	0.13	-0.12	-0.06	-0.15	-0.07	-0.07	0.01	0.00	-0.23	0.15
	Diversified Hedge Funds	3.60	3.82	6.84	3.30	0.18	0.01	-0.42	-0.33	0.16	-0.06	-0.14	-0.12	-0.03	0.33	0.27	0.63	0.67	-0.33	-0.02	-0.24	0.07	0.46	0.42	0.51	0.02	0.40
	Event Driven Hedge Funds	3.20	3.55	8.52	3.10	0.18	-0.09	-0.47	-0.45	0.12	-0.08	-0.14	-0.09	-0.08	0.32	0.25	0.76	0.76	-0.39	0.02	-0.28	0.14	0.50	0.53	0.59	0.00	0.33
	Long Bias Hedge Funds	3.30	3.85	10.75	3.40	0.10	-0.08	-0.41	-0.39	0.14	-0.02	-0.09	-0.03	-0.03	0.35	0.29	0.75	0.68	-0.34	0.12	-0.25	0.23	0.53	0.60	0.59	0.00	0.22
	Relative Value Hedge Funds	3.80	3.99	6.24	3.60	0.23	-0.09	-0.43	-0.38	0.21	0.02	-0.03	-0.02	0.00	0.42	0.34	0.84	0.85	-0.33	0.01	-0.22	0.12	0.59	0.55	0.66	0.11	0.45
	Macro Hedge Funds	2.70	2.99	7.75	2.20	-0.06	0.11	0.07	0.07	0.27	0.17	0.07	0.20	0.18	0.28	0.27	0.21	0.10	0.11	0.31	0.14	0.33	0.25	0.29	0.21	0.12	0.13
	Direct Lending	6.90	7.71	13.26	6.80	0.31	-0.15	-0.52	-0.51	0.14	-0.19	-0.15	-0.23	-0.22	0.20	0.10	0.72	0.75	-0.43	-0.20	-0.30	-0.09	0.50	0.41	0.56	0.04	0.39
	Commodities	2.60	3.86	16.36	2.30	0.29	0.03	-0.21	-0.29	0.27	-0.02	-0.06	0.03	-0.05	0.24	0.18	0.49	0.43	-0.30	0.25	-0.26	0.34	0.42	0.52	0.45	-0.05	0.22
	Gold	3.00	4.41	17.32	2.90	0.00	0.08	0.36	0.27	0.49	0.41	0.37	0.39	0.32	0.37	0.31	0.11	-0.06	0.27	0.53	0.21	0.53	0.35	0.39	0.31	0.22	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. Please note that all information shown is based on qualitative analysis. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only–they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2021. Alternative asset classes (including hedge funds, private equity, real estate, direct lending, transportation and infrastructure) 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, 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. 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. Equity Diversified Factor	U.S. Convertible Bond	Global Convertible Bond hedged	Global Credit Sensitive Convertible hedged	Private Equity	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	Diversified Hedge Funds	Event Driven Hedge Funds	Long Bias Hedge Funds	Relative Value Hedge Funds	Macro Hedge Funds	Direct Lending	Commodities	Gold
U.S. Large Cap	1.00																																				
U.S. Mid Cap	0.96	1.00																																			
U.S. Small Cap	0.91	0.95	1.00																																		
Euro Area Large Cap	0.85	0.83	0.76	1.00																																	
Japanese Equity	0.71	0.70	0.65	0.74	1.00																																
Hong Kong Equity	0.68	0.67	0.61	0.73	0.63	1.00																															
UK Large Cap	0.85	0.82	0.74	0.91	0.74	0.77	1.00																														
EAFE Equity	0.88	0.87	0.79	0.97	0.83	0.79	0.95	1.00																													
Chinese Domestic Equity	0.40	0.38	0.34	0.39	0.33	0.56	0.41	0.42	1.00																												
Emerging Markets Equity	0.76	0.77	0.70	0.83	0.68	0.87	0.82	0.87	0.55	1.00																											
AC Asia ex-Japan Equity	0.74	0.75	0.68	0.80	0.66	0.90	0.79	0.84	0.59	0.98	1.00																										
AC World Equity	0.96	0.94	0.87	0.93	0.79	0.79	0.93	0.97	0.45	0.88	0.86	1.00																									
U.S. Equity Value Factor	0.97	0.96	0.93	0.82	0.70	0.65	0.82	0.86	0.36	0.74	0.71	0.93	1.00																								
U.S. Equity Momentum Factor	0.96	0.96	0.90	0.82	0.69	0.68	0.81	0.86	0.41	0.77	0.75	0.94	0.91	1.00																							
U.S. Equity Quality Factor	0.99	0.96	0.91	0.83	0.69	0.66	0.83	0.87	0.38	0.75	0.72	0.95	0.96	0.96	1.00																						
U.S. Equity Minimum Volatility Factor	0.94	0.92	0.86	0.78	0.64	0.60	0.78	0.82	0.32	0.70	0.67	0.89	0.93	0.91	0.95	1.00																					
U.S. Equity Dividend Yield Factor	0.94	0.95	0.90	0.80	0.68	0.66	0.82	0.85	0.33	0.74	0.71	0.91	0.97	0.90	0.95	0.96	1.00																				
U.S. Equity Diversified Factor	0.97	0.98	0.92	0.83	0.70	0.66	0.83	0.86	0.38	0.75	0.73	0.94	0.97	0.95	0.98	0.97	0.97	1.00																			
U.S. Convertible Bond	0.86	0.90	0.84	0.78	0.69	0.71	0.77	0.83	0.46	0.79	0.78	0.88	0.83	0.90	0.85	0.78	0.82	0.85	1.00																		
Global Convertible Bond hedged	0.86	0.89	0.82	0.83	0.73	0.75	0.82	0.87	0.50	0.83	0.82	0.91	0.83	0.89	0.85	0.78	0.81	0.84	0.98	1.00																	
Global Credit Sensitive Convertible hedged	0.46	0.44	0.39	0.44	0.36	0.36	0.48	0.47	0.21	0.38	0.36	0.48	0.40	0.46	0.44	0.39	0.40	0.42	0.47	0.49	1.00																
Private Equity	0.80	0.81	0.76	0.79	0.62	0.71	0.81	0.81	0.50	0.82	0.78	0.84	0.78	0.80	0.78	0.72	0.76	0.79	0.81	0.83	0.46	1.00															
U.S. Core Real Estate	0.41	0.41	0.38	0.32	0.35	0.32	0.42	0.38	0.13	0.37	0.35	0.40	0.42	0.39	0.39	0.44	0.41	0.41	0.29	0.29	0.27	0.43	1.00														
U.S. Value-Added Real Estate	0.41	0.41	0.38	0.32	0.35	0.32	0.42	0.38	0.13	0.37	0.35	0.40	0.42	0.39	0.39	0.44	0.41	0.40	0.29	0.29	0.26	0.43	1.00	1.00													
European Core Real Estate	0.59	0.61	0.54	0.70	0.54	0.59	0.76	0.72	0.41	0.72	0.67	0.69	0.58	0.59	0.57	0.51	0.56	0.58	0.63	0.65	0.33	0.82	0.51	0.51	1.00												
Asia Pacific Core Real Estate	0.59	0.60	0.51	0.60	0.53	0.60	0.67	0.65	0.30	0.65	0.62	0.65	0.58	0.59	0.57	0.58	0.59	0.59	0.55	0.56	0.46	0.61	0.74	0.74	0.69	1.00											
U.S. REITs	0.73	0.76	0.73	0.65	0.52	0.48	0.62	0.67	0.16	0.57	0.56	0.71	0.75	0.71	0.75	0.81	0.80	0.76	0.63	0.62	0.28	0.52	0.54	0.54	0.39	0.58	1.00										
Global Core Infrastructure	0.53	0.50	0.45	0.60	0.45	0.59	0.62	0.60	0.19	0.63	0.58	0.60	0.50	0.52	0.51	0.46	0.49	0.50	0.51	0.51	0.20	0.65	0.38	0.38	0.63	0.50	0.38	1.00									
Global Core Transport	0.07	0.08	0.09	0.12	-0.04	-0.09	0.09	0.07	-0.11	-0.01	-0.05	0.05	0.10	0.05	0.07	0.13	0.09	0.07	-0.05	-0.03	0.16	0.06	0.56	0.56	0.27	0.33	0.28	0.17	1.00								
Diversified Hedge Funds	0.71	0.73	0.64	0.67	0.62	0.62	0.73	0.73	0.46	0.70	0.67	0.76	0.65	0.77	0.69	0.63	0.64	0.70	0.78	0.81	0.52	0.80	0.37	0.37	0.65	0.57	0.41	0.46	0.06	1.00							
Event Driven Hedge Funds	0.81	0.84	0.79	0.77	0.68	0.69	0.83	0.83	0.45	0.78	0.74	0.85	0.80	0.82	0.78	0.71	0.78	0.80	0.85	0.87	0.56	0.85	0.43	0.43	0.70	0.62	0.53	0.51	0.08	0.87	1.00						
Long Bias Hedge Funds	0.87	0.90	0.85	0.83	0.74	0.78	0.85	0.88	0.49	0.86	0.84	0.93	0.85	0.89	0.85	0.77	0.83	0.86	0.91	0.92	0.50	0.86	0.35	0.35	0.69	0.60	0.56	0.55	-0.01	0.87	0.94	1.00					
Relative Value Hedge Funds	0.72	0.76	0.68	0.71	0.65	0.70	0.78	0.77	0.45	0.77	0.73	0.79	0.71	0.75	0.69	0.66	0.71	0.73	0.82	0.85	0.51	0.81	0.46	0.46	0.69	0.66	0.50	0.54	0.06	0.85	0.93	0.87	1.00				
Macro Hedge Funds	0.28	0.28	0.19	0.32	0.26	0.29	0.35	0.35	0.20	0.38	0.35	0.35	0.23	0.32	0.29	0.28	0.26	0.28	0.32	0.35	0.19	0.33	-0.06	-0.06	0.25	0.11	0.17	0.14	-0.11	0.55	0.35	0.42	0.32	1.00			
Direct Lending	0.63	0.69	0.63	0.54	0.44	0.50	0.62	0.59	0.29	0.60	0.54	0.64	0.65	0.67	0.63	0.61	0.65	0.67	0.67	0.67	0.37	0.75	0.47	0.46	0.61	0.60	0.43	0.44	0.10	0.65	0.76	0.71	0.79	0.10	1.00		
Commodities	0.48	0.50	0.43	0.51	0.39	0.49	0.61	0.56	0.25	0.62	0.55	0.57	0.45	0.51	0.46	0.41	0.46	0.46	0.52	0.50	0.35	0.63	0.36	0.36	0.65	0.56	0.31	0.50	0.12	0.58	0.61	0.62	0.59	0.42	0.55	1.00	
Gold	-0.01	0.00	-0.06	0.06	-0.02	0.18	0.09	0.08	0.16	0.22	0.18	0.07	-0.04	0.03	0.01	0.04	0.02	0.01	0.09	0.09	0.00	0.08	-0.07	-0.07	0.04	0.16	0.05	0.17	-0.10	0.11	0.04	0.12	0.07	0.40	0.04	0.38	1.00

		COMPOUND RETURN 2021 (%)	ANNUALIZED VOLATILITY (%)	ARITHMETIC RETURN 2022 (%)	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
FIXED INCOME	Euro Inflation	1.50	1.50	0.67	1.30	1.00																		
	Euro Cash	0.10	0.10	0.60	0.20	0.05	1.00																	
	U.S. Aggregate Bonds hedged	1.40	1.46	3.51	1.30	-0.21	0.21	1.00																
	Euro Aggregate Bonds	1.20	1.27	3.64	0.80	-0.21	0.15	0.66	1.00															
	U.S. Inv Grade Corporate Bonds hedged	1.50	1.70	6.46	1.70	-0.16	0.09	0.80	0.59	1.00														
	Euro Inv Grade Corp Bonds	1.50	1.61	4.71	1.40	-0.11	0.02	0.52	0.72	0.79	1.00													
	U.S. High Yield Bonds hedged	2.70	3.03	8.29	3.90	0.09	-0.07	0.18	0.09	0.55	0.57	1.00												
	Euro High Yield Bonds	2.90	3.27	8.76	3.60	0.08	-0.11	0.10	0.17	0.48	0.66	0.87	1.00											
	U.S. Leveraged Loans hedged	3.50	3.80	7.89	4.30	0.20	-0.14	-0.03	-0.05	0.35	0.46	0.83	0.88	1.00										
	Euro Government Bonds	1.10	1.19	4.21	0.70	-0.21	0.16	0.62	0.97	0.47	0.56	-0.04	0.03	-0.17	1.00									
	Euro Govt Inflation-Linked Bonds	0.80	0.92	4.84	0.30	-0.01	0.10	0.51	0.76	0.58	0.67	0.36	0.33	0.15	0.72	1.00								
	World Government Bonds hedged	0.80	0.85	3.09	0.50	-0.25	0.21	0.82	0.82	0.51	0.38	-0.17	-0.20	-0.35	0.85	0.54	1.00							
	World Government Bonds	1.00	1.24	7.05	0.40	-0.14	0.14	0.38	0.50	0.17	0.15	-0.32	-0.24	-0.26	0.51	0.16	0.60	1.00						
	World ex-Euro Government Bonds hedged	0.70	0.75	3.07	0.40	-0.23	0.20	0.83	0.59	0.47	0.21	-0.23	-0.32	-0.42	0.62	0.34	0.94	0.54	1.00					
	World ex-Euro Government Bonds	1.00	1.43	9.42	0.20	-0.13	0.13	0.28	0.34	0.07	0.04	-0.35	-0.27	-0.27	0.35	0.03	0.48	0.97	0.46	1.00				
	Global Multiverse Bonds hedged	1.20	1.24	2.94	1.10	-0.22	0.20	0.94	0.84	0.81	0.67	0.24	0.19	0.03	0.79	0.68	0.88	0.43	0.80	0.30	1.00			
	Emerging Markets Sovereign Debt hedged	4.00	4.38	8.96	4.40	-0.02	0.00	0.50	0.36	0.72	0.62	0.71	0.54	0.45	0.26	0.54	0.22	-0.19	0.17	-0.29	0.55	1.00		
	Emerging Markets Local Currency Debt	4.60	5.00	9.16	3.80	0.03	0.09	0.29	0.36	0.44	0.50	0.44	0.41	0.36	0.29	0.41	0.19	0.26	0.09	0.20	0.40	0.55	1.00	
	Emerging Markets Corporate Bonds hedged	3.60	3.93	8.29	3.80	0.01	-0.05	0.42	0.31	0.73	0.69	0.76	0.67	0.58	0.17	0.47	0.09	-0.19	0.04	-0.27	0.46	0.90	0.53	1.00
EQUITIES	European Large Cap	5.10	6.10	14.64	5.00	0.07	-0.21	-0.03	0.06	0.32	0.48	0.69	0.74	0.65	-0.04	0.31	-0.25	-0.28	-0.35	-0.32	0.07	0.50	0.46	0.55
	European Small Cap	6.50	7.83	17.07	6.50	0.06	-0.21	-0.04	0.02	0.33	0.48	0.71	0.78	0.69	-0.09	0.25	-0.30	-0.31	-0.38	-0.34	0.05	0.46	0.38	0.55
	U.S. Large Cap	2.80	3.76	14.20	2.70	0.08	-0.23	-0.10	0.05	0.18	0.38	0.52	0.56	0.56	-0.02	0.19	-0.23	0.02	-0.33	0.01	0.01	0.26	0.47	0.34
	U.S. Large Cap hedged	2.80	3.87	15.04	3.30	0.11	-0.22	-0.01	0.00	0.31	0.42	0.70	0.63	0.58	-0.09	0.26	-0.25	-0.45	-0.32	-0.50	0.06	0.53	0.33	0.57
	Euro Area Large Cap	5.80	7.09	16.78	5.20	0.04	-0.19	-0.02	0.06	0.31	0.45	0.67	0.71	0.60	-0.02	0.33	-0.24	-0.37	-0.34	-0.41	0.08	0.51	0.40	0.55
	Euro Area Small Cap	6.20	7.63	17.75	6.40	0.04	-0.19	-0.01	0.05	0.34	0.47	0.70	0.75	0.65	-0.04	0.31	-0.25	-0.37	-0.34	-0.41	0.08	0.50	0.36	0.57
	UK Large Cap	3.70	4.74	14.89	6.10	0.11	-0.21	-0.08	0.01	0.28	0.45	0.63	0.72	0.66	-0.09	0.21	-0.31	-0.17	-0.40	-0.19	0.00	0.41	0.48	0.50
	UK Large Cap hedged	2.60	3.49	13.63	5.80	-0.02	-0.11	0.07	0.08	0.36	0.44	0.64	0.60	0.53	0.00	0.32	-0.15	-0.34	-0.22	-0.39	0.16	0.56	0.41	0.56
	Japanese Equity	5.40	6.34	14.27	5.10	-0.02	-0.17	-0.08	0.07	0.22	0.35	0.42	0.48	0.46	-0.01	0.20	-0.20	0.09	-0.30	0.08	0.01	0.20	0.48	0.31
	Japanese Equity hedged	5.00	6.44	17.66	5.20	0.10	-0.03	-0.18	-0.09	0.12	0.26	0.50	0.51	0.48	-0.14	0.19	-0.36	-0.49	-0.44	-0.52	-0.11	0.32	0.30	0.39
	Chinese Domestic Equity	6.90	10.49	28.87	6.10	-0.06	0.00	-0.04	0.06	0.14	0.22	0.27	0.32	0.28	0.02	0.08	-0.12	-0.05	-0.19	-0.06	0.02	0.18	0.25	0.25
	Emerging Markets Equity	5.60	6.92	16.93	5.80	0.06	-0.11	0.05	0.08	0.39	0.49	0.69	0.69	0.63	-0.02	0.32	-0.20	-0.22	-0.29	-0.26	0.12	0.55	0.63	0.62
	AC Asia ex-Japan Equity	5.70	7.03	17.05	5.70	-0.01	-0.11	0.07	0.12	0.40	0.51	0.66	0.66	0.58	0.02	0.31	-0.15	-0.15	-0.25	-0.19	0.15	0.50	0.59	0.58
	AC World Equity	3.70	4.57	13.60	3.70	0.06	-0.21	-0.04	0.07	0.30	0.48	0.65	0.70	0.66	-0.03	0.27	-0.24	-0.10	-0.35	-0.13	0.06	0.40	0.55	0.49
	AC World ex-EMU Equity	3.50	4.37	13.54	3.60	0.07	-0.21	-0.05	0.07	0.29	0.47	0.64	0.68	0.65	-0.03	0.25	-0.24	-0.05	-0.35	-0.08	0.05	0.38	0.56	0.47
	Developed World Equity	3.50	4.39	13.69	3.50	0.06	-0.22	-0.06	0.07	0.28	0.46	0.63	0.68	0.64	-0.03	0.25	-0.25	-0.08	-0.35	-0.11	0.05	0.37	0.52	0.46
	Global Convertible Bond hedged	4.30	4.80	10.22	3.80	0.01	-0.10	0.12	0.10	0.50	0.56	0.80	0.76	0.70	-0.01	0.35	-0.20	-0.41	-0.29	-0.47	0.18	0.63	0.38	0.70
	Global Credit Sensitive Convertible hedged	3.40	3.63	6.87	3.40	0.16	-0.25	0.03	0.14	0.26	0.39	0.36	0.46	0.39	0.06	0.15	-0.09	-0.16	-0.16	-0.20	0.11	0.26	0.17	0.34
ALTERNATIVES	Private Equity	6.80	8.18	17.45	6.40	0.13	-0.20	-0.22	-0.11	0.20	0.35	0.60	0.58	0.65	-0.22	0.14	-0.41	-0.16	-0.47	-0.16	-0.12	0.41	0.48	0.49
	U.S. Core Real Estate	4.50	5.25	12.61	4.50	0.28	-0.36	-0.17	-0.17	-0.03	0.08	0.33	0.34	0.43	-0.21	-0.06	-0.25	0.05	-0.24	0.10	-0.16	0.12	0.33	0.23
	European Core Real Estate	4.80	5.29	10.16	5.00	0.25	-0.29	-0.37	-0.32	0.01	0.10	0.52	0.49	0.59	-0.39	-0.05	-0.54	-0.21	-0.56	-0.19	-0.34	0.25	0.31	0.37
	European Value-Added Real Estate	6.80	8.01	16.30	7.70	0.25	-0.29	-0.37	-0.32	0.01	0.10	0.52	0.49	0.59	-0.39	-0.05	-0.54	-0.21	-0.56	-0.19	-0.34	0.25	0.31	0.37
	Asia Pacific Core Real Estate	6.20	7.08	13.80	5.20	0.23	-0.32	-0.05	-0.13	0.22	0.24	0.49	0.48	0.56	-0.22	0.00	-0.28	0.01	-0.28	0.04	-0.05	0.31	0.39	0.39
	Global REITs	4.60	5.42	13.19	5.40	0.02	-0.20	0.19	0.24	0.44	0.53	0.63	0.63	0.54	0.16	0.38	0.03	0.04	-0.06	0.01	0.29	0.47	0.59	0.49
	Global Core Infrastructure	4.80	5.26	9.91	4.70	0.21	-0.21	-0.04	0.01	0.12	0.17	0.32	0.33	0.43	-0.03	0.12	-0.13	0.19	-0.19	0.18	0.01	0.24	0.40	0.27
	Global Core Transport	6.10	6.97	13.73	6.20	0.20	-0.23	-0.09	-0.13	-0.25	-0.26	-0.10	-0.09	0.01	-0.07	-0.13	0.00	0.27	0.03	0.31	-0.13	-0.22	0.09	-0.15
	Diversified Hedge Funds hedged	2.40	2.62	6.70	2.50	0.15	-0.16	-0.05	-0.05	0.30	0.39	0.65	0.67	0.67	-0.15	0.20	-0.33	-0.40	-0.37	-0.43	0.00	0.45	0.27	0.52
	Event Driven Hedge Funds hedged	2.00	2.35	8.52	2.30	0.21	-0.17	-0.09	-0.08	0.29	0.42	0.77	0.77	0.77	-0.19	0.22	-0.39	-0.48	-0.46	-0.50	-0.02	0.50	0.33	0.59
	Long Bias Hedge Funds hedged	2.10	2.66	10.73	2.60	0.12	-0.14	-0.03	-0.07	0.34	0.42	0.75	0.72	0.69	-0.17	0.23	-0.35	-0.51	-0.40	-0.55	0.02	0.53	0.33	0.61
	Relative Value Hedge Funds hedged	2.60	2.79	6.27	2.80	0.21	-0.08	0.03	0.00	0.40	0.50	0.85	0.84	0.86	-0.12	0.27	-0.32	-0.38	-0.39	-0.41	0.09	0.58	0.42	0.67
	Macro Hedge Funds hedged	1.50	1.80	7.81	1.40	0.02	0.15	0.18	0.19	0.31	0.26	0.19	0.18	0.08	0.14	0.30	0.13	-0.06	0.11	-0.11	0.21	0.24	0.11	0.20
	Direct Lending	5.60	6.63	14.94	5.40	0.10	-0.07	-0.10	0.01	-0.05	0.04	0.13	0.13	0.25	-0.01	-0.02	-0.07	0.46	-0.12	0.49	-0.03	0.00	0.44	0.05
	Commodities	1.30	2.22	13.78	0.90	0.26	-0.11	-0.12	-0.17	0.11	0.14	0.38	0.32	0.42	-0.23	0.08	-0.32	-0.09	-0.32	-0.08	-0.11	0.21	0.30	0.30
	Gold	1.70	3.01	16.57	1.50	-0.01	0.09	0.31	0.19	0.23	0.12	-0.07	-0.10	-0.11	0.17	0.09	0.29	0.39	0.32	0.39	0.29	0.12	0.28	0.12

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. Please note that all information shown is based on qualitative analysis. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only–they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2021. Alternative asset classes (including hedge funds, private equity, real estate, direct lending, transportation and infrastructure) 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, 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. 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 Large Cap	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 Bond hedged	Global Credit Sensitive Convertible hedged	Private Equity	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	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
European Large Cap	1.00																																	
European Small Cap	0.92	1.00																																
U.S. Large Cap	0.80	0.74	1.00																															
U.S. Large Cap hedged	0.84	0.80	0.79	1.00																														
Euro Area Large Cap	0.97	0.89	0.73	0.84	1.00																													
Euro Area Small Cap	0.92	0.97	0.68	0.81	0.93	1.00																												
UK Large Cap	0.93	0.86	0.80	0.74	0.85	0.80	1.00																											
UK Large Cap hedged	0.87	0.79	0.65	0.80	0.86	0.82	0.82	1.00																										
Japanese Equity	0.66	0.61	0.70	0.48	0.59	0.57	0.68	0.49	1.00																									
Japanese Equity hedged	0.71	0.67	0.57	0.67	0.71	0.67	0.66	0.61	0.74	1.00																								
Chinese Domestic Equity	0.32	0.33	0.35	0.27	0.29	0.30	0.35	0.22	0.28	0.31	1.00																							
Emerging Markets Equity	0.76	0.75	0.65	0.70	0.72	0.73	0.74	0.68	0.55	0.58	0.50	1.00																						
AC Asia ex-Japan Equity	0.73	0.72	0.65	0.66	0.69	0.69	0.71	0.63	0.56	0.55	0.56	0.97	1.00																					
AC World Equity	0.92	0.86	0.95	0.84	0.86	0.82	0.90	0.77	0.75	0.68	0.40	0.81	0.79	1.00																				
AC World ex-EMU Equity	0.88	0.84	0.96	0.82	0.81	0.78	0.89	0.74	0.76	0.66	0.41	0.80	0.79	1.00	1.00																			
Developed World Equity	0.91	0.85	0.97	0.84	0.85	0.81	0.89	0.76	0.76	0.68	0.37	0.75	0.74	1.00	0.99	1.00																		
Global Convertible Bond hedged	0.81	0.85	0.65	0.85	0.82	0.85	0.72	0.76	0.51	0.67	0.38	0.78	0.75	0.79	0.76	0.77	1.00																	
Global Credit Sensitive Convertible hedged	0.48	0.48	0.36	0.47	0.47	0.48	0.44	0.42	0.28	0.30	0.15	0.37	0.34	0.43	0.41	0.43	0.50	1.00																
Private Equity	0.72	0.71	0.77	0.64	0.66	0.64	0.74	0.58	0.57	0.55	0.47	0.72	0.71	0.80	0.81	0.79	0.66	0.34	1.00															
U.S. Core Real Estate	0.36	0.33	0.47	0.29	0.26	0.25	0.43	0.16	0.41	0.27	0.13	0.34	0.35	0.43	0.45	0.44	0.16	0.16	0.47	1.00														
European Core Real Estate	0.57	0.58	0.55	0.42	0.49	0.50	0.66	0.41	0.49	0.48	0.39	0.59	0.55	0.60	0.61	0.59	0.47	0.16	0.79	0.61	1.00													
European Value-Added Real Estate	0.57	0.58	0.55	0.42	0.49	0.50	0.66	0.41	0.49	0.48	0.39	0.59	0.55	0.60	0.61	0.59	0.47	0.16	0.79	0.61	1.00	1.00												
Asia Pacific Core Real Estate	0.55	0.50	0.56	0.44	0.45	0.45	0.60	0.40	0.51	0.33	0.26	0.55	0.54	0.59	0.60	0.58	0.40	0.34	0.57	0.79	0.67	0.67	1.00											
Global REITs	0.76	0.70	0.78	0.69	0.70	0.67	0.74	0.67	0.62	0.50	0.25	0.67	0.67	0.82	0.82	0.82	0.63	0.32	0.62	0.55	0.50	0.50	0.61	1.00										
Global Core Infrastructure	0.33	0.27	0.50	0.24	0.26	0.18	0.42	0.16	0.41	0.23	0.12	0.37	0.36	0.46	0.48	0.46	0.17	-0.07	0.54	0.51	0.49	0.49	0.44	0.43	1.00									
Global Core Transport	-0.01	-0.07	0.16	-0.12	-0.06	-0.10	0.02	-0.17	0.09	-0.04	-0.06	-0.14	-0.12	0.04	0.06	0.07	-0.25	-0.05	0.08	0.64	0.31	0.31	0.37	0.20	0.33	1.00								
Diversified Hedge Funds hedged	0.73	0.80	0.58	0.72	0.70	0.78	0.70	0.64	0.48	0.63	0.39	0.71	0.66	0.71	0.69	0.69	0.82	0.50	0.70	0.26	0.56	0.56	0.46	0.49	0.21	-0.14	1.00							
Event Driven Hedge Funds hedged	0.79	0.85	0.62	0.80	0.77	0.84	0.75	0.73	0.48	0.65	0.34	0.75	0.68	0.76	0.74	0.73	0.87	0.56	0.71	0.29	0.56	0.56	0.46	0.58	0.20	-0.13	0.88	1.00						
Long Bias Hedge Funds hedged	0.80	0.85	0.63	0.87	0.79	0.85	0.73	0.75	0.48	0.68	0.36	0.80	0.75	0.78	0.76	0.75	0.92	0.51	0.67	0.19	0.48	0.48	0.40	0.58	0.18	-0.25	0.89	0.94	1.00					
Relative Value Hedge Funds hedged	0.75	0.80	0.57	0.70	0.71	0.77	0.73	0.67	0.49	0.62	0.37	0.76	0.70	0.72	0.70	0.69	0.84	0.50	0.71	0.35	0.60	0.60	0.54	0.58	0.30	-0.11	0.85	0.92	0.87	1.00				
Macro Hedge Funds hedged	0.26	0.27	0.11	0.27	0.25	0.29	0.23	0.32	0.09	0.15	0.12	0.30	0.26	0.22	0.21	0.20	0.35	0.18	0.19	-0.15	0.08	0.08	-0.01	0.16	-0.10	-0.25	0.54	0.32	0.41	0.30	1.00			
Direct Lending	0.21	0.15	0.52	0.03	0.10	0.06	0.31	0.06	0.43	0.11	0.21	0.22	0.25	0.40	0.45	0.42	0.02	-0.05	0.54	0.51	0.50	0.50	0.46	0.36	0.58	0.50	0.10	0.09	0.00	0.18	-0.12	1.00		
Commodities	0.36	0.35	0.36	0.31	0.26	0.28	0.47	0.33	0.27	0.22	0.17	0.47	0.41	0.42	0.44	0.40	0.35	0.25	0.54	0.39	0.56	0.56	0.51	0.31	0.33	0.08	0.49	0.48	0.46	0.51	0.30	0.34	1.00	
Gold	-0.19	-0.17	-0.10	-0.22	-0.25	-0.21	-0.09	-0.16	-0.12	-0.34	0.12	0.02	0.00	-0.10	-0.08	-0.12	-0.13	-0.10	0.02	0.08	-0.03	-0.03	0.16	-0.05	0.19	0.11	-0.03	-0.14	-0.12	-0.06	0.25	0.34	0.29	1.00

		COMPOUND RETURN 2021 (%)	ANNUALIZED VOLATILITY (%)	ARITHMETIC RETURN 2022 (%)	COMPOUND RETURN 2022 (%)	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
FIXED INCOME	UK Inflation	2.20	2.21	1.73	2.00	1.00																				
	UK Cash	1.50	1.50	0.62	1.10	-0.18	1.00																			
	U.S. Aggregate Bonds hedged	2.80	2.86	3.49	2.10	-0.12	0.18	1.00																		
	Euro Aggregate Bonds hedged	2.60	2.66	3.58	1.70	-0.18	0.09	0.65	1.00																	
	U.S. Inv Grade Corporate Bonds hedged	3.00	3.20	6.35	2.50	-0.13	0.04	0.79	0.58	1.00																
	Euro Inv Grade Corp Bonds hedged	2.90	3.00	4.60	2.20	-0.09	-0.07	0.49	0.70	0.78	1.00															
	UK Inv Grade Corporate Bonds	2.30	2.58	7.55	1.90	0.06	-0.15	0.55	0.56	0.76	0.79	1.00														
	U.S. High Yield Bonds hedged	4.10	4.43	8.29	4.80	0.00	-0.08	0.19	0.09	0.57	0.57	0.46	1.00													
	Euro High Yield Bonds hedged	4.30	4.64	8.42	4.40	0.00	-0.15	0.11	0.15	0.50	0.65	0.51	0.89	1.00												
	Global Credit hedged	2.90	3.02	4.95	2.40	-0.11	0.02	0.79	0.68	0.97	0.86	0.83	0.56	0.51	1.00											
	U.S. Leveraged Loans hedged	4.90	5.19	7.89	5.10	0.10	-0.19	-0.05	-0.06	0.34	0.46	0.38	0.80	0.86	0.33	1.00										
	Euro Government Bonds hedged	2.50	2.58	4.17	1.50	-0.19	0.13	0.60	0.97	0.45	0.54	0.43	-0.04	0.01	0.55	-0.19	1.00									
	UK Gilts	0.90	1.13	6.80	-0.20	-0.09	0.11	0.69	0.58	0.42	0.24	0.53	-0.16	-0.20	0.47	-0.31	0.60	1.00								
	UK Inflation-Linked Bonds	-0.50	-0.09	9.13	-1.40	-0.01	-0.01	0.55	0.41	0.47	0.33	0.56	0.19	0.11	0.52	0.08	0.37	0.69	1.00							
	World Government Bonds hedged	2.20	2.25	3.09	1.40	-0.13	0.19	0.82	0.81	0.50	0.35	0.41	-0.16	-0.21	0.56	-0.38	0.84	0.83	0.53	1.00						
	World Government Bonds	1.40	1.80	9.01	1.00	-0.11	0.22	0.49	0.43	0.17	-0.01	0.11	-0.34	-0.40	0.21	-0.50	0.48	0.64	0.42	0.70	1.00					
	World ex-UK Government Bonds hedged	2.40	2.44	2.95	1.60	-0.12	0.19	0.82	0.82	0.50	0.36	0.39	-0.15	-0.19	0.56	-0.37	0.85	0.78	0.50	1.00	0.68	1.00				
	World ex-UK Government Bonds	1.40	1.83	9.41	1.10	-0.13	0.22	0.47	0.41	0.16	-0.02	0.09	-0.34	-0.40	0.19	-0.50	0.47	0.61	0.40	0.68	0.99	0.65	1.00			
	Emerging Markets Sovereign Debt hedged	5.50	5.87	8.91	5.20	-0.04	0.02	0.53	0.40	0.75	0.66	0.59	0.72	0.59	0.78	0.43	0.28	0.16	0.35	0.24	0.01	0.26	0.00	1.00		
	Emerging Markets Local Currency Debt	5.00	5.57	11.06	4.40	-0.15	0.21	0.44	0.38	0.43	0.36	0.35	0.33	0.24	0.46	0.11	0.36	0.32	0.38	0.36	0.44	0.36	0.43	0.60	1.00	
	Emerging Markets Corporate Bonds hedged	5.00	5.33	8.32	4.70	0.01	-0.04	0.44	0.33	0.75	0.71	0.61	0.75	0.69	0.76	0.56	0.18	0.05	0.27	0.11	-0.11	0.13	-0.13	0.89	0.48	1.00
EQUITIES	UK All Cap	4.60	5.45	13.47	6.80	0.08	-0.13	0.05	0.06	0.37	0.45	0.44	0.67	0.66	0.38	0.55	-0.03	-0.10	0.14	-0.19	-0.19	-0.18	-0.18	0.58	0.45	0.58
	UK Large Cap	4.10	4.97	13.63	6.70	0.08	-0.12	0.06	0.07	0.36	0.44	0.44	0.65	0.64	0.38	0.53	-0.02	-0.08	0.16	-0.16	-0.16	-0.16	-0.15	0.57	0.48	0.57
	UK Small Cap	7.20	8.41	16.34	7.10	0.07	-0.17	-0.01	0.01	0.33	0.45	0.39	0.67	0.68	0.35	0.59	-0.10	-0.16	0.06	-0.26	-0.31	-0.25	-0.33	0.51	0.28	0.55
	U.S. Large Cap	3.20	4.13	13.98	3.30	0.04	-0.15	0.07	0.12	0.27	0.36	0.35	0.52	0.45	0.30	0.40	0.06	0.03	0.24	-0.06	0.07	-0.06	0.07	0.41	0.51	0.41
	U.S. Large Cap hedged	4.30	5.35	14.99	4.10	0.05	-0.19	-0.01	0.00	0.32	0.43	0.35	0.70	0.65	0.33	0.59	-0.09	-0.21	0.03	-0.26	-0.37	-0.25	-0.37	0.53	0.30	0.55
	Euro Area Large Cap	6.20	7.74	18.41	5.80	-0.02	-0.07	0.11	0.10	0.36	0.40	0.39	0.63	0.61	0.39	0.44	0.03	-0.07	0.18	-0.10	-0.07	-0.09	-0.06	0.59	0.53	0.56
	Euro Area Large Cap hedged	7.20	8.48	16.79	6.00	0.00	-0.17	-0.02	0.05	0.32	0.45	0.40	0.68	0.72	0.34	0.60	-0.03	-0.20	0.04	-0.25	-0.39	-0.24	-0.38	0.51	0.29	0.54
	Euro Area Small Cap	6.60	8.32	19.55	7.00	0.01	-0.11	0.10	0.07	0.39	0.41	0.41	0.66	0.64	0.40	0.48	-0.01	-0.09	0.16	-0.12	-0.08	-0.11	-0.08	0.59	0.49	0.58
	Euro Area Small Cap hedged	7.60	9.03	17.82	7.20	0.01	-0.20	-0.02	0.03	0.34	0.46	0.41	0.70	0.76	0.35	0.65	-0.07	-0.22	0.02	-0.27	-0.38	-0.26	-0.38	0.50	0.27	0.56
	Japanese Equity	5.80	6.62	13.26	5.70	-0.09	-0.11	0.07	0.12	0.28	0.31	0.30	0.40	0.35	0.29	0.29	0.06	0.00	0.19	-0.05	0.07	-0.05	0.08	0.34	0.46	0.36
	Japanese Equity hedged	6.50	7.97	17.98	6.10	0.02	-0.19	-0.21	-0.09	0.13	0.28	0.21	0.52	0.53	0.13	0.50	-0.15	-0.33	-0.08	-0.39	-0.55	-0.38	-0.54	0.30	0.13	0.38
	AC Asia ex-Japan Equity	6.10	7.52	17.62	6.30	0.00	-0.03	0.19	0.15	0.45	0.46	0.38	0.62	0.56	0.46	0.42	0.06	0.00	0.17	-0.02	-0.02	-0.02	-0.02	0.61	0.58	0.60
	Chinese Domestic Equity	7.30	10.76	28.35	6.70	-0.04	0.07	0.05	0.10	0.18	0.21	0.10	0.25	0.25	0.18	0.19	0.06	-0.06	0.00	-0.03	-0.09	-0.02	-0.09	0.25	0.19	0.28
	Emerging Markets Equity	6.00	7.49	18.06	6.40	0.04	-0.03	0.17	0.11	0.44	0.45	0.39	0.66	0.58	0.45	0.46	0.03	-0.03	0.20	-0.06	-0.04	-0.06	-0.04	0.65	0.63	0.64
	AC World Equity	4.10	4.98	13.64	4.30	0.03	-0.12	0.11	0.12	0.38	0.44	0.42	0.64	0.58	0.40	0.47	0.04	0.00	0.24	-0.08	0.01	-0.08	0.01	0.56	0.59	0.56
	AC World ex-UK Equity	4.10	5.00	13.80	4.20	0.02	-0.11	0.12	0.13	0.37	0.43	0.41	0.63	0.56	0.40	0.46	0.05	0.00	0.24	-0.07	0.03	-0.07	0.03	0.56	0.59	0.55
	Developed World Equity	3.90	4.77	13.60	4.10	0.02	-0.13	0.10	0.12	0.36	0.42	0.41	0.62	0.56	0.39	0.46	0.05	0.00	0.24	-0.08	0.02	-0.08	0.02	0.53	0.56	0.53
	Global Convertible Bond hedged	5.70	6.19	10.21	4.60	-0.06	-0.12	0.11	0.09	0.50	0.55	0.42	0.81	0.77	0.49	0.69	-0.03	-0.20	0.03	-0.22	-0.38	-0.21	-0.38	0.64	0.31	0.69
	Global Credit Sensitive Convertible hedged	4.80	5.05	7.24	4.20	0.10	-0.28	-0.02	0.14	0.22	0.38	0.38	0.31	0.40	0.27	0.36	0.05	-0.16	-0.03	-0.11	-0.23	-0.11	-0.24	0.25	0.08	0.33
ALTERNATIVES	Private Equity	7.20	8.41	16.34	7.00	0.10	-0.15	-0.14	-0.02	0.23	0.36	0.34	0.50	0.46	0.27	0.48	-0.13	-0.20	0.19	-0.28	-0.16	-0.29	-0.17	0.43	0.34	0.45
	U.S. Core Real Estate	4.90	5.36	9.88	5.10	0.43	-0.42	-0.20	-0.16	-0.10	0.05	0.15	0.28	0.27	-0.05	0.39	-0.21	-0.18	0.09	-0.24	-0.38	-0.23	-0.40	0.06	-0.14	0.16
	European Core Real Estate	5.20	5.77	11.05	5.60	0.23	-0.21	-0.29	-0.21	-0.01	0.07	0.06	0.30	0.25	-0.02	0.28	-0.27	-0.32	0.07	-0.36	-0.15	-0.36	-0.15	0.17	0.13	0.24
	UK Core Real Estate	6.10	6.93	13.37	5.90	0.20	-0.26	-0.25	-0.14	-0.02	0.06	0.05	0.23	0.24	-0.03	0.21	-0.18	-0.29	-0.11	-0.27	-0.24	-0.26	-0.23	0.08	-0.02	0.15
	European Value-Added Real Estate	7.20	8.57	17.39	8.30	0.24	-0.27	-0.35	-0.28	-0.02	0.08	0.06	0.41	0.36	-0.03	0.43	-0.34	-0.40	0.03	-0.47	-0.35	-0.46	-0.36	0.20	0.01	0.29
	Global REITs	5.00	5.91	14.00	6.00	0.03	-0.14	0.31	0.27	0.48	0.49	0.53	0.62	0.54	0.52	0.40	0.20	0.20	0.37	0.16	0.12	0.15	0.11	0.58	0.59	0.53
	Global Core Infrastructure	5.20	5.68	10.12	5.30	0.07	-0.07	0.17	0.23	0.13	0.11	0.23	-0.03	-0.04	0.17	-0.02	0.22	0.32	0.44	0.22	0.35	0.20	0.33	0.13	0.31	0.06
	Global Core Transport	6.50	7.30	13.19	6.80	0.23	-0.11	0.02	-0.02	-0.28	-0.30	-0.14	-0.31	-0.30	-0.25	-0.24	0.06	0.15	0.13	0.18	0.26	0.19	0.24	-0.33	-0.02	-0.30
	Diversified Hedge Funds hedged	3.80	4.02	6.72	3.30	0.14	-0.17	-0.06	-0.05	0.30	0.39	0.36	0.63	0.66	0.30	0.67	-0.16	-0.28	0.03	-0.33	-0.48	-0.32	-0.48	0.44	0.12	0.50
	Event Driven Hedge Funds hedged	3.40	3.75	8.51	3.10	0.08	-0.19	-0.10	-0.08	0.29	0.43	0.34	0.75	0.77	0.29	0.76	-0.20	-0.34	-0.01	-0.40	-0.52	-0.39	-0.52	0.48	0.22	0.57
	Long Bias Hedge Funds hedged	3.50	4.05	10.71	3.40	0.03	-0.14	-0.04	-0.08	0.34	0.42	0.32	0.75	0.72	0.33	0.68	-0.18	-0.31	-0.03	-0.36	-0.49	-0.35	-0.49	0.53	0.26	0.59
	Relative Value Hedge Funds hedged	4.00	4.19	6.24	3.60	0.07	-0.12	0.02	0.00	0.40	0.51	0.40	0.83	0.84	0.40	0.85	-0.13	-0.31	0.06	-0.33	-0.51	-0.31	-0.52	0.57	0.25	0.65
	Macro Hedge Funds hedged	2.90	3.19	7.79	2.20	0.00	0.13	0.16	0.18	0.27	0.24	0.23	0.19	0.18	0.27	0.07	0.13	0.10	0.15	0.12	0.01	0.11	0.01	0.25	0.15	0.20
	Direct Lending	6.00	7.25	16.53	6.00	-0.05	0.04	0.07	0.18	-0.07	-0.04	0.02	-0.19	-0.22	-0.02	-0.17	0.20	0.32	0.32	0.23	0.52	0.21	0.51	-0.13	0.32	-0.15
	Commodities	1.70	2.64	13.98	1.50	0.20	-0.03	0.04	-0.10	0.17	0.11	0.11	0.33	0.20	0.15	0.26	-0.15	-0.13	0.14	-0.14	0.06	-0.14	0.06	0.33	0.37	0.34
	Gold	2.10	3.60	17.85	2.10	-0.08	0.17	0.43	0.24	0.27	0.08	0.15	-0.08	-0.17	0.27	-0.25	0.23	0.42	0.32	0.42	0.50	0.41	0.49	0.20	0.40	0.12

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. Please note that all information shown is based on qualitative analysis. Exclusive reliance on this information is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only–they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice.

Source: J.P. Morgan Asset Management; as of September 30, 2021. Alternative asset classes (including hedge funds, private equity, real estate, direct lending, transportation and infrastructure) 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, 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. 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 All Cap	UK Large Cap	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 Bond hedged	Global Credit Sensitive Convertible hedged	Private Equity	U.S. Core Real Estate	European Core Real Estate	UK Core Real Estate	European Value-Added Real Estate	Global REITs	Global Core Infrastructure	Global Core Transport	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 All Cap	1.00																																		
UK Large Cap	0.99	1.00																																	
UK Small Cap	0.87	0.82	1.00																																
U.S. Large Cap	0.78	0.78	0.66	1.00																															
U.S. Large Cap hedged	0.83	0.81	0.78	0.82	1.00																														
Euro Area Large Cap	0.89	0.88	0.76	0.77	0.79	1.00																													
Euro Area Large Cap hedged	0.87	0.85	0.81	0.69	0.85	0.89	1.00																												
Euro Area Small Cap	0.86	0.84	0.85	0.72	0.76	0.94	0.82	1.00																											
Euro Area Small Cap hedged	0.85	0.81	0.90	0.64	0.81	0.83	0.93	0.90	1.00																										
Japanese Equity	0.62	0.62	0.51	0.66	0.51	0.61	0.56	0.59	0.54	1.00																									
Japanese Equity hedged	0.64	0.62	0.64	0.51	0.68	0.60	0.73	0.57	0.70	0.72	1.00																								
AC Asia ex-Japan Equity	0.71	0.70	0.62	0.65	0.65	0.72	0.62	0.72	0.63	0.53	0.46	1.00																							
Chinese Domestic Equity	0.28	0.28	0.26	0.29	0.28	0.27	0.27	0.28	0.28	0.21	0.24	0.52	1.00																						
Emerging Markets Equity	0.75	0.74	0.64	0.67	0.68	0.76	0.65	0.77	0.66	0.54	0.48	0.97	0.47	1.00																					
AC World Equity	0.89	0.88	0.76	0.95	0.85	0.89	0.80	0.85	0.77	0.72	0.60	0.80	0.34	0.83	1.00																				
AC World ex-UK Equity	0.87	0.87	0.75	0.95	0.85	0.88	0.78	0.85	0.75	0.72	0.60	0.80	0.34	0.83	1.00	1.00																			
Developed World Equity	0.88	0.88	0.75	0.96	0.86	0.88	0.80	0.84	0.76	0.73	0.60	0.75	0.31	0.77	1.00	0.99	1.00																		
Global Convertible Bond hedged	0.80	0.76	0.81	0.66	0.86	0.77	0.82	0.79	0.85	0.52	0.69	0.72	0.39	0.74	0.78	0.77	0.76	1.00																	
Global Credit Sensitive Convertible hedged	0.40	0.39	0.37	0.30	0.44	0.35	0.43	0.34	0.43	0.21	0.31	0.24	0.11	0.26	0.35	0.34	0.35	0.44	1.00																
Private Equity	0.69	0.68	0.64	0.72	0.65	0.65	0.62	0.62	0.59	0.45	0.46	0.62	0.34	0.66	0.75	0.75	0.75	0.64	0.46	1.00															
U.S. Core Real Estate	0.18	0.18	0.20	0.22	0.28	0.05	0.23	0.08	0.22	0.08	0.27	0.07	-0.07	0.10	0.17	0.17	0.17	0.13	0.22	0.19	1.00														
European Core Real Estate	0.49	0.50	0.42	0.36	0.32	0.42	0.34	0.44	0.36	0.28	0.30	0.33	0.15	0.41	0.43	0.42	0.42	0.35	0.36	0.65	0.24	1.00													
UK Core Real Estate	0.38	0.39	0.33	0.21	0.26	0.26	0.30	0.29	0.31	0.14	0.25	0.15	0.07	0.21	0.24	0.23	0.24	0.25	0.27	0.36	0.34	0.74	1.00												
European Value-Added Real Estate	0.51	0.51	0.48	0.35	0.40	0.40	0.43	0.43	0.45	0.26	0.40	0.34	0.19	0.42	0.42	0.41	0.41	0.43	0.32	0.66	0.39	0.94	0.76	1.00											
Global REITs	0.74	0.74	0.62	0.78	0.68	0.73	0.64	0.71	0.61	0.60	0.43	0.69	0.20	0.70	0.83	0.83	0.82	0.61	0.22	0.54	0.38	0.32	0.28	0.33	1.00										
Global Core Infrastructure	0.09	0.12	-0.05	0.27	0.02	0.13	-0.02	0.01	-0.12	0.17	-0.08	0.06	-0.22	0.10	0.21	0.22	0.22	-0.09	0.04	0.25	-0.02	0.12	-0.12	0.02	0.17	1.00									
Global Core Transport	-0.23	-0.20	-0.29	-0.01	-0.26	-0.16	-0.24	-0.19	-0.27	-0.10	-0.23	-0.36	-0.26	-0.35	-0.14	-0.13	-0.10	-0.40	0.02	-0.14	0.40	0.14	0.19	0.07	0.05	0.22	1.00								
Diversified Hedge Funds hedged	0.67	0.64	0.73	0.49	0.71	0.58	0.70	0.64	0.77	0.40	0.63	0.55	0.35	0.59	0.61	0.60	0.59	0.81	0.49	0.65	0.22	0.42	0.30	0.51	0.40	-0.10	-0.31	1.00							
Event Driven Hedge Funds hedged	0.76	0.73	0.79	0.57	0.80	0.67	0.78	0.72	0.84	0.43	0.66	0.60	0.31	0.65	0.68	0.67	0.67	0.86	0.55	0.67	0.28	0.45	0.34	0.54	0.51	-0.09	-0.30	0.88	1.00						
Long Bias Hedge Funds hedged	0.78	0.74	0.80	0.61	0.87	0.72	0.80	0.76	0.84	0.47	0.70	0.70	0.35	0.74	0.74	0.73	0.72	0.92	0.47	0.65	0.17	0.36	0.24	0.44	0.53	-0.10	-0.41	0.88	0.94	1.00					
Relative Value Hedge Funds hedged	0.70	0.67	0.72	0.49	0.71	0.60	0.72	0.65	0.77	0.41	0.63	0.60	0.32	0.65	0.62	0.60	0.59	0.83	0.49	0.62	0.32	0.42	0.30	0.53	0.49	-0.06	-0.32	0.85	0.93	0.87	1.00				
Macro Hedge Funds hedged	0.31	0.31	0.25	0.18	0.27	0.27	0.24	0.30	0.28	0.15	0.12	0.29	0.15	0.33	0.27	0.27	0.26	0.33	0.20	0.32	-0.15	0.28	0.21	0.23	0.19	0.05	-0.16	0.54	0.33	0.40	0.31	1.00			
Direct Lending	0.00	0.03	-0.13	0.33	-0.18	-0.04	-0.15	-0.10	-0.20	0.25	-0.17	-0.04	-0.05	-0.06	0.18	0.19	0.21	-0.21	0.01	0.25	-0.02	0.17	0.00	0.07	0.13	0.38	0.40	-0.19	-0.19	-0.27	-0.17	-0.02	1.00		
Commodities	0.42	0.44	0.29	0.35	0.31	0.33	0.20	0.36	0.23	0.22	0.12	0.41	0.12	0.49	0.43	0.43	0.41	0.33	0.19	0.45	0.15	0.43	0.15	0.41	0.34	0.13	-0.07	0.40	0.41	0.41	0.40	0.34	0.15	1.00	
Gold	-0.08	-0.06	-0.16	-0.02	-0.21	-0.07	-0.27	-0.04	-0.23	-0.07	-0.41	0.09	0.10	0.11	0.00	0.01	-0.02	-0.13	-0.14	-0.05	-0.24	-0.12	-0.28	-0.24	0.04	0.26	0.09	-0.12	-0.19	-0.14	-0.15	0.29	0.36	0.33	1.00

IV Appendix

LTCMA ACKNOWLEDGMENTS

EDITORIAL TEAM

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

Michael Hood
Global Strategist, Multi-Asset Solutions

Michael Feser, CFA
Portfolio Manager, Multi-Asset Solutions

Anthony Werley
Chief Investment Officer, Endowments & Foundations Group

Patrik Schöwitz, CFA
Global Strategist, Multi-Asset 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

Thushka Maharaj, D.Phil., CFA
Global Strategist, Multi-Asset Solutions

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

Monica Issar
Global Head of WM Multi-Asset and Portfolio Solutions

Karen Ward
Chief Market Strategist, EMEA, Global Market Insights Strategy

Rajesh Tanna
Portfolio Manager, International Equities

Usman Naeem
Portfolio Manager, Global Fixed Income, Currency & Commodities

LTCMA WORKING GROUP

Nicolas Aguirre, CFA
Head of Portfolio Construction & Risk, Endowments & Foundations Group

Michael Akinyele
Global Strategist, Multi-Asset Solutions

Michael Albrecht, CFA
Global Strategist, Multi-Asset Solutions

Dan Aust
Head of Insights Programs, EMEA

Katya Chegaeva
Quantitative Retirement Strategist Multi-Asset Solutions

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

Philippa Clough
Portfolio Manager, International Equities Group

Jackie Culley
Associate, Insights Editorial Team

Kerry Craig, CFA
Global Market Strategist, Global Market Insights Strategy

Sean Daly, CFA
Portfolio Manager, Global Fixed Income, Currency & Commodities

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

Tilmann Galler, CFA
Global Market Strategist, Global Market Insights Strategy

Jared Gross
Head of Institutional Portfolio Strategy

Vincent Juvyns
Global Market Strategist, Global Market Insights Strategy

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

Leonid Kogan
Chief Investment Scientist 55ip

Akira Kunikyo
Investment Specialist, Multi-Asset Solutions

David Lebovitz
Global Market Strategist, Global Market Insights Strategy

LTCMA WORKING GROUP *continued*

Tim Lintern, CFA
Global Strategist,
Multi-Asset Solutions

John C. Manley
Global Market Strategist, Global Market Insights Strategy

Ravi Pagaria
Investment Director
55ip

Meera Pandit, CFA
Market Analyst,
Global Market Insights Strategy

Stephen Parker
Head of Advisory Solutions,
Private Bank

Catherine Peterson
Global Head of
Insights Programs

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

Mallika Saran
Investment Research and Design,
Advisory and Core Beta Solutions

Allison Schneider
Associate,
Global Insights

Christopher M. Sediqzad, CFA
Research Analyst,
Multi-Asset Solutions
Manager Research

Jason De Sena, CFA
Alternatives Strategist,
Alternatives Investment Strategy
& Solutions

Shivani Sharma
Quantitative Research,
International Equities Group

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

Caspar Siegert, Ph.D.
Research Analyst, Sustainable
Investing

Maria Paola Toschi
Global Strategist
Global Market Insights Strategy

Julia Wang
Global Market Strategist
Private Bank

Daniel Weisman
Alternative Investments
J.P. Morgan Private Bank

Jennifer Wu
Global Head of
Sustainable Investing

Xiao Xiao, CFA
Quantitative Analyst,
Multi-Asset Solutions

EXECUTIVE SPONSORS

George Gatch
Chief Executive Officer,
Asset Management

Jed Laskowitz
Global Head of Asset Management
Solutions

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 2022 edition, including: Madhur Ambastha, John Ancona, Boris Arabadjiev, Sara Bellenda, Jonathan Blum, Michael Cembalest, Weiren Chang, Dave Esrig, Gregory Fedorenko, Meena Gandhi, Jeff Geller, Roger Hallam, Tariq Hammed, Karim Hassouna, Josh Helfat, Ian Hui, Sorca Kelly-Scholte, Tracey Kemp, Jason Ko, Paul Levene, Agnes Lin, Courtney Mee, Nicolas Meer, Robert Michele, Karthik Narayan, Garrett Norman, Ettie Philitas, Anton Pil, Yazann Romahi, Vikas Sabhnani, Joe Staines, Vidit Tewari, Katy Thorneycroft, Alexandra Tirlea, Kenneth Tsang, Jean Walshe, Livia Wu, Jasslyn Yeo, Chaoping Zhu and Paul Zummo.

We also want to express our utmost appreciation and gratitude to Global Insights and the Investment Writing team, Jill Hamburg-Coplan, Barbara Heubel, Barbara Rudolph and Melissa Wiegand; and Global Creative Services for design, Mark Virgo and Jay Lonie.

LET'S SOLVE IT®

NOT FOR RETAIL DISTRIBUTION: This communication has been prepared exclusively for institutional, wholesale, professional clients and qualified investors only, as defined by local laws and regulations.

JPMAM Long-Term Capital Market Assumptions: 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. Please note that all information shown is based on qualitative analysis. Exclusive reliance on the above is not advised. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. Note that these asset class and strategy assumptions are passive only – they do not consider the impact of active management. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for, accounting, legal or tax advice. The outputs of the assumptions are provided for illustration/discussion purposes only and are subject to significant limitations. "Expected" or "alpha" return estimates are subject to uncertainty and error. For example, changes in the historical data from which it is estimated will result in different implications for asset class returns. Expected returns for each asset class are conditional on an economic scenario; actual returns in the event the scenario comes to pass could be higher or lower, as they have been in the past, so an investor should not expect to achieve returns similar to the outputs shown herein. References to future returns for either asset allocation strategies or asset classes are not promises of actual returns a client portfolio may achieve. Because of the inherent limitations of all models, potential investors should not rely exclusively on the model when making a decision. The model cannot account for the impact that economic, market, and other factors may have on the implementation and ongoing management of an actual investment portfolio. Unlike actual portfolio outcomes, the model outcomes do not reflect actual trading, liquidity constraints, fees, expenses, taxes and other factors that could impact the future returns. The model assumptions are passive only – they do not consider the impact of active management. A manager's ability to achieve similar outcomes is subject to risk factors over which the manager may have no or limited control. The views contained herein are not to be taken as advice or a recommendation to buy or sell any investment in any jurisdiction, nor is it a commitment from J.P. Morgan Asset Management or any of its subsidiaries to participate in any of the transactions mentioned herein. Any forecasts, figures, opinions or investment techniques and strategies set out are for information purposes only, based on certain assumptions and current market conditions and are subject to change without prior notice. All information presented herein is considered to be accurate at the time of production. This material does not contain sufficient information to support an investment decision and it should not be relied upon by you in evaluating the merits of investing in any securities or products. In addition, users should make an independent assessment of the legal, regulatory, tax, credit and accounting implications and determine, together with their own financial professional, if any investment mentioned herein is believed to be appropriate to their personal goals. Investors should ensure that they obtain all available relevant information before making any investment. It should be noted that investment involves risks, the value of investments and the income from them may fluctuate in accordance with market conditions and taxation agreements and investors may not get back the full amount invested. Both past performance and yield are not a reliable indicator of current and future results.

J.P. Morgan Asset Management is the brand for the asset management business of JPMorgan Chase & Co. and its affiliates worldwide.

To the extent permitted by applicable law, we may record telephone calls and monitor electronic communications to comply with our legal and regulatory obligations and internal policies. Personal data will be collected, stored and processed by J.P. Morgan Asset Management in accordance with our privacy policies at **https://am.jpmorgan.com/global/privacy.**

This communication is issued by the following entities:

In the United States, by J.P. Morgan Investment Management Inc. or J.P. Morgan Alternative Asset Management, Inc., both regulated by the Securities and Exchange Commission; in Latin America, for intended recipients' use only, by local J.P. Morgan entities, as the case may be. In Canada, for institutional clients' use only, by JPMorgan Asset Management (Canada) Inc., which is a registered Portfolio Manager and Exempt Market Dealer in all Canadian provinces and territories except the Yukon and is also registered as an Investment Fund Manager in British Columbia, Ontario, Quebec and Newfoundland and Labrador. In the United Kingdom, by JPMorgan Asset Management (UK) Limited, which is authorized and regulated by the Financial Conduct Authority; in other European jurisdictions, by JPMorgan Asset Management (Europe) S.à r.l. In Asia Pacific ("APAC"), by the following issuing entities and in the respective jurisdictions in which they are primarily regulated: JPMorgan Asset Management (Asia Pacific) Limited, or JPMorgan Funds (Asia) Limited, or JPMorgan Asset Management Real Assets (Asia) Limited, each of which is regulated by the Securities and Futures Commission of Hong Kong; JPMorgan Asset Management (Singapore) Limited (Co. Reg. No. 197601586K), this advertisement or publication has not been reviewed by the Monetary Authority of Singapore; JPMorgan Asset Management (Taiwan) Limited; JPMorgan Asset Management (Japan) Limited, which is a member of the Investment Trusts Association, Japan, the Japan Investment Advisers Association, Type II Financial Instruments Firms Association and the Japan Securities Dealers Association and is regulated by the Financial Services Agency (registration number "Kanto Local Finance Bureau (Financial Instruments Firm) No. 330"); in Australia, to wholesale clients only as defined in section 761A and 761G of the Corporations Act 2001 (Commonwealth), by JPMorgan Asset Management (Australia) Limited (ABN 55143832080) (AFSL 376919).

For U.S. only: If you are a person with a disability and need additional support in viewing the material, please call us at 1-800-343-1113 for assistance.

Copyright 2021 JPMorgan Chase & Co. All rights reserved.

LV–JPM53234 | 11/21 | US | 09z0210211170025