2022 Long-Term Capital Market Assumptions

Invesco Investment Solutions | Japanese yen (JPY) | Q1 Update

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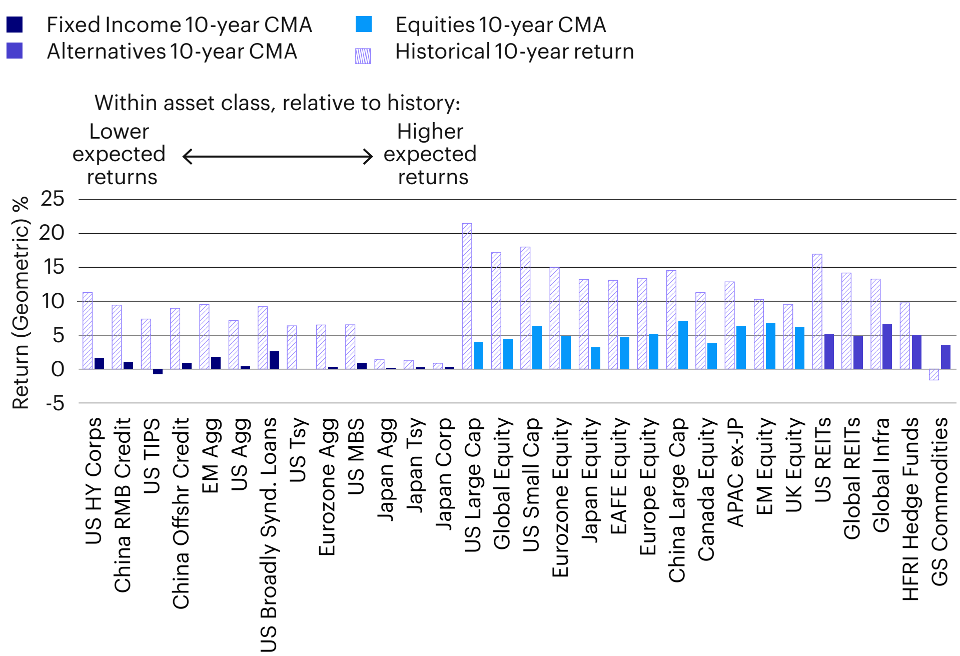
Executive Summary

Duy Nguyen
CIO, Invesco Investment Solutions

Invesco Investment Solutions is proud to present our Q1 update to our 2022 Capital Market Assumptions (CMAs). We hope the insights and data presented in this publication assist in your asset allocation process as you begin to rebalance portfolios in the coming months. We have made significant enhancements this year for our CMAs including the launch of custom client CMAs and an industry benchmarking process within our analytics platform, Vision. Overall, we are covering over 170 assets in nearly 20 currencies across public and private markets to aid our clients globally in assessing their investment opportunities.

- **Strategic Perspective**: The Russian invasion of the Ukraine has increased risks meaningfully for investors. Our thoughts are primarily with those affected by the war and we acknowledge the human tragedy before us, with thousands of deaths counted so far and millions displaced from their homes. As is our responsibility to our clients, we plan on using this platform to assess potential impacts to our long-term capital market assumptions (CMAs). Primarily, increasing inflation through oil and commodity channels and decreasing growth and earnings for impacted regions near the conflict.
- **Tactical View**: Our framework remains in a slowdown regime. Historically, this economic backdrop has led to modest but positive returns across asset classes, with a convergence in performance between growth-sensitive and defensive assets, as compensation for growth risk diminishes.
- **Global Market Outlook**: We expect 2022 to be a year of transition as policies and economies move toward a more normal state. However, issues remain that will likely define the economic and market environment, including central bank tightening, the global pandemic, the outbreak of war, and continued supply-chain disruptions that threaten to keep inflation high across many economies. And so, our 2022 outlook is centered on the question of inflation and how markets and policymakers may react to it.

Figure 1: Expectations relative to historical average (JPY)



Source: Invesco, estimates as of Dec. 31, 2021. Proxies listed in **Figure 14**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 18 for information about our CMA methodology. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here.

1 Global 60/40 benchmark (60% MSCI ACWI / 40% Bloomberg Barclays Global Agg USD hedged)

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Asset Allocation Insights

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For further details on our process for defining scenarios and adjustments, please refer to our CMA Methodology paper.

Strategic perspective

The Russian invasion of the Ukraine has increased risks meaningfully for investors. Our thoughts are primarily with those affected by the war and we acknowledge the human tragedy before us, with thousands of deaths counted so far and millions displaced from their homes. As is our responsibility to our clients, we plan on using this platform to assess potential impacts to our long-term capital market assumptions (CMAs). Primarily, increasing inflation through oil and commodity channels and decreasing growth in the form of GDP and real earnings. The long-term CMA data in the subsequent figures of this document are dated as of the end of 2021 and do not reflect the potential impacts of war as of yet as the Russian invasion occurred on the 24th of February. We will continue to examine these risks in detail between now and our next publication to determine if adjustments to our methodology are required.

Inflation
Central bankers have finally generated the inflation they've been targeting for so many years. Fiscal over-stimulus related to the pandemic and disruptions to global supply chains have accomplished what quantitative easing could not and has grown the money supply, bringing with it levels of inflation not seen in decades. While year-over-year inflation is dramatically high in developed markets (just shy of 8% in the US, above that of India, South Africa, and Mexico!), economies like China and Japan who have resisted reopening their economies are still hovering around 1%.

The war in the Ukraine will most likely increase inflation, especially in Europe, as Russia and the Ukraine are major exporters of oil, wheat, and other raw materials. Sanctions, boycotts, and disrupted supply chains are all limiting factors on already strained trade systems that rely on these goods. With a ceasefire and reversal of these restrictions appearing unlikely in the near term, sourcing substitutes may prove costly. This recent uptick in inflation will be noticed in future updates of our CMAs as inflation expectations rise. For the most part, long term estimates (10Y+), have remained well anchored, while medium term (5Y) have certainly increased dramatically.

We do believe the general path of inflation over the long term is driven mostly by demographic and technological changes, which are both expected to place a ceiling on inflation as they continue their deflationary trends. In a related discussion of long-term inflationary trends, we would like to reiterate that the onshoring of supply chains and reversal of globalization is expected to be inflationary as rebuilding existing infrastructure and utilizing less efficient capital increases production costs. To hedge potential inflationary surges, we look to the CMA building blocks of assets that incorporate inflation into their nominal projections, like equities, real estate, infrastructure, and commodities.

Earnings growth
The true impact of war on growth long-term is unclear. We estimate the risks to earnings are more towards the downside for most regions close to the conflict, with the possibility of a prolonged reduction in economic activity in Europe and nearby emerging markets combined with increases in the prices of raw materials and energy globally. What remains clear is that most of the developed world is moving past the pandemic phase and toward a new normal. With this transition we will see the ebbing of pandemic-related stimulus and monetary policy which has been supportive of growth for the past 2 years. We model the impact of this as a reduction in growth expectations that will continue to play out over the coming quarters. Growth moderation will likely be observed at different paces depending on the level of excess stimulus still sitting on the sidelines, pace of each country's return to normal, and degree of impact from the Russia-Ukraine war.

Path of Central Banks

The US has raised rates for the first time in four years and has signaled they are on a path to provide six more, one at every meeting, until the end of 2022. Raising interest rates hurts bond prices in the short term and signals an aging business cycle, but it also provides additional yield for fixed income instruments, making the assets more attractive relative to equities.

We factor in the direction of central banks and future investor reactions into our CMAs by using forward, market-based yield curve estimates for our fixed income assets.

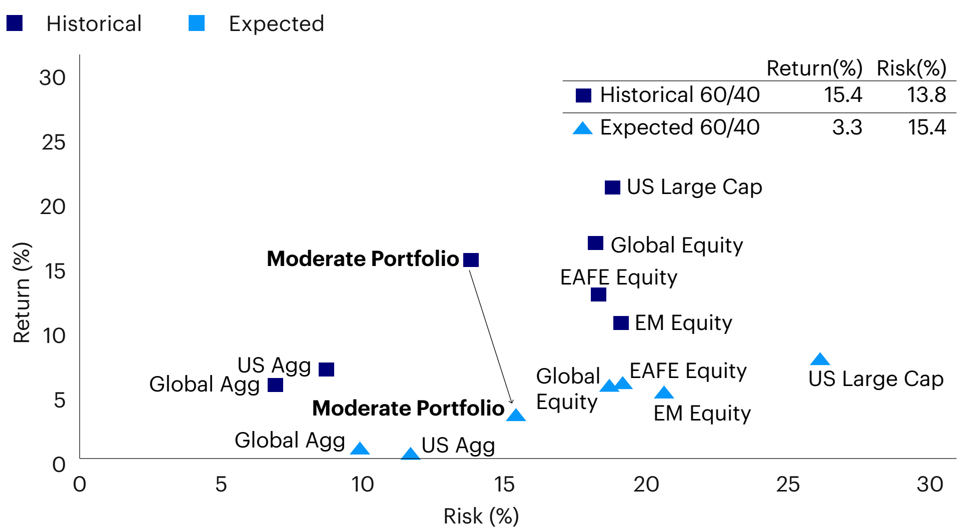
Longer duration assets, like aggregate bonds, treasuries, and high yield, tend to be more sensitive to rate increases than shorter duration assets, like bank loans.

1Q22 CMA Update

We anticipate lower growth and lower yields on most assets, with a traditional 60/40 severely underperforming relative to history. Indeed, the start to this year has been the toughest in the history of this portfolio mix, with the combination of rising bond yields, inflation, war, and central bank threats deflating technology stocks within equity markets, resulting in returns of -10% (USD, as of 3/15/22).

The major change in our recent update was a beginning of a reduction of post-pandemic fueled earnings growth, reverting us closer to trend growth in our longer-term estimates. This has further reduced our equity CMAs as the world reopens, with the majority of the reduction occurring in markets that quickly reopened such as Developed Markets, relative to the more cautious stance in Asia.

Figure 2: Significant drop in expected return for traditional 60/40 portfolios amid increased risk (JPY)



Source: Invesco, estimates as of Dec. 31, 2021. Proxies listed in **Figure 14**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 18 for information about our CMA methodology. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here. The 60/40 Portfolio is a blend of 60% S&P 500 Index and 40% Bloomberg Barclays US Aggregate Index.

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Head of Tactical Asset Allocation,
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For further details on our macro regime framework, please refer to our CMA Methodology paper.

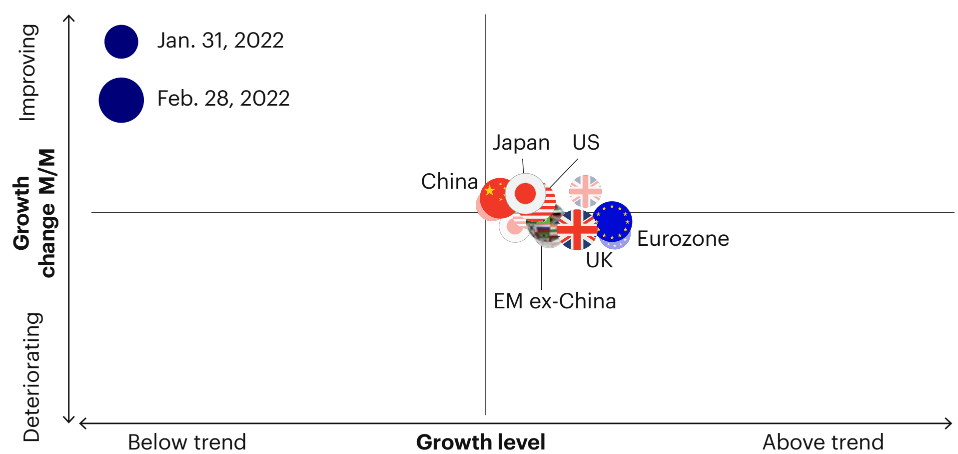
Tactical view

Our macro framework continues to point to a decelerating growth environment (**Figure 3 and 4**), coupled with rising inflationary pressures (**Figure 5**). The escalation of the Russia/Ukraine conflict increases downside risks to growth and increases upside risks to inflation, amplifying trends already in place for the past few quarters. The impact on the economy and financial markets is propagated via several direct and indirect channels related to Russia's dominant role in commodity markets, and the severe economic and financial sanctions imposed by the Western world.

Figure 3a: Macro framework points to a slowdown regime

	LEIs		Global risk appetite		
Region	**Current level of growth**		**Change in global growth expectations**		**Expected macro regimes**
Global	**Above trend**	&	**Growth expectation deteriorating**	=	**Slowdown**
United States	**Above trend**				**Slowdown**
Developed markets ex-USA	**Above trend**				**Slowdown**
Europe	Above trend				Slowdown
United Kingdom	Above trend				Slowdown
Japan	Above trend				Slowdown
Emerging markets	**Above trend**				**Slowdown**
China	Above trend				Slowdown
Emerging markets ex-China	Above trend				Slowdown

Figure 3b: Leading economic indicators continue to decelerate at a moderate pace across regions



Sources: Bloomberg L.P., Macrobond. Invesco Investment Solutions research and calculations. Proprietary leading economic indicators of Invesco Investment Solutions. Macro regime data as of Feb. 28, 2022. The Leading Economic Indicators (LEIs) are proprietary, forward-looking measures of the level of economic growth. The Global Risk Appetite Cycle Indicator (GRACI) is a proprietary measure of the markets' risk sentiment.

Figure 4: Global risk appetite is decelerating, signaling declining growth expectations GRACI and the global LEI

Sources: Bloomberg L.P., MSCI, FTSE, Barclays, JPMorgan, Invesco Investment Solutions research and calculations, from Jan. 1, 1992 to Feb. 28, 2022. The Global Leading Economic Indicator (LEI) is a proprietary, forward-looking measure of the growth level in the economy. A reading above (below) 100 on the Global LEI signals growth above (below) a long-term average. The Global Risk Appetite Cycle Indicator (GRACI) is a proprietary measure of the markets' risk sentiment. A reading above (below) zero signals a positive (negative) compensation for risk taking in global capital markets in the recent past. Past performance does not guarantee future results.

Commodity markets and upside risks to inflation

Russia and Ukraine are both major commodity producers. Russia represents about 12% of the world's oil production and 17% of natural gas production, supplying about 1/3 of Europe's total natural gas consumption. In the metals market, while Russia represents a smaller share of production (between 5% and 10% of the world's copper, nickel, and aluminum), there are important second-round effects to be considered as Russia's energy powers about 40% of Europe's aluminum production, an energy-intensive industry. Therefore, the overall impact on industrial metals is likely to be larger than Russia's metals production numbers might suggest. Furthermore, Russia produces about 40% of the world's palladium and 20% of platinum, key components to catalytic converters used in cars. Finally, Russia and Ukraine account for more than 30% of the world's wheat exports and 20% of corn production, with a direct impact on agricultural commodities and global food prices[1]. Resulting price pressures are emerging also in our inflation momentum indicator, primarily via imported inflation (**Figure 5**).

Figure 5a: US Inflation Momentum Indicator (IMI)

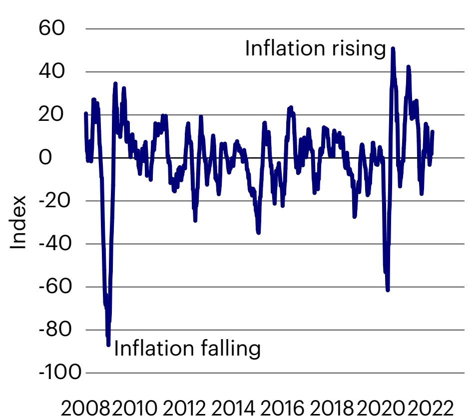
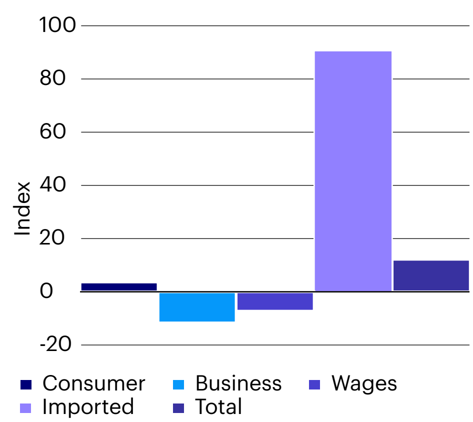


Figure 5b: IIS Inflation Momentum Indicator: Categories



Sources: Bloomberg L.P. data as of Feb. 28, 2022, Invesco Investment Solutions calculations. The US Inflation Momentum Indicator (IMI) measures the change in inflation statistics on a trailing three-month basis, covering indicators across consumer and producer prices, inflation expectation surveys, import prices, wages, and energy prices. A positive (negative) reading indicates inflation has been rising (falling) on average over the past three months.

Financial sanctions and downside risks to growth
Western nations have announced an unprecedented round of economic and financial sanctions, likely to deliver a meaningful hit to the Russian economy, with some non-negligible spillover to key trading partners and global financial institutions. The combination of

- freezing all Russia's central bank foreign exchange reserves (about US$630 billion) held in Western financial institutions[2],
- curtailing the convertibility between the ruble and US dollar, euro, or British pound,
- barring major Russian banks from SWIFT,

will dramatically limit Russia's ability to transact with any global financial institution, since only 15% of Russian exports are denominated in ruble, with the remaining 85% denominated in US dollar and euro. However, these measures are likely to carry a smaller, residual negative impact also for Western institutions and global trade, due to payment and settlement difficulties incurred by countries exporting to Russia, until alternative solutions are put in place.

Market impact
The reaction across financial markets has been notable and directionally intuitive across equity, fixed income, commodity, and currency markets. However, moves have only been outright disorderly for Russian assets, with Russian equities and currency falling by roughly 50% and 30% respectively over the past month. The Federal Reserve and the European Central Bank have announced their readiness to address potential funding stress in money markets with emergency liquidity backstops, with the goal to offset collateral damage from the sanctions. At this stage, it seems unlikely these developments will derail the path of the Fed to steadily raise interest rates in 2022. Adhering to our investment process, we stand ready to alter our asset allocation in response to changing macro/market conditions.

Investment positioning

We maintain an overall neutral risk stance relative to our benchmark in the Global Tactical Asset Allocation model[3]. **We are moderately overweight equities relative to fixed income, and within equities we favor defensive sectors and factors. We move to an underweight stance on portfolio credit risk[4], with a higher allocation to short and intermediate credit maturities, and overweight interest rate duration relative to benchmark.** (**Figure 4, 5, 6**). In particular:

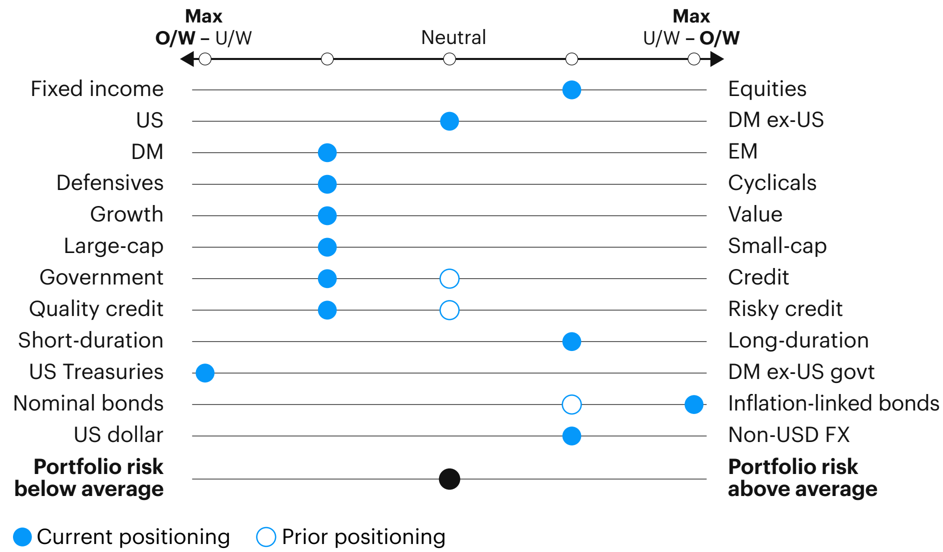
- Within **equities** we overweight defensive factors like quality and low volatility, which tend to outperform via a combination of declining growth expectations and higher duration properties. Similarly, we favor defensive sectors with quality characteristics and positive exposure to lower bond yields such as information technology, communication services, health care, consumer staples, etc. (Figure 6). From a regional perspective, we maintain an underweight exposure in emerging markets relative to developed markets as slowing global growth and rising geopolitical risk provide headwinds to risk appetite in these markets.
- In **fixed income** we remain overweight duration despite the recent decline in bond yields. Rising inflationary pressures are likely to keep short and intermediate bond yields on the rise, once the dust settles, while declining growth expectations should exert downward pressure on the long end of the yield curve. We have increased our inflation-linked bonds exposure to a max overweight relative to nominal Treasuries, given rising inflationary pressures. We further reduce our credit exposure, moving to an underweight stance relative to benchmark, with a higher allocation to short and intermediate maturities in high yield and bank loans, and no exposure to emerging markets debt. We favor US Treasuries over other developed government bond markets given the yield advantage on a currency-hedged basis.

1 All policy pricing references as of Nov. 1, 2021.
2 Source: Federal Reserve, Assets and Liabilities of Commercial Banks in the United States - H.8, Oct. 29, 2021
3 Global 60/40 benchmark (60% MSCI ACWI / 40% Bloomberg Barclays Global Agg USD hedged)
4 Credit risk defined as DTS (duration times spread).

- In **currency markets** we remain underweight in US dollar exposure. In developed markets we underweight the British pound, Swiss franc, Japanese yen, and Australian dollar, while we overweight the euro, Canadian dollar, Singapore dollar, Norwegian kroner, and Swedish krona. In EM we favor high yielders with attractive valuations such as the Indian rupee, Indonesian rupiah, and Brazilian real. We exited our ruble position in early February, despite attractive valuations, on rising idiosyncratic risks. We underweight the Taiwan dollar, Korean won and Philippine peso.

Figure 6: Relative tactical asset allocation positioning

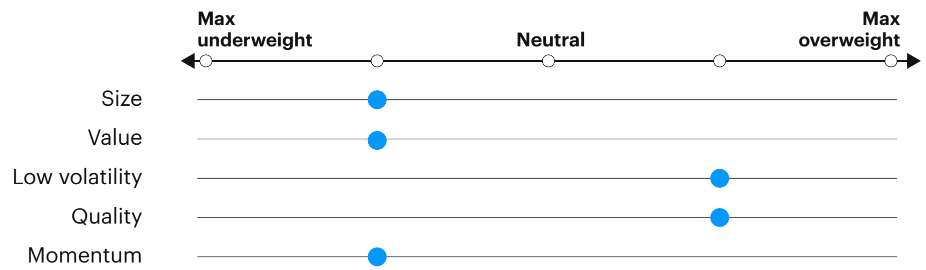
Underweight USD exposure, as growth outside the US surprises to the upside



Source: Invesco Investment Solutions, Feb. 28, 2022. DM = developed markets. EM = emerging markets. FX = foreign exchange. For illustrative purposes only.

Figure 7: Tactical factor positioning

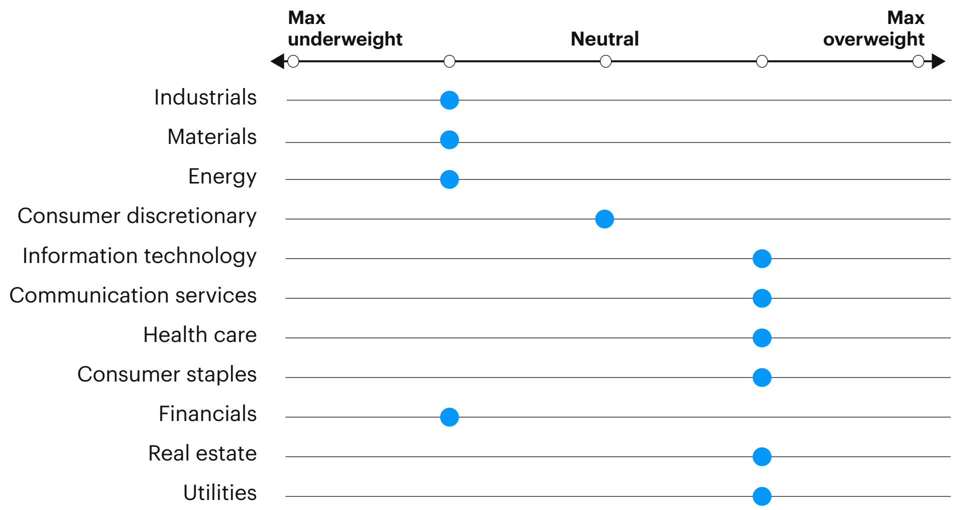
Factor tilts within the slowdown regime are toward quality and low volatility



Source: Invesco Investment Solutions, Feb. 28, 2022. For illustrative purposes only. Neutral refers to an equally weighted factor portfolio.

Figure 8: Tactical sector positioning

In a slowdown regime, we overweight defensive sectors relative to cyclicals



Source: Invesco Investment Solutions, Feb. 28, 2022. For illustrative purposes only. Sector allocations derived from factor and style allocations.

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Global Market Outlook

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We expect 2022 to be a year of transition as policies and economies move toward a more normal state. However, issues remain that will likely define the economic and market environment, including central bank tightening, the global pandemic, the outbreak of war, and continued supply-chain disruptions that threaten to keep inflation high across many economies. And so, our 2022 outlook is centered on the question of inflation and how markets and policymakers may react to it.

In our base case scenario, we expect developed economies' growth to normalize, decelerating to a more sustainable rate as fiscal stimulus is gradually removed. However, we expect emerging economies, led by China, to experience improving economic growth later in the year. We anticipate that inflation will peak in mid-2022 and then start to slowly moderate, backing down toward target rates by the end of 2023 as supply-chain issues resolve, vaccination levels increase, and more employees return to the workforce. We are optimistic that the Fed's tightening will be appropriate and not aggressive; in other words, it is enough to slow the overheating economy but not end the economic cycle. Finally, we expect volatility will increase as markets digest the transition to slower growth and a gradual tightening in monetary policy.

In our transitory inflation risk scenario, current inflation fears prove to be overblown, with inflation gradually coming off its current highs toward something close to or below 2%. We see higher than normal growth in this environment, ultimately pointing to economies being earlier in the cycle than we currently judge them. We believe this scenario has a low probability of coming to fruition.

In our persistent inflation risk scenario, developed central banks' messaging fails to convince markets that inflation is transitory, with further elevated prints throughout 2022.This causes inflation expectations to become unanchored and would signal a loss of credibility for those central banks, requiring action that prompts a significant risk of ending the current economic cycle. We believe the risks of the persistent inflationary scenario have increased but believe our base case scenario is still more likely.

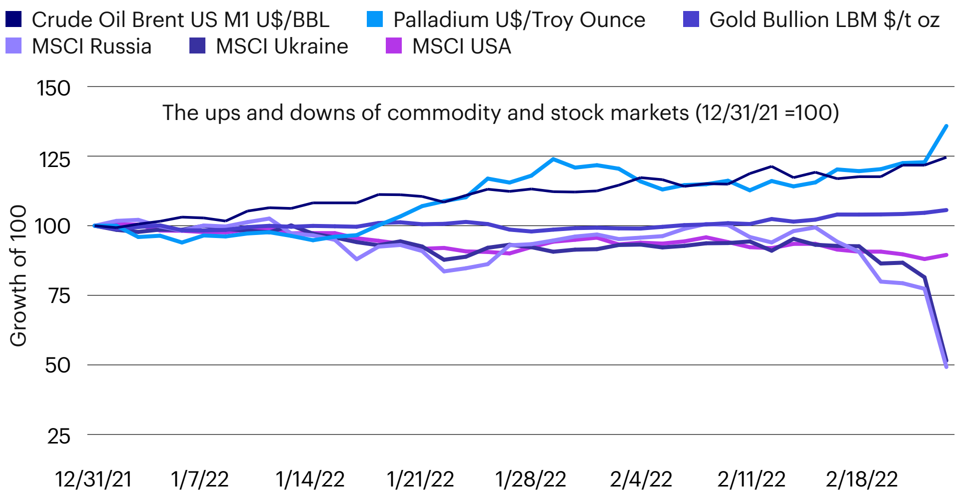
From a relative asset allocation perspective, our base case expectations lead us to a reduced risk posture, with a slight overweighting of equities tilted toward defensive sectors such as IT, communication services, health care, real estate, and consumer staples. We prefer quality and large caps in this scenario, given slowing growth expectations. We also anticipate that alternatives such as real estate and private credit, as well as commodities, would outperform in this environment. For regional allocations, our base case indicates a preference for emerging markets (including EM currencies) due to cyclical divergence and US equities over other developed markets as the global slowdown favors regions with lower cyclical exposure and lower operating leverage.

Since the writing of our outlook, Russian forces have invaded Ukraine. Focusing on this development, we expect high market volatility to continue in the near term but note that past conflicts have often provided interesting entry points for long-term investors. Our deep dive, Russia/Ukraine and the World: Fog of War, lays out potential scenarios and views, and we currently believe we are in a full-blown open conflict scenario. Open conflict in Europe is clearly a major shock to the international system. We do expect, however, hostilities to focus on Ukrainian territory, given NATO's protection of Western Europe. Hence, collateral damage would be heaviest in Ukraine and Russia, with important, but not extreme, effects beyond those two economies; Europe most exposed, the US and Asia less so with many emerging markets in between.

Market reaction so far is risk-off but not indiscriminate (Figure X). Movements across asset classes and regions reflect macro exposure to striking moves in commodities most affected by the conflict.

- **Commodities**: Oil, gas, grains, and palladium have risen sharply. Russia is a major exporter of all of these, Ukraine of grains.
- **Currencies**: US dollar, Swiss franc, Japanese yen have rallied; the euro and sterling are weaker.
- **Bonds**: US Treasuries, EZ government bonds led by German Bunds, UK Gilts have all rallied.
- **Equities**: Indexes are off across the board, led by EMEA. Countries with strong Russian trade links like Germany have fared less well than energy-producing nations.
- **Emerging Markets**: Russia/Ukraine are down sharply. Commodity importers such as Turkey and India have been hit harder than exporters (e.g., Brazil). Mexican peso and South African rand (bellwether proxies for emerging market (EM) risk) are softer but so far holding up reasonably well.

Figure 9: Select asset class performance as Russia launches "special military operations" in Ukraine



Source: MSCI, as of Feb. 24, 2022. Past performance is no guarantee of future results.

We expect the consequences to translate into a somewhat less hawkish stance from major central banks – tilting the Federal Reserve (Fed) towards a 25bps hike in March and keeping the ECB on the fence. The war (and the risk of stagflation) strengthens the case for portfolio diversification, given the heightened volatility and uncertainty. Further, our approach of defining potential outlook scenarios gives us the flexibility to pivot to a new playbook should there be a significant escalation.

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Figure 10: 10-year asset class expectations (JPY)

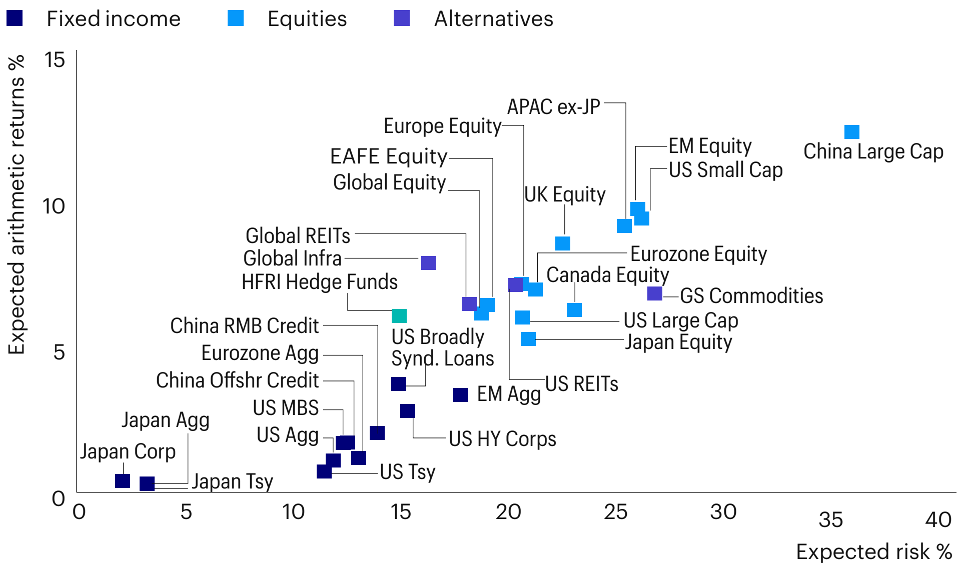

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Figure 11: CMA difference: 5-year minus 10-year assumptions (JPY)

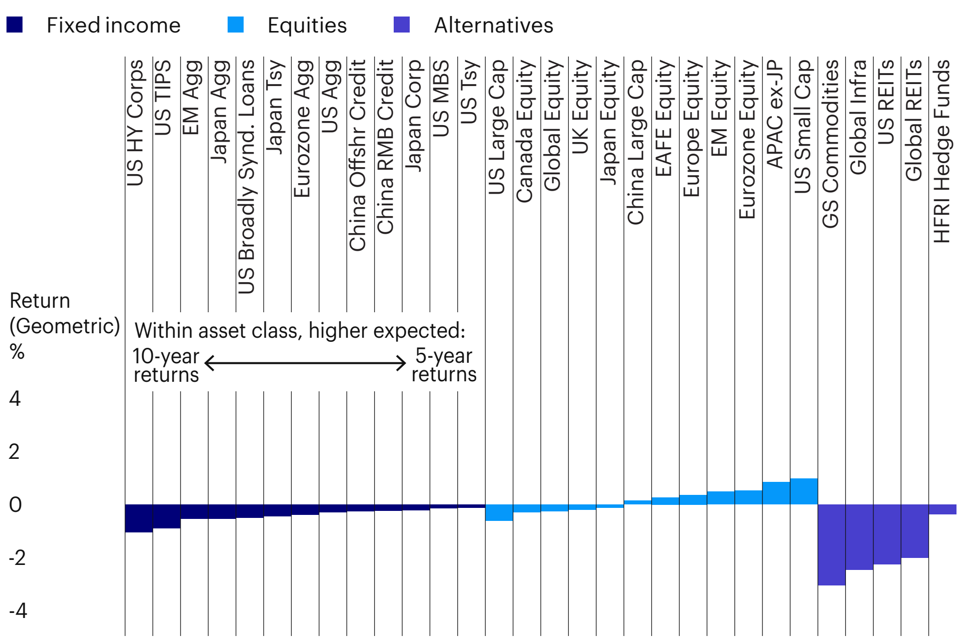

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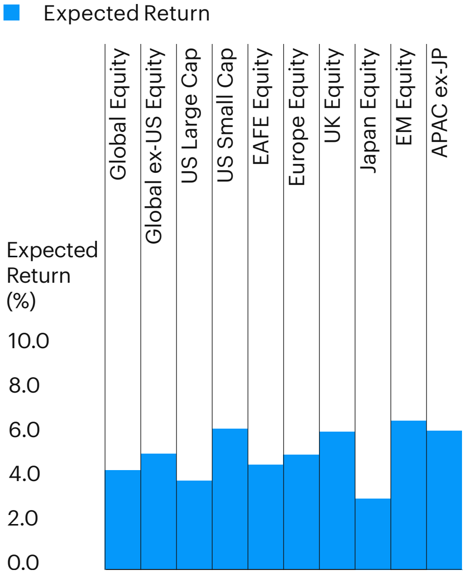
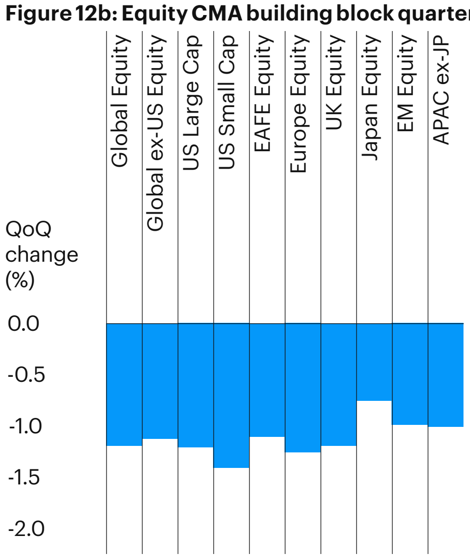
Figure 12a: Equity CMA building block contribution (JPY) (%)



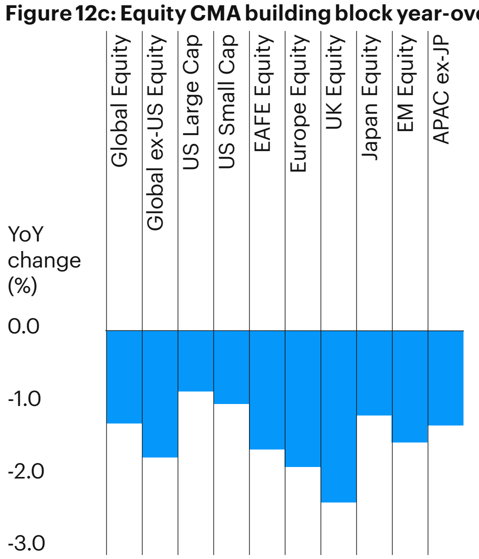
	Dividend Yield	Buyback Yield	LT Earnings Growth	Expected Inflation	Valuation Change	Currency Adj. (IRP)
Global Equity	1.71	0.67	2.72	1.68	-1.10	-1.24
Global ex-US Equity	2.46	0.00	2.77	1.56	-0.69	-0.92
US Large Cap	1.23	1.09	2.69	1.75	-1.36	-1.45
US Small Cap	1.04	0.70	4.19	1.75	0.03	-1.45
EAFE Equity	2.53	0.00	2.30	1.06	-1.01	-0.18
Europe Equity	2.54	0.00	2.27	1.35	-1.02	-0.01
UK Equity	3.67	0.00	2.45	1.93	-0.99	-0.90
Japan Equity	2.14	0.00	2.29	-0.18	-1.05	0.00
EM Equity	2.35	0.00	3.97	2.69	0.02	-2.42
APAC ex-JP	2.24	0.00	3.47	2.49	0.19	-2.22

Figure 12b: Equity CMA building block quarter-over-quarter change and contribution (JPY) (%)



	Dividend Yield	Buyback Yield	LT Earnings Growth	Expected Inflation	Valuation Change	Currency Adj. (IRP)
Global Equity	-0.05	0.02	-1.23	0.14	-0.09	-0.01
Global ex-US Equity	0.02	0.00	-1.28	0.15	-0.02	-0.03
US Large Cap	-0.07	0.00	-1.20	0.12	-0.12	0.02
US Small Cap	-0.02	0.04	-1.58	0.12	-0.03	0.02
EAFE Equity	0.03	0.00	-1.24	0.11	-0.03	-0.01
Europe Equity	-0.04	0.00	-1.29	0.12	-0.10	-0.01
UK Equity	-0.02	0.00	-1.21	0.16	-0.14	-0.02
Japan Equity	0.13	0.00	-1.04	-0.02	0.14	0.00
EM Equity	0.04	0.00	-1.22	0.26	0.02	-0.12
APAC ex-JP	0.02	0.00	-1.20	0.22	0.04	-0.11

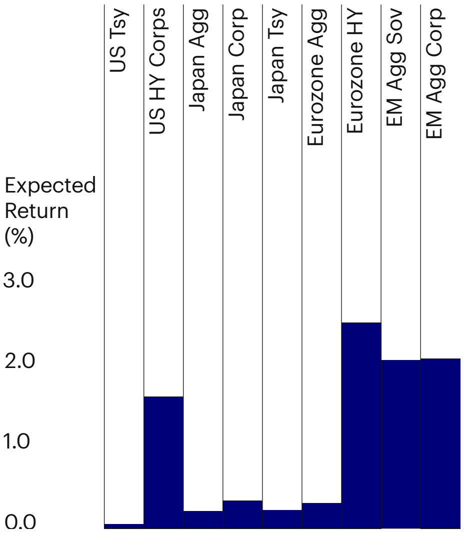
Figure 12c: Equity CMA building block year-over-year change and contribution (JPY) (%)



	Dividend Yield	Buyback Yield	LT Earnings Growth	Expected Inflation	Valuation Change	Currency Adj. (IRP)
Global Equity	-0.03	0.08	-1.39	0.33	0.25	-0.52
Global ex-US Equity	0.27	0.00	-1.86	0.31	-0.03	-0.42
US Large Cap	-0.17	0.07	-1.04	0.34	0.51	-0.55
US Small Cap	-0.11	0.06	-1.30	0.34	0.55	-0.55
EAFE Equity	0.21	0.00	-1.55	0.28	-0.24	-0.34
Europe Equity	0.10	0.00	-1.62	0.35	-0.27	-0.43
UK Equity	0.33	0.00	-2.35	0.56	-0.17	-0.72
Japan Equity	0.44	0.00	-1.39	-0.04	-0.18	0.00
EM Equity	0.46	0.00	-2.25	0.45	0.48	-0.65
APAC ex-JP	0.13	0.00	-1.53	0.39	0.34	-0.63

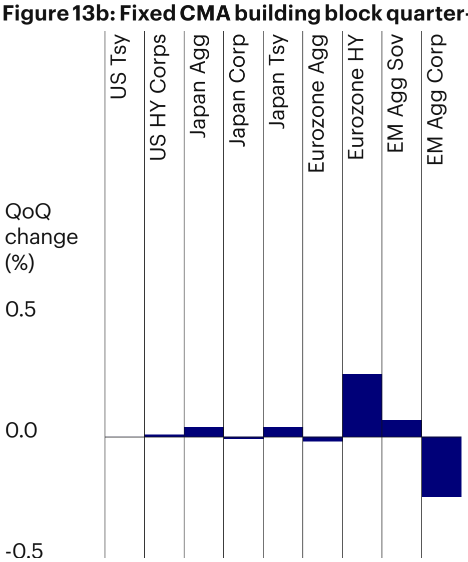
Source: Invesco, estimates as of Dec. 31, 2021. Proxies listed in **Figure 14**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 18 for information about our CMA methodology. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here. **Performance, whether actual or simulated, does not guarantee future results.**

Figure 13a: Fixed CMA building block contribution (JPY) (%)



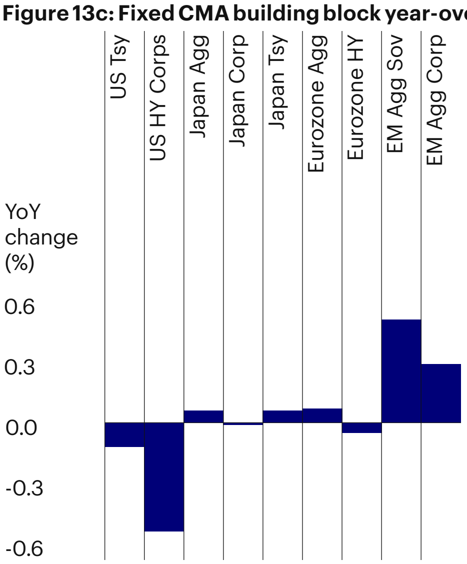
	Average Yield	Roll Return	Valuation Change (Yield Curve)	Valuation Change (OAS)	Credit Loss	Currency Adj. (IRP)
US Tsy	1.51	0.39	-0.40	0.00	0.00	-1.45
US HY Corps	5.70	0.35	-0.28	-0.98	-1.70	-1.45
Japan Agg	0.50	0.49	-0.75	-0.02	0.00	0.00
Japan Corp	0.67	0.14	-0.28	-0.02	-0.16	0.00
Japan Tsy	0.45	0.44	-0.65	0.00	0.00	0.00
Eurozone Agg	0.62	0.38	-0.42	-0.28	-0.23	0.25
Eurozone HY	4.19	0.08	-0.19	-0.51	-1.26	0.25
EM Agg Sov	5.03	0.37	-0.55	-0.15	-1.16	-1.45
EM Agg Corp	5.15	0.39	-0.31	-0.35	-1.33	-1.45

Figure 13b: Fixed CMA building block quarter-over-quarter change and contribution (JPY) (%)



	Average Yield	Roll Return	Valuation Change (Yield Curve)	Valuation Change (OAS)	Credit Loss	Currency Adj. (IRP)
US Tsy	0.02	-0.33	0.29	0.00	0.00	0.02
US HY Corps	-0.10	-0.15	0.23	0.01	0.00	0.02
Japan Agg	0.05	0.05	-0.06	0.00	0.00	0.00
Japan Corp	0.02	-0.01	-0.02	-0.01	0.00	0.00
Japan Tsy	0.04	0.05	-0.05	0.00	0.00	0.00
Eurozone Agg	0.03	-0.15	0.06	0.08	-0.03	-0.01
Eurozone HY	0.18	0.01	-0.02	0.10	0.00	-0.01
EM Agg Sov	-0.03	-0.35	0.32	0.13	-0.01	0.02
EM Agg Corp	-0.23	-0.24	0.26	-0.24	0.19	0.02

Figure 13c: Fixed CMA building block year-over-year change and contribution (JPY) (%)



	Average Yield	Roll Return	Valuation Change (Yield Curve)	Valuation Change (OAS)	Credit Loss	Currency Adj. (IRP)
US Tsy	0.44	-0.33	0.32	0.00	0.00	-0.55
US HY Corps	0.13	0.20	0.05	-0.45	0.07	-0.55
Japan Agg	0.10	0.06	-0.10	0.00	0.00	0.00
Japan Corp	0.03	0.00	-0.03	-0.04	0.03	0.00
Japan Tsy	0.08	0.05	-0.08	0.00	0.00	0.00
Eurozone Agg	0.26	0.05	0.04	0.11	-0.04	-0.35
Eurozone HY	0.17	-0.02	-0.01	0.14	0.02	-0.35
EM Agg Sov	0.54	-0.37	0.38	0.38	0.13	-0.55
EM Agg Corp	0.55	-0.02	0.25	0.12	-0.06	-0.55

Source: Invesco, estimates as of Dec. 31, 2021. Proxies listed in **Figure 14**. These estimates are forward-looking,are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 18 for information about our CMA methodology. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here. **Performance, whether actual or simulated, does not guarantee future results.**

Figure 14: 10-year asset class expected returns, risk, and return-to-risk (JPY)

	Asset class	Index	Expected geometric return %	Expected arithmetic return %	Expected risk %	Arithmetic return to risk ratio
Fixed income	US Tsy Short	BBG BARC US Tsy Short	-0.6	0.1	12.0	0.01
	US Tsy IM	BBG BARC US Tsy IM	0.0	0.6	11.2	0.06
	US Tsy Long	BBG BARC US Tsy Long	-0.1	0.9	13.9	0.06
	US TIPS	BBG BARC US TIPS	-0.7	0.0	12.2	0.00
	US Broadly Synd. Loans	CSFB Leverage Loan	2.6	3.7	14.9	0.25
	US Agg	BBG BARC US Agg	0.4	1.1	11.8	0.09
	US IG Corp	BBG BARC US IG	0.3	1.1	12.5	0.09
	US MBS	BBG BARC US MBS	0.9	1.7	12.3	0.13
	US Preferred Stocks	BOA ML Fixed Rate Pref Securities	1.4	2.4	14.6	0.17
	US HY Corps	BBG BARC US HY	1.6	2.8	15.3	0.18
	UK Linker	BofA ML UK Inflation-Linked Gilt	0.2	1.1	13.9	0.08
	UK Gilts	BBG BARC Sterling Agg Gilts	0.2	0.9	11.8	0.07
	UK Corp	BBG BARC Sterling Agg Non-Gilts Corp	0.7	2.0	16.7	0.12
	Global Agg	BBG BARC Global Agg	0.5	1.0	9.8	0.10
	Global Agg ex-US	BBG BARC Global Agg ex-US	0.8	1.2	9.3	0.13
	Global Tsy	BBG BARC Global Tsy	0.5	0.8	8.1	0.10
	Global Sov	BBG BARC Global Sov	0.2	0.9	12.7	0.07
	Global Corp	BBG BARC Global Corp	0.6	1.5	13.4	0.11
	Global IG	BBG BARC Global Corp IG	0.4	1.4	14.5	0.10
	Eurozone Corp	BBG BARC Euro Agg Credit Corp	0.7	1.8	15.1	0.12
	Eurozone Tsy	BBG BARC Euro Agg Gov Tsy	0.6	1.4	12.7	0.11
	Asian Dollar IG	BOA ML AC IG	1.1	2.1	14.3	0.14
	EM Agg	BBG BARC EM Agg	1.8	3.3	17.8	0.19
	EM Agg Sov	BBG BARC EM Sov	2.1	3.4	16.6	0.20
	China Policy Bk & Tsy	BBG BARC China PB Tsy TR	0.7	1.5	13.2	0.12
	China RMB Credit	BBG BARC China Corporate	1.1	2.0	13.9	0.15
Equities	Global Equity	MSCI ACWI	4.5	6.1	18.7	0.33
	Global ex-US Equity	MSCI ACWI ex-US	5.2	6.9	19.4	0.36
	US Broad Market	Russell 3000	4.2	6.3	21.3	0.29
	US Large Cap	S&P 500	4.0	6.0	20.6	0.29
	US Mid Cap	Russell Midcap	4.9	7.3	23.1	0.32
	US Small Cap	Russell 2000	6.3	9.3	26.2	0.36
	EAFE Equity	MSCI EAFE	4.7	6.4	19.0	0.34
	Europe Equity	MSCI Europe	5.2	7.1	20.6	0.34
	Eurozone Equity	MSCI Euro ex-UK	4.9	6.9	21.2	0.33
	UK Large Cap	FTSE 100	6.2	8.4	22.4	0.38
	UK Small Cap	FTSE Small Cap UK	7.0	10.2	27.5	0.37
	Canada Equity	S&P TSX	3.8	6.2	23.0	0.27
	Japan Equity	MSCI JP	3.2	5.2	20.9	0.25
	EM Equity	MSCI EM	6.7	9.7	26.0	0.37
	China Small Cap	CSI 500	7.0	13.0	38.4	0.34
	Pacific ex-JP Equity	MSCI Pacific ex-JP	5.2	8.3	26.6	0.31
Alternatives	US REITs	FTSE NAREIT Equity	5.2	7.1	20.3	0.35
	Global REITs	FTSE EPRA/NAREIT Developed	4.9	6.4	18.2	0.35
	HFRI Hedge Funds	HFRI HF	5.0	6.0	14.9	0.40
	GS Commodities	S&P GSCI	3.6	6.8	26.8	0.25
	Agriculture	S&P GSCI Agriculture	-1.0	1.8	24.1	0.07
	Energy	S&P GSCI Energy	6.0	12.3	39.3	0.31
	Industrial Metals	S&P GSCI Industrial Metals	3.3	6.2	25.5	0.24
	Precious Metals	S&P GSCI Precious Metals	1.0	2.6	18.8	0.14

Source: Invesco, estimates as of Dec. 31, 2021. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 18 for information about our CMA methodology. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here. Agg = Aggregate, Infra = Infrastructure, Corp = Corporate, DJ = Dow Jones, HY = High Yield, Muni = Municipals, Tsy = Treasury, IM = Intermediate, ML = Merrill Lynch, Sov = Sovereign, EM = Emerging Markets, IG = Investment Grade, APAC = Asia Pacific, Gov = Government, MBS = Mortgage Backed Securities, TIPS = Treasury Inflation Protected Securities.

Figure 15: 10-year correlations (JPY)

- Greater than 0.70
- 0.30 to 0.70
- Less than 0.30

		Fixed income																									
	Asset class	US Tsy Short	US Tsy IM	US Tsy Long	US TIPS	US Broadly Synd. Loans	US Agg	US IG Corp	US MBS	US Preferred Stocks	US HY Corps	UK Linker	UK Gilts	UK Corp	Global Agg	Global Agg ex-US	Global Tsy	Global Sov	Global Corp	Global IG	Eurozone Corp	Eurozone Tsy	Asian Dollar IG	EM Agg	EM Agg Sov	China Policy Bk & Tsy	China RMB Credit
Fixed income	US Tsy Short	1.00																									
	US Tsy IM	0.95	1.00																								
	US Tsy Long	0.37	0.57	1.00																							
	US TIPS	0.81	0.86	0.57	1.00																						
	US Broadly Synd. Loans	0.83	0.73	0.15	0.77	1.00																					
	US Agg	0.93	0.97	0.62	0.91	0.80	1.00																				
	US IG Corp	0.78	0.81	0.54	0.88	0.85	0.92	1.00																			
	US MBS	0.97	0.98	0.52	0.87	0.79	0.97	0.83	1.00																		
	US Preferred Stocks	0.52	0.49	0.20	0.57	0.62	0.57	0.69	0.52	1.00																	
	US HY Corps	0.71	0.62	0.13	0.74	0.93	0.73	0.85	0.69	0.70	1.00																
	UK Linker	0.52	0.53	0.36	0.70	0.63	0.62	0.69	0.55	0.50	0.65	1.00															
	UK Gilts	0.59	0.62	0.41	0.71	0.60	0.68	0.69	0.63	0.46	0.60	0.87	1.00														
	UK Corp	0.55	0.51	0.19	0.66	0.72	0.62	0.74	0.56	0.57	0.75	0.82	0.91	1.00													
	Global Agg	0.80	0.83	0.47	0.87	0.77	0.89	0.89	0.84	0.61	0.78	0.76	0.81	0.80	1.00												
	Global Agg ex-US	0.56	0.57	0.27	0.69	0.63	0.65	0.72	0.60	0.54	0.69	0.75	0.79	0.82	0.93	1.00											
	Global Tsy	0.71	0.76	0.51	0.82	0.65	0.82	0.80	0.76	0.55	0.68	0.76	0.82	0.76	0.98	0.95	1.00										
	Global Sov	0.73	0.75	0.43	0.85	0.79	0.84	0.90	0.78	0.62	0.83	0.73	0.73	0.77	0.95	0.88	0.91	1.00									
	Global Corp	0.73	0.73	0.38	0.84	0.84	0.84	0.94	0.77	0.70	0.87	0.77	0.78	0.87	0.96	0.89	0.90	0.95	1.00								
	Global IG	0.73	0.74	0.39	0.84	0.84	0.84	0.94	0.77	0.69	0.87	0.77	0.78	0.86	0.96	0.89	0.91	0.95	1.00	1.00							
	Eurozone Corp	0.52	0.50	0.12	0.62	0.64	0.58	0.68	0.53	0.56	0.71	0.68	0.70	0.80	0.87	0.97	0.88	0.85	0.88	0.87	1.00						
	Eurozone Tsy	0.52	0.55	0.27	0.62	0.54	0.60	0.63	0.56	0.47	0.60	0.66	0.70	0.71	0.89	0.97	0.93	0.83	0.82	0.82	0.95	1.00					
	Asian Dollar IG	0.86	0.88	0.50	0.92	0.86	0.94	0.94	0.91	0.60	0.83	0.67	0.69	0.70	0.90	0.72	0.83	0.91	0.90	0.91	0.68	0.66	1.00				
	EM Agg	0.69	0.67	0.31	0.80	0.84	0.78	0.88	0.73	0.62	0.90	0.66	0.62	0.72	0.85	0.76	0.77	0.92	0.90	0.90	0.74	0.67	0.89	1.00			
	EM Agg Sov	0.65	0.64	0.33	0.78	0.80	0.76	0.87	0.70	0.61	0.87	0.66	0.61	0.71	0.83	0.75	0.76	0.92	0.88	0.88	0.73	0.67	0.86	0.99	1.00		
	China Policy Bk & Tsy	0.89	0.85	0.31	0.76	0.74	0.84	0.72	0.87	0.50	0.66	0.52	0.61	0.58	0.78	0.62	0.72	0.69	0.71	0.71	0.56	0.57	0.78	0.66	0.64	1.00	
	China RMB Credit	0.90	0.86	0.29	0.77	0.78	0.84	0.74	0.88	0.50	0.69	0.54	0.62	0.60	0.79	0.63	0.73	0.71	0.73	0.73	0.58	0.58	0.80	0.69	0.66	0.98	1.00
Equities	Global Equity	0.56	0.46	-0.01	0.58	0.76	0.55	0.68	0.53	0.67	0.85	0.60	0.59	0.75	0.72	0.73	0.65	0.75	0.80	0.78	0.76	0.64	0.65	0.79	0.78	0.59	0.61
	Global ex-US Equity	0.50	0.40	-0.05	0.54	0.71	0.50	0.65	0.47	0.64	0.82	0.59	0.57	0.76	0.71	0.76	0.65	0.74	0.79	0.78	0.79	0.67	0.62	0.78	0.77	0.54	0.57
	US Broad Market	0.59	0.49	0.02	0.60	0.77	0.58	0.68	0.56	0.66	0.84	0.57	0.56	0.71	0.69	0.67	0.61	0.72	0.77	0.75	0.69	0.57	0.65	0.76	0.75	0.61	0.62
	US Large Cap	0.60	0.50	0.04	0.60	0.76	0.58	0.68	0.57	0.66	0.83	0.57	0.57	0.70	0.70	0.67	0.62	0.72	0.77	0.75	0.69	0.58	0.65	0.76	0.74	0.62	0.63
	US Mid Cap	0.56	0.45	0.00	0.58	0.78	0.55	0.69	0.52	0.67	0.85	0.57	0.54	0.70	0.68	0.66	0.59	0.71	0.77	0.75	0.69	0.56	0.64	0.77	0.75	0.58	0.60
	US Small Cap	0.53	0.42	-0.06	0.51	0.73	0.50	0.62	0.48	0.61	0.80	0.49	0.50	0.65	0.61	0.60	0.53	0.64	0.70	0.68	0.62	0.50	0.58	0.70	0.68	0.55	0.57
	EAFE Equity	0.52	0.42	-0.03	0.55	0.71	0.51	0.65	0.49	0.64	0.81	0.59	0.58	0.76	0.71	0.75	0.66	0.74	0.79	0.77	0.79	0.67	0.62	0.77	0.76	0.55	0.57
	Europe Equity	0.50	0.41	-0.03	0.52	0.69	0.50	0.63	0.47	0.62	0.79	0.60	0.59	0.76	0.71	0.76	0.66	0.74	0.78	0.76	0.79	0.68	0.59	0.76	0.75	0.53	0.55
	Eurozone Equity	0.48	0.39	-0.03	0.51	0.66	0.48	0.61	0.45	0.61	0.78	0.58	0.57	0.73	0.70	0.76	0.66	0.73	0.76	0.75	0.79	0.69	0.58	0.75	0.74	0.51	0.53
	UK Large Cap	0.53	0.42	-0.05	0.54	0.72	0.51	0.63	0.50	0.61	0.80	0.60	0.62	0.79	0.70	0.73	0.63	0.71	0.77	0.76	0.76	0.63	0.61	0.75	0.74	0.57	0.58
	UK Small Cap	0.46	0.34	-0.11	0.49	0.73	0.44	0.61	0.42	0.59	0.80	0.59	0.60	0.80	0.64	0.68	0.56	0.66	0.74	0.73	0.73	0.58	0.57	0.71	0.69	0.51	0.53
	Canada Equity	0.44	0.34	-0.06	0.53	0.70	0.45	0.62	0.41	0.60	0.79	0.56	0.52	0.69	0.63	0.67	0.56	0.67	0.73	0.72	0.70	0.56	0.57	0.74	0.72	0.47	0.50
	Japan Equity	0.52	0.43	-0.01	0.51	0.66	0.50	0.58	0.49	0.58	0.71	0.46	0.45	0.61	0.59	0.57	0.52	0.62	0.66	0.65	0.60	0.50	0.58	0.66	0.63	0.55	0.58
	EM Equity	0.39	0.30	-0.08	0.47	0.62	0.40	0.57	0.37	0.56	0.75	0.51	0.49	0.67	0.62	0.69	0.57	0.67	0.70	0.69	0.72	0.60	0.54	0.74	0.72	0.46	0.48
	China Small Cap	0.36	0.34	0.06	0.41	0.42	0.38	0.43	0.36	0.31	0.47	0.36	0.38	0.43	0.46	0.44	0.42	0.46	0.48	0.48	0.44	0.39	0.46	0.49	0.46	0.42	0.42
	Pacific ex-JP Equity	0.42	0.33	-0.03	0.52	0.66	0.45	0.62	0.41	0.60	0.77	0.53	0.53	0.72	0.66	0.72	0.60	0.70	0.75	0.74	0.75	0.62	0.58	0.75	0.74	0.48	0.49
Alternatives	US REITs	0.38	0.34	0.14	0.50	0.60	0.46	0.59	0.39	0.61	0.71	0.52	0.47	0.58	0.57	0.57	0.53	0.63	0.64	0.63	0.55	0.47	0.54	0.65	0.65	0.40	0.40
	Global REITs	0.41	0.35	0.09	0.54	0.67	0.48	0.65	0.41	0.66	0.78	0.60	0.56	0.71	0.65	0.69	0.61	0.70	0.74	0.73	0.68	0.58	0.59	0.73	0.74	0.45	0.45
	HFRI Hedge Funds	0.82	0.72	0.14	0.76	0.91	0.78	0.82	0.78	0.66	0.90	0.63	0.64	0.76	0.82	0.71	0.72	0.81	0.86	0.86	0.72	0.63	0.83	0.84	0.81	0.78	0.81
	GS Commodities	0.39	0.28	-0.17	0.43	0.61	0.33	0.43	0.33	0.39	0.61	0.44	0.39	0.54	0.49	0.53	0.43	0.53	0.55	0.54	0.58	0.46	0.45	0.55	0.54	0.38	0.43
	Agriculture	0.25	0.20	-0.11	0.27	0.31	0.21	0.25	0.22	0.28	0.35	0.23	0.23	0.30	0.33	0.37	0.31	0.34	0.34	0.34	0.39	0.33	0.28	0.34	0.32	0.27	0.28
	Energy	0.32	0.22	-0.19	0.36	0.55	0.27	0.38	0.27	0.34	0.55	0.38	0.32	0.47	0.41	0.45	0.35	0.47	0.48	0.47	0.51	0.40	0.38	0.49	0.49	0.30	0.35
	Industrial Metals	0.40	0.31	-0.12	0.42	0.55	0.35	0.42	0.35	0.39	0.57	0.41	0.40	0.51	0.52	0.56	0.47	0.51	0.55	0.54	0.59	0.50	0.45	0.54	0.51	0.43	0.45
	Precious Metals	0.08	0.11	0.09	0.28	0.14	0.15	0.21	0.12	0.05	0.21	0.32	0.33	0.31	0.31	0.37	0.33	0.32	0.30	0.30	0.35	0.34	0.24	0.32	0.32	0.10	0.11

Source: Invesco, estimates as of Dec. 31, 2021. Proxies listed in **Figure 14.** These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 18 for information about our CMA methodology. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here.

Figure 15: 10-year correlations (JPY)

- Greater than 0.70
- 0.30 to 0.70
- Less than 0.30

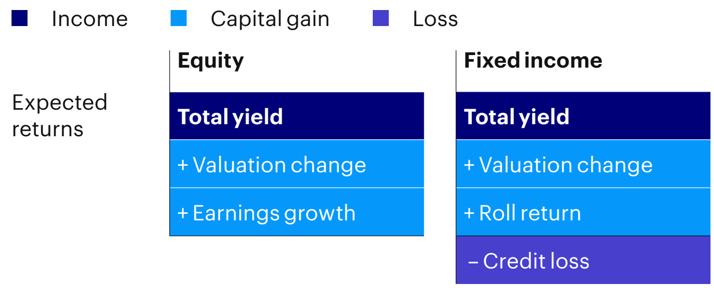
		Equities																Alternatives							
	Asset class	Global Equity	Global ex-US Equity	US Broad Market	US Large Cap	US Mid Cap	US Small Cap	EAFE Equity	Europe Equity	Eurozone Equity	UK Large Cap	UK Small Cap	Canada Equity	Japan Equity	EM Equity	China Small Cap	Pacific ex-JP Equity	US REITs	Global REITs	HFRI Hedge Funds	GS Commodities	Agriculture	Energy	Industrial Metals	Precious Metals
Fixed income	US Tsy Short																								
	US Tsy IM																								
	US Tsy Long																								
	US TIPS																								
	US Broadly Synd. Loans																								
	US Agg																								
	US IG Corp																								
	US MBS																								
	US Preferred Stocks																								
	US HY Corps																								
	UK Linker																								
	UK Gilts																								
	UK Corp																								
	Global Agg																								
	Global Agg ex-US																								
	Global Tsy																								
	Global Sov																								
	Global Corp																								
	Global IG																								
	Eurozone Corp																								
	Eurozone Tsy																								
	Asian Dollar IG																								
	EM Agg																								
	EM Agg Sov																								
	China Policy Bk & Tsy																								
	China RMB Credit																								
Equities	Global Equity	1.00																							
	Global ex-US Equity	0.98	1.00																						
	US Broad Market	0.98	0.91	1.00																					
	US Large Cap	0.97	0.90	1.00	1.00																				
	US Mid Cap	0.96	0.91	0.98	0.97	1.00																			
	US Small Cap	0.91	0.86	0.94	0.91	0.96	1.00																		
	EAFE Equity	0.97	0.99	0.91	0.91	0.90	0.85	1.00																	
	Europe Equity	0.96	0.97	0.90	0.90	0.89	0.83	0.99	1.00																
	Eurozone Equity	0.95	0.97	0.89	0.89	0.88	0.82	0.98	0.99	1.00															
	UK Large Cap	0.94	0.95	0.88	0.88	0.87	0.82	0.96	0.97	0.94	1.00														
	UK Small Cap	0.89	0.91	0.84	0.83	0.86	0.83	0.91	0.90	0.88	0.91	1.00													
	Canada Equity	0.90	0.90	0.87	0.86	0.89	0.84	0.87	0.86	0.84	0.88	0.84	1.00												
	Japan Equity	0.81	0.83	0.76	0.76	0.76	0.74	0.85	0.77	0.76	0.77	0.76	0.70	1.00											
	EM Equity	0.88	0.93	0.80	0.79	0.81	0.77	0.87	0.85	0.84	0.83	0.82	0.85	0.71	1.00										
	China Small Cap	0.49	0.50	0.46	0.46	0.45	0.42	0.47	0.45	0.44	0.45	0.45	0.47	0.43	0.53	1.00									
	Pacific ex-JP Equity	0.91	0.94	0.85	0.84	0.86	0.81	0.91	0.88	0.87	0.88	0.85	0.88	0.73	0.92	0.49	1.00								
Alternatives	US REITs	0.76	0.72	0.77	0.76	0.80	0.76	0.72	0.71	0.71	0.68	0.68	0.69	0.58	0.63	0.27	0.70	1.00							
	Global REITs	0.86	0.86	0.84	0.83	0.86	0.81	0.86	0.84	0.83	0.83	0.82	0.81	0.70	0.78	0.37	0.86	0.94	1.00						
	HFRI Hedge Funds	0.88	0.85	0.88	0.87	0.88	0.85	0.85	0.82	0.80	0.84	0.82	0.82	0.76	0.76	0.51	0.79	0.63	0.73	1.00					
	GS Commodities	0.62	0.65	0.58	0.57	0.61	0.59	0.63	0.63	0.59	0.68	0.62	0.72	0.51	0.59	0.30	0.61	0.40	0.53	0.66	1.00				
	Agriculture	0.40	0.41	0.36	0.36	0.36	0.35	0.40	0.39	0.38	0.41	0.38	0.41	0.29	0.41	0.15	0.43	0.30	0.37	0.38	0.45	1.00			
	Energy	0.56	0.58	0.52	0.51	0.56	0.54	0.57	0.57	0.54	0.62	0.56	0.65	0.47	0.51	0.25	0.53	0.36	0.47	0.59	0.98	0.31	1.00		
	Industrial Metals	0.66	0.67	0.61	0.61	0.63	0.59	0.64	0.64	0.61	0.67	0.64	0.70	0.49	0.66	0.44	0.68	0.47	0.58	0.63	0.63	0.39	0.53	1.00	
	Precious Metals	0.25	0.29	0.20	0.20	0.21	0.16	0.25	0.25	0.25	0.26	0.23	0.38	0.13	0.36	0.30	0.31	0.17	0.23	0.24	0.27	0.20	0.20	0.35	1.00

Source: Invesco, estimates as of Dec. 31, 2021. Proxies listed in **Figure 14**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 18 for information about our CMA methodology. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here.

About our capital market assumptions methodology

We employ a fundamentally based "building block" approach to estimating asset class returns. Estimates for income and capital gain components of returns for each asset class are informed by fundamental and historical data. Components are then combined to establish estimated returns (Figure 14). Here we provide a summary of key elements of the methodology used to produce our long-term (10-year) estimates. Five-year assumptions are also available upon request. Please see Invesco's capital market assumption methodology whitepaper for more detail.

Figure 16: Our building block approach to estimating returns



For illustrative purposes only.

Fixed income returns are composed of:

- **Average yield:** The average of the starting (initial) yield and the expected yield for bonds.
- **Valuation change (yield curve):** Estimated changes in valuation given changes in the Treasury yield curve.
- **Roll return:** Reflects the impact on the price of bonds that are held over time. Given a positively sloped yield curve, a bond's price will be positively impacted as interest payments remain fixed but time to maturity decreases.
- **Credit adjustment:** Estimated potential impact on returns from credit rating downgrades and defaults.

Equity returns are composed of:

- **Dividend yield:** Dividend per share divided by price per share.
- **Buyback yield:** Percentage change in shares outstanding resulting from companies buying back or issuing shares.
- **Valuation change:** The expected change in value given the current Price/Earnings (P/E) ratio and the assumption of reversion to the long-term average P/E ratio.
- **Long-term (LT) earnings growth:** The estimated rate in the growth of earnings based on the long-term average real GDP per capita and inflation.

Currency adjustments are based on the theory of Interest Rate Parity (IRP) which suggests a strong relationship between interest rates and the spot and forward exchange rates between two given currencies. Interest rate parity theory assumes that no arbitrage opportunities exist in foreign exchange markets. It is based on the notion that, over the long term, investors will be indifferent between varying rate of returns on deposits in different currencies because any excess return on deposits will be offset by changes in the relative value of currencies.

Volatility estimates for the different asset classes, we use rolling historical quarterly returns of various market benchmarks. Given that benchmarks have differing histories within and across asset classes, we normalise the volatility estimates of shorter-lived benchmarks to ensure that all series are measured over similar time periods.

Correlation estimates are calculated using trailing 20 years of monthly returns. Given that recent asset class correlations could have a more meaningful effect on future observations, we place greater weight on more recent observations by applying a 10-year half-life to the time series in our calculation.

Arithmetic versus geometric returns. Our building block methodology produces estimates of geometric (compound) asset class returns. However, standard mean-variance portfolio optimisation requires return inputs to be provided in arithmetic rather than in geometric terms. This is because the arithmetic mean of a weighted sum (e.g., a portfolio) is the weighted sum of the arithmetic means (of portfolio constituents). This does not hold for geometric returns. Accordingly, we translate geometric estimates into arithmetic terms. We provide both arithmetic returns and geometric returns given that the former informs the optimisation process regarding expected outcomes, while the latter informs the investor about the rate at which asset classes might be expected to grow wealth over the long run.

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Invesco Investment Solutions

Invesco Investment Solutions is an experienced multi-asset team that seeks to deliver desired client outcomes using Invesco's global capabilities, scale and infrastructure. We partner with you to fully understand your goals and harness strategies across Invesco's global spectrum of active, passive, factor and alternative investments that address your unique needs. From robust research and analysis to bespoke investment solutions, our team brings insight and innovation to your portfolio construction process. Our approach starts with a complete understanding of your needs:

- We help support better investment outcomes by delivering insightful and thorough analytics.
- By putting analytics into practice, we develop investment approaches specific to your needs.
- We work as an extension of your team to engage across functions and implement solutions.

The foundation of the team's process is the development of capital market assumptions — long-term forecasts for the behavior of different asset classes. Their expectations for returns, volatility, and correlation serve as guidelines for long-term, strategic asset allocation decisions.

Assisting clients in North America, Europe and Asia, Invesco's Investment Solutions team consists of over 75 professionals, with 20+ years of experience across the leadership team. The team benefits from Invesco's on-the-ground presence in 25 countries worldwide, with over 150 professionals to support investment selection and ongoing monitoring.

About the Invesco Global Market Strategist office

The GMS office is comprised of investment professionals based in different regions, with different areas of expertise. It provides data and commentary on global markets, offering insights into key trends and themes and their investment implications.

Investment risks
The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the fullamount invested.

Invesco Investment Solutions develops CMAs that provide long-term estimates for the behavior of major asset classes globally. The team is dedicated to designing outcome-oriented, multi-asset portfolios that meet the specific goals of investors. The assumptions, which are based on 5- and 10-year investment time horizons, are intended to guide these strategic asset class allocations. For each selected asset class, we develop assumptions for estimated return, estimated standard deviation of return (volatility), and estimated correlation with other asset classes. This information is not intended as a recommendation to invest in a specific asset class or strategy, or as a promise of future performance. Estimated returns are subject to uncertainty and error, and can be conditional on economic scenarios. In the event a particular scenario comes to pass, actual returns could be significantly higher or lower than these estimates.

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