
2022 Long-Term Capital Market Assumptions

Invesco Investment Solutions | Japanese yen (JPY) | Q2 Update

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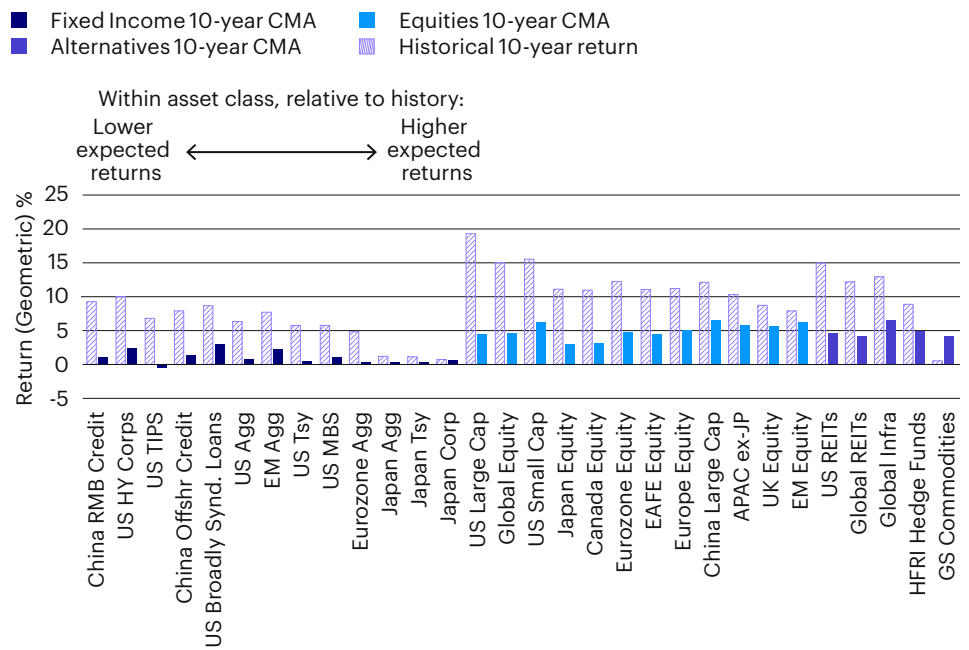
Executive Summary



Duy Nguyen
CIO, Invesco Investment Solutions

- The end of highly accommodative monetary policy could be the cause of 2022’s market correction, however many of the same concerns about assets we have been focused on remain pertinent today; lower expected returns than history in both equities and fixed income, with higher levels of volatility and correlations, reducing portfolio diversification.
- While geopolitical and economic risks are abound in the start to 2022, we would like to use this publication as a means of reaffirming some positives for those that have a long-term view on markets, spanning full business cycles and not individual quarters.
- As a means of providing context for our Capital Market Assumptions (CMAs) in the form of a portfolio, we have assembled a model strategic asset allocation, the Invesco Investment Solutions Flagship, with a risk target similar to a global 60% equity and 40% fixed income benchmark and will present any changes to this allocation each quarter.

Figure 1: Expectations relative to historical average (JPY)



Source: Invesco, estimates as of March 31, 2022. Proxies listed in **Figure 8**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 12 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.

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Asset Allocation Insights



Jacob Borbidge
Senior Portfolio Manager,
Head of Investment Research,
Invesco Investment Solutions

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

Executive Summary

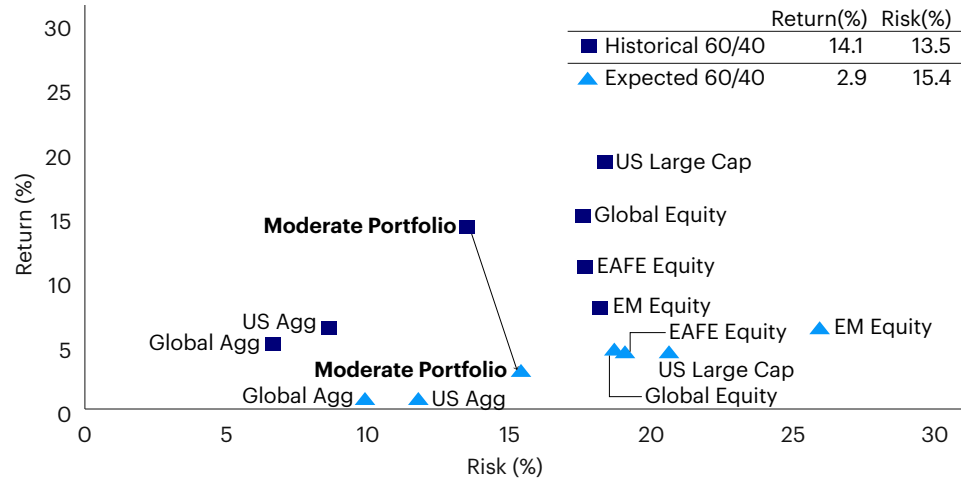
Asset Allocation Insights

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Strategic perspective

In what was one of the most difficult first quarters for financial markets in recent history, where aggregate fixed income assets fell more than equities, investors are justifiably concerned as to how position their portfolios now that downside volatility has resurfaced. The end of highly accommodative monetary policy could be the cause of 2022's market correction, however many of the same concerns about assets we have been focused on remain pertinent today; lower expected returns than history in both equities and fixed income, with higher levels of volatility and correlations, reducing portfolio diversification (Fig 2).

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



Source: Invesco, estimates as of March 31, 2022. Proxies listed in **Figure 8**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 12 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.

While geopolitical and economic risks are abound in the start to 2022, we would like to use this publication as a means of reaffirming some positives for those that have a long-term view on markets, spanning full business cycles and not individual quarters:

1. Markets are often mean reverting over the long-term, with forward looking returns inversely related to historical returns for equities and fixed income alike. Our prior publications have mostly expressed this relationship with respect to lower CMAs, however, as most assets have recently depreciated in value, our CMAs indicate investors may experience a more favorable investing environment going forward than those deploying capital last quarter. For equities, our building blocks for yield, valuation and earnings experience this phenomenon to various degrees. Within fixed income, credit spreads clearly showcase this as well.
2. As we have documented in our methodology, volatility is also mean reverting. While we do anticipate near-term turbulence due to the war in the Ukraine, lockdowns in China, and the tightening of financial conditions, elevated levels of risk tend to calm down over the course of a business cycle. While the Invesco Investment Solutions team is not presently projecting a recession, we remain vigilant in monitoring the potential impacts these forces may have on our portfolios and the assets we cover.
3. Finally, yields of fixed income instruments are now at levels that may start to appear attractive to buyers of longer duration assets, offering significantly more expected return than a few quarters ago. Yields on their own are great predictors of fixed income returns for those that can hold to maturity given their seniority in the capital structure. Should there be a recession in the near future, the drawdown on these assets tends to be much shallower than their equity or equity-like counterparts.

2Q22 CMA Observations (10Y, USD):**Equities:**

- Given the prolonged war in the Ukraine, we implemented downward adjustments to earnings in regions that have large exposures to Russian revenues due to the likely possibility of further sanctions or shifts in the preference of trade with Russian entities. Of all of the equity regions, the UK and EMEA have the largest exposure to Russian revenues, concentrated in their energy sectors. Canada was a beneficiary of this adjustment as they may be able to provide resource substitutes.
- A muted and prolonged recovery from COVID-19 in APAC has served to reduce our near-term growth estimates in emerging markets (EM), lowering expected earnings in that region. Our EM equity CMAs remain significantly higher than those in developed regions.
- Overall, our global equity CMAs are expected to be around 0.75% higher than last quarter, with the largest regional increase in US large cap equities (+1.0%), driven mostly by valuation improvements. The beneficiaries of improved valuations include China and REITs, however on an absolute basis, valuations are still high and a headwind for the CMAs of most assets. Real earnings estimates continue to decline, while nominal earnings are expected to increase due to higher inflation expectations.
- As not all regions have begun to increase their discount rates, APAC currencies like Yen and RMB are significantly cheaper on using an IRP framework. In general, EM currencies are expensive compared to the USD, while DM currencies are at a discount.

Fixed Income:

- Global aggregate fixed income is expected to return +0.9% more than last quarter as the building blocks for yield, expected and current, and valuation have increased. Roll return is mostly down as expected yield curves determined by forward markets have flattened outside of the TIPS market. Duration is higher for credit (+1 year for high yield) and slightly down for treasuries (-1 year).

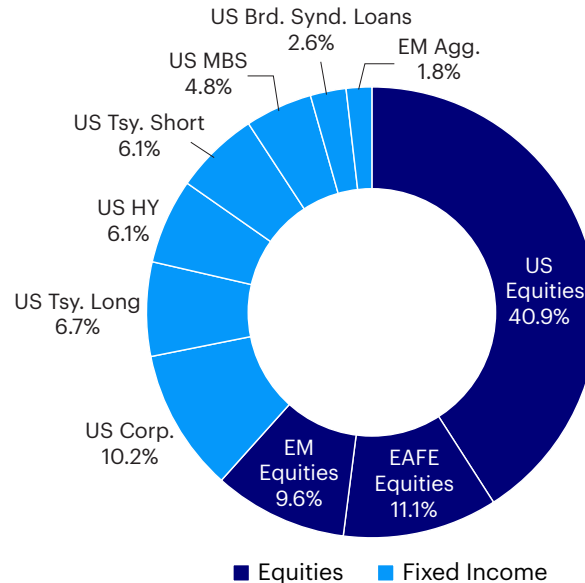
Alternatives:

- Slower growth and higher costs of financing have been driving private equity LBO returns lower (-2% YoY), however they remain significantly above those of public equities.
- Hedge funds and listed infrastructure provide some of the best expected sharpe ratios amongst all asset classes. For investors that are able to take on alternative forms of risk, this may be a way of diversifying in what continues to be a difficult environment for traditional assets.
- Commodity CMAs remain significantly higher than history, have very low correlations to traditional assets, and are anticipated to perform well in higher-than-average inflationary periods. We acknowledge the difficulty in predicting commodity returns and recognize that these dollar-based assets may face headwinds should the USD continue to appreciate.

Strategic Asset Allocation Trends:

As a means of providing context for our CMAs in the form of a portfolio, we have assembled a model strategic asset allocation, the Invesco Investment Solutions Flagship, with a risk target similar to a global 60% equity and 40% fixed income benchmark. By smoothing our CMAs over five years and optimizing using proprietary risk budgeting techniques, the model portfolio represents the strategic views of the Solutions team across a sample investment universe of common assets (Fig 3).

Figure 3: 2022 Q1 SAA Rebalance (USD)



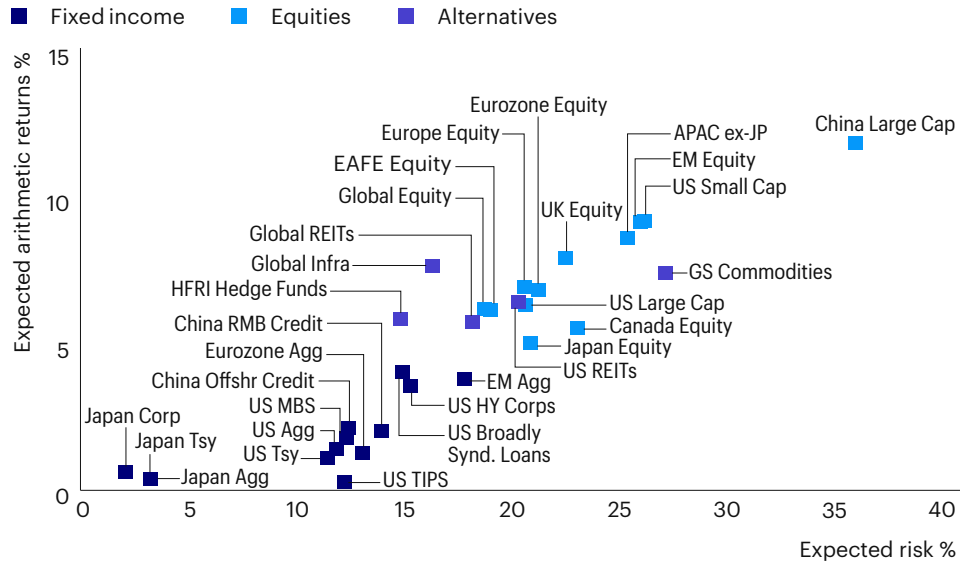
Source: Invesco Investment Solutions, as of March 31, 2022. Proxies listed in **Figure 8**. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here. References to overweights and underweights are relative to a 60% global equity and 40% global aggregate fixed income benchmark.

- Portfolio level:
 - Remain slight overweight in equities and treasuries at the expense of fixed income
 - Remain overweight in duration
- Within equities:
 - Overweight in US & EM
 - Underweight in EAFE
- Within fixed income:
 - Remain overweight in risky credit & underweight high-quality credit

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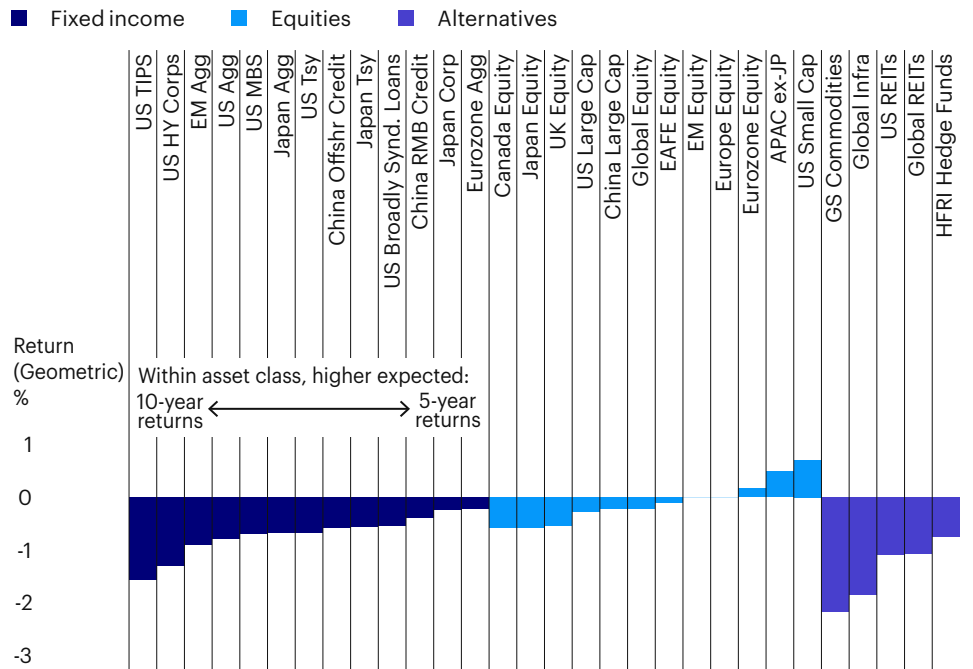
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Figure 4: 10-year asset class expectations (JPY)



Source: Invesco, estimates as of March 31, 2022. Proxies listed in **Figure 8**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 12 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 5: CMA difference: 5-year minus 10-year assumptions (JPY)



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Figure 6a: Equity CMA building block contribution (JPY) (%)

■ Expected Return

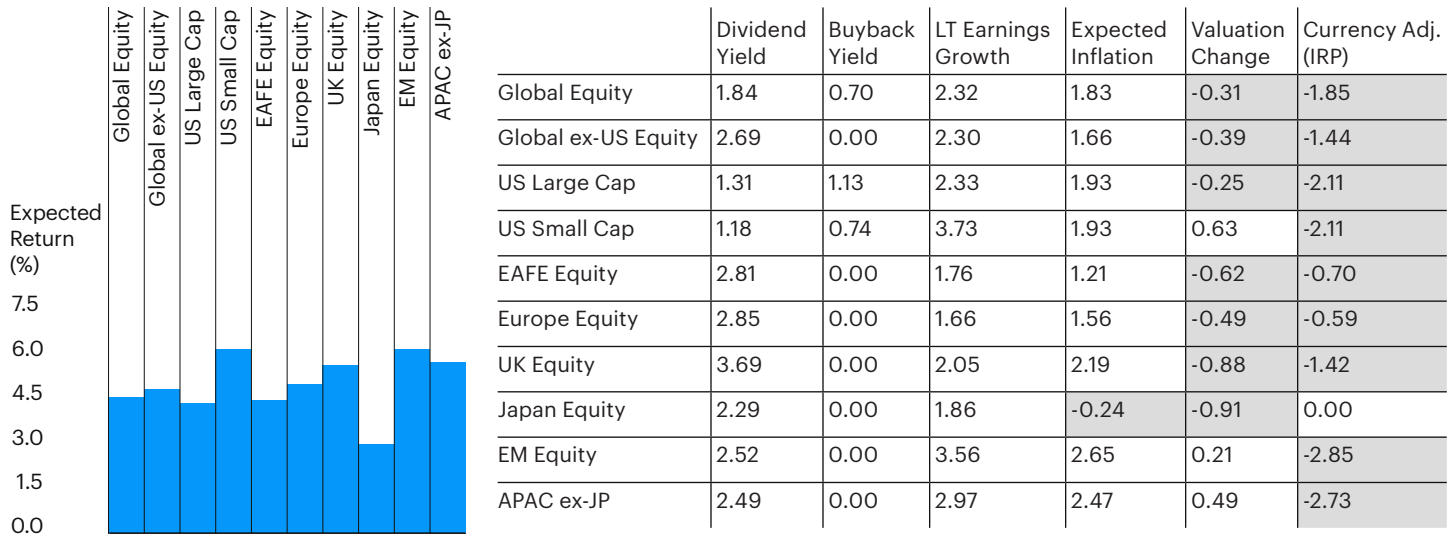


Figure 6b: Equity CMA building block quarter-over-quarter change and contribution (JPY) (%)

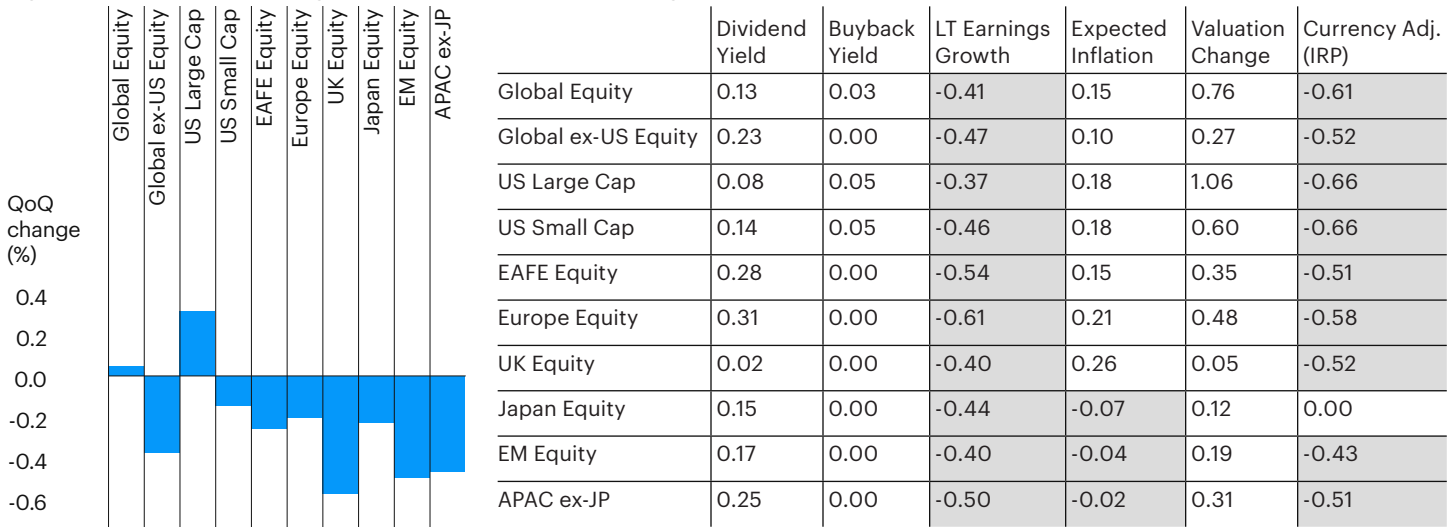
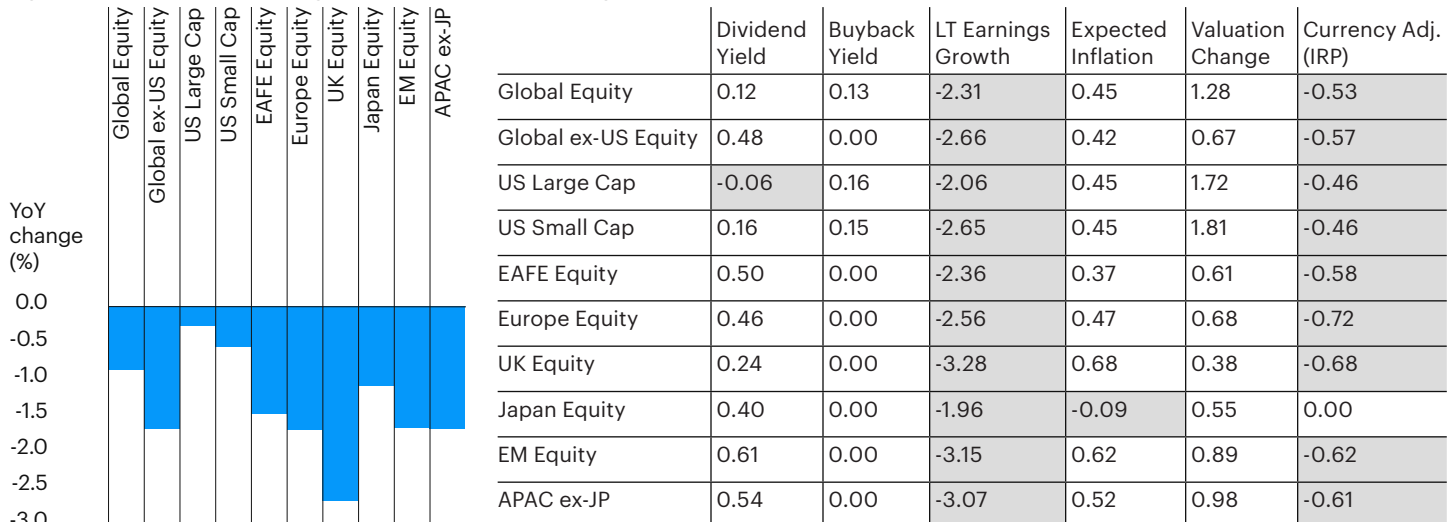


Figure 6c: Equity CMA building block year-over-year change and contribution (JPY) (%)



Source: Invesco, estimates as of March 31, 2022. Proxies listed in Figure 8. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 12 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 7a: Fixed CMA building block contribution (JPY) (%)

■ Expected Return

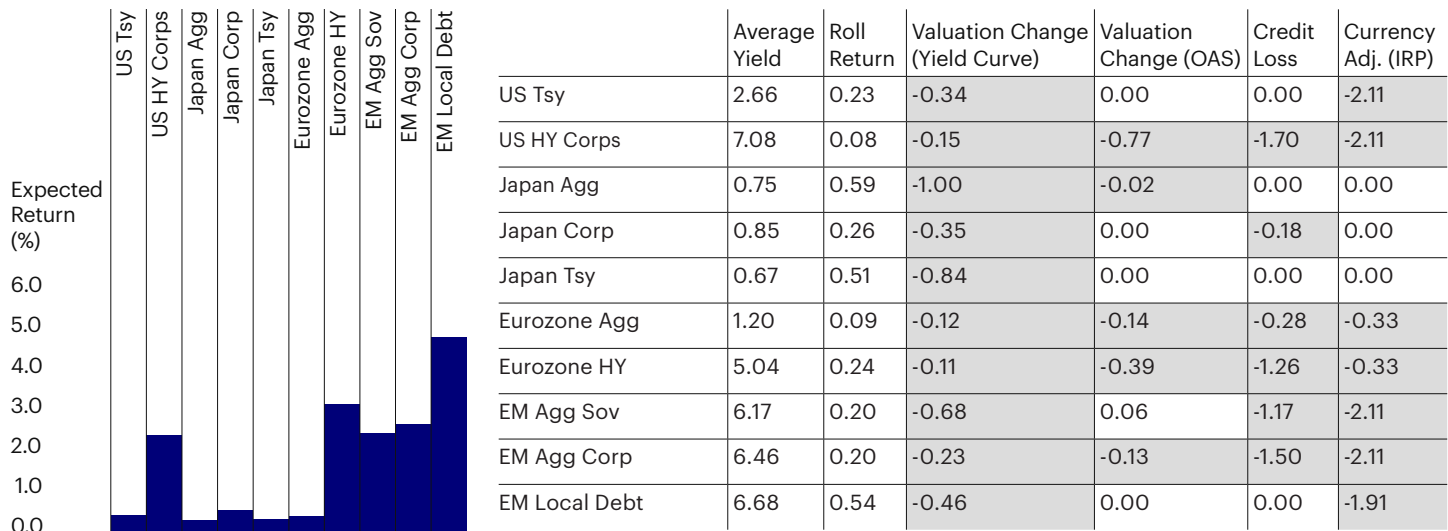


Figure 7b: Fixed CMA building block quarter-over-quarter change and contribution (JPY) (%)

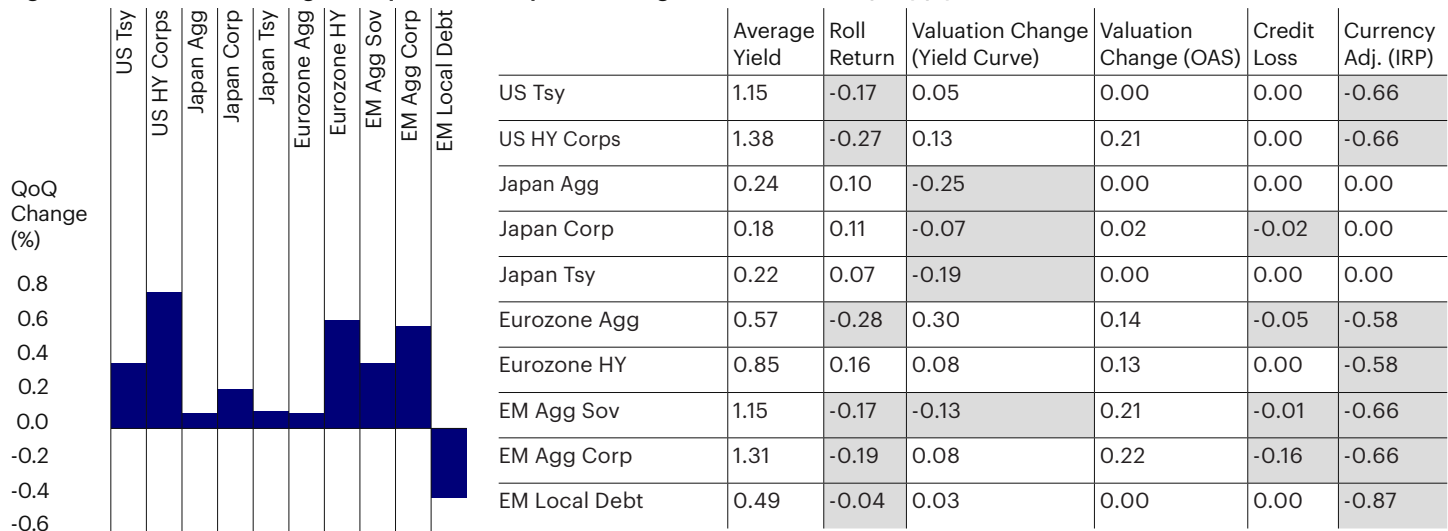
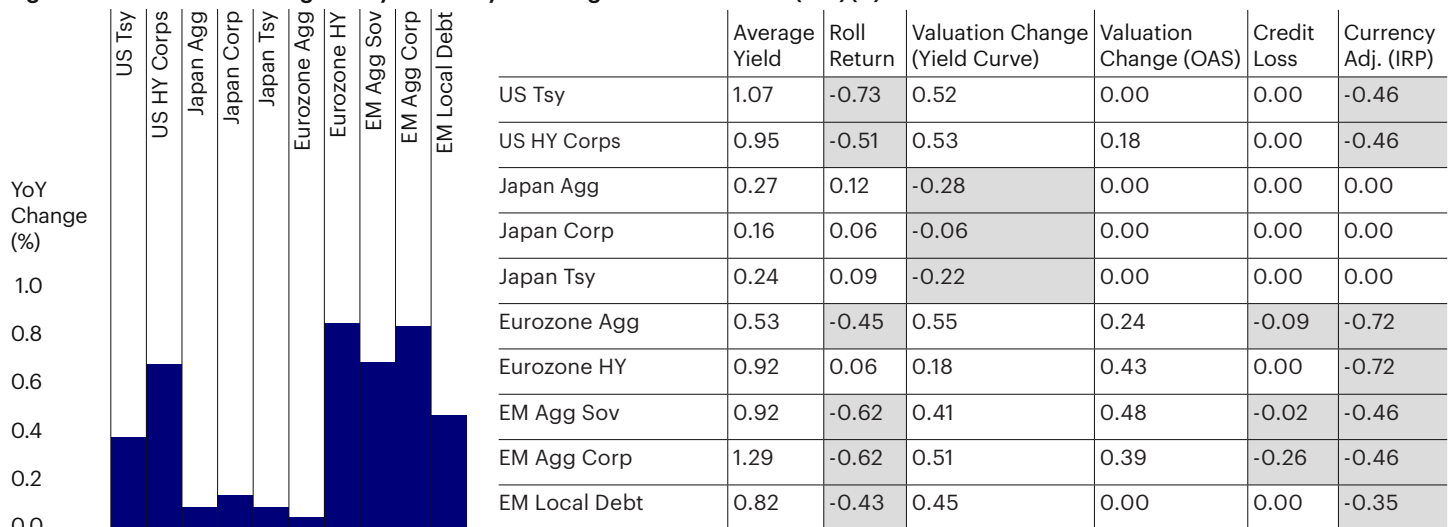


Figure 7c: Fixed CMA building block year-over-year change and contribution (JPY) (%)



Source: Invesco, estimates as of March 31, 2022. Proxies listed in Figure 8. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 12 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 8: 10-year asset class expected returns, risk, and return-to-risk (JPY)

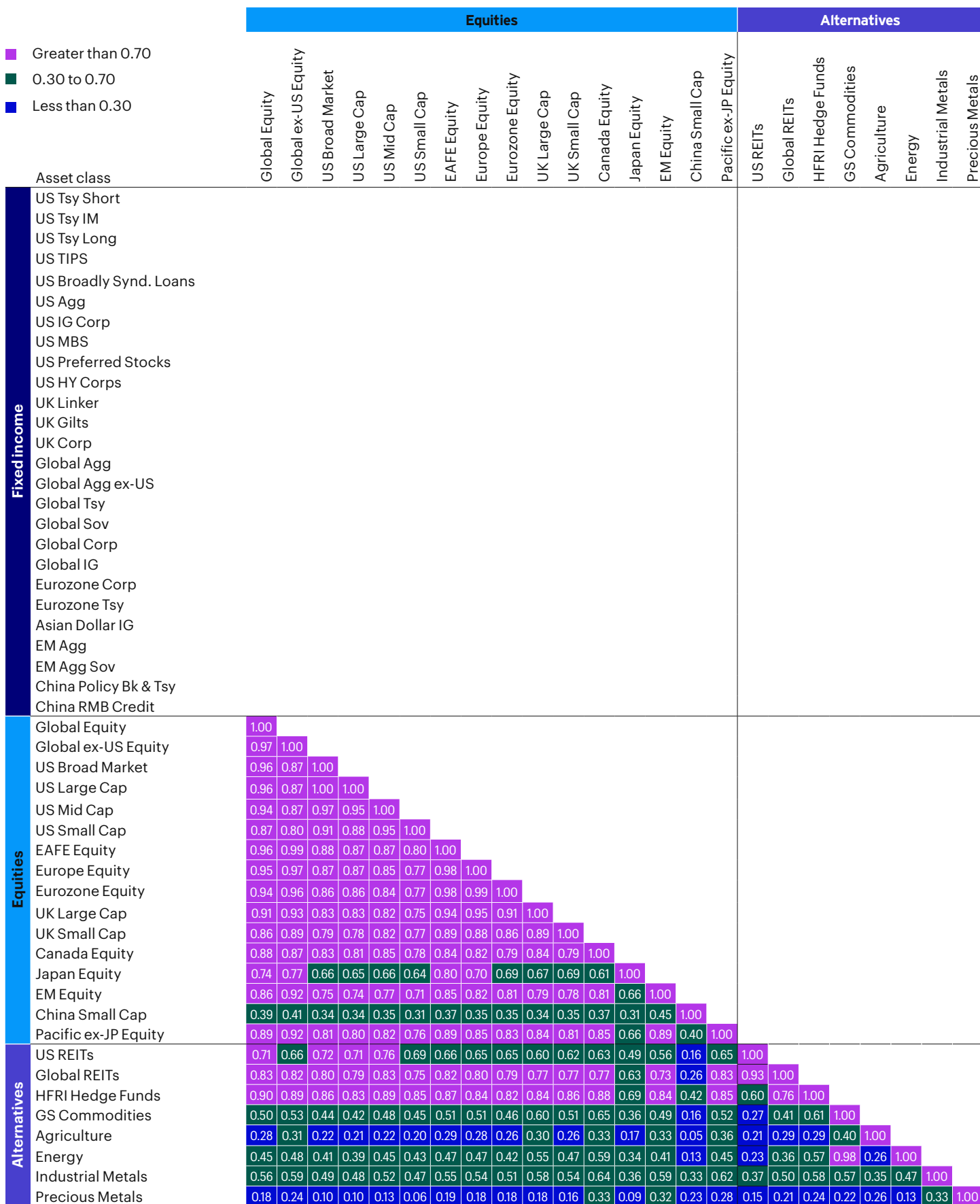
	Asset class	Index	Expected geometric return %	Expected arithmetic return %	Total Yield %	Expected risk %	Arithmetic return to risk ratio	
Fixed Income	US Tsy Short	BBG US Tsy Short	-0.6	0.1	-1.3	12.0	0.01	
	US Tsy IM	BBG US Tsy IM	0.4	1.0	0.3	11.2	0.09	
	US Tsy Long	BBG US Tsy Long	-0.5	0.5	0.4	13.9	0.04	
	US TIPS	BBG US TIPS	-0.5	0.3	-0.6	12.2	0.02	
	US Broadly Synd. Loans	CSFB Leverage Loan	3.0	4.0	3.1	14.8	0.27	
	US Agg	BBG US Agg	0.7	1.4	0.8	11.8	0.12	
	US IG Corp	BBG US IG	0.8	1.6	1.5	12.5	0.13	
	US MBS	BBG US MBS	1.0	1.8	0.9	12.2	0.14	
	US Preferred Stocks	BOA ML Fixed Rate Pref Securities	1.4	2.4	3.0	14.5	0.16	
	US HY Corps	BBG US HY	2.4	3.5	3.9	15.3	0.23	
	UK Linker	BofA ML UK Inflation-Linked Gilt	0.0	1.0	0.6	13.9	0.07	
	UK Gilts	BBG Sterling Agg Gilts	0.6	1.3	0.2	11.9	0.11	
	UK Corp	BBG Sterling Agg Non-Gilts Corp	1.0	2.4	1.6	16.6	0.14	
	Global Agg	BBG Global Agg	0.8	1.3	0.9	9.8	0.13	
	Global Agg ex-US	BBG Global Agg ex-US	0.7	1.1	0.9	9.3	0.12	
	Global Tsy	BBG Global Tsy	0.6	0.9	0.6	8.1	0.11	
	Global Sov	BBG Global Sov	0.2	1.1	1.0	12.9	0.08	
	Global Corp	BBG Global Corp	1.0	1.9	1.5	13.3	0.14	
	Global IG	BBG Global Corp IG	1.0	2.0	1.5	14.5	0.14	
	Eurozone Corp	BBG Euro Agg Credit Corp	0.9	2.0	1.2	15.1	0.13	
	Eurozone Tsy	BBG Euro Agg Gov Tsy	0.6	1.4	0.5	12.7	0.11	
	Asian Dollar IG	BOA ML AC IG	1.4	2.4	2.0	14.3	0.17	
	EM Agg	BBG EM Agg	2.3	3.8	3.5	17.8	0.21	
	EM Agg Sov	BBG EM Sov	2.5	3.8	3.7	16.6	0.23	
	China Policy Bk & Tsy	BBG China PB Tsy TR	0.7	1.5	0.2	13.3	0.11	
	China RMB Credit	BBG China Corporate	1.1	2.0	0.9	13.9	0.15	
	Equities	Global Equity	MSCI ACWI	4.6	6.2	0.7	18.7	0.33
		Global ex-US Equity	MSCI ACWI ex-US	4.9	6.6	1.3	19.3	0.34
US Broad Market		Russell 3000	4.5	6.6	0.3	21.2	0.31	
US Large Cap		S&P 500	4.4	6.3	0.3	20.6	0.31	
US Mid Cap		Russell Midcap	4.9	7.3	0.3	23.1	0.32	
US Small Cap		Russell 2000	6.2	9.2	-0.2	26.1	0.35	
EAFE Equity		MSCI EAFE	4.5	6.1	2.1	19.0	0.32	
Europe Equity		MSCI Europe	5.0	6.9	2.3	20.6	0.34	
Eurozone Equity		MSCI Euro ex-UK	4.8	6.8	2.3	21.2	0.32	
UK Large Cap		FTSE 100	5.5	7.8	2.3	22.3	0.35	
UK Small Cap		FTSE Small Cap UK	6.7	10.0	1.5	27.5	0.36	
Canada Equity		S&P TSX	3.1	5.5	0.2	23.0	0.24	
Japan Equity		MSCI JP	3.0	5.0	2.3	20.9	0.24	
EM Equity		MSCI EM	6.2	9.2	-0.3	25.9	0.35	
China Small Cap		CSI 500	7.3	13.3	-1.0	38.3	0.35	
Pacific ex-JP Equity		MSCI Pacific ex-JP	4.5	7.6	1.1	26.5	0.29	
US REITs		FTSE NAREIT Equity	4.5	6.4	0.8	20.3	0.32	
Global REITs		FTSE EPRA/NAREIT Developed	4.2	5.7	1.3	18.1	0.32	
Alternatives		HFRI Hedge Funds	HFRI HF	4.8	5.8	-	14.8	0.40
		GS Commodities	S&P GSCI	4.1	7.4	-	27.1	0.27
	Agriculture	S&P GSCI Agriculture	-0.5	2.3	-	24.3	0.09	
	Energy	S&P GSCI Energy	6.8	13.1	-	39.6	0.33	
	Industrial Metals	S&P GSCI Industrial Metals	3.7	6.7	-	25.6	0.26	
	Precious Metals	S&P GSCI Precious Metals	1.1	2.8	-	18.8	0.15	

Source: Invesco, estimates as of March 31, 2022. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 12 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 9: 10-year correlations (JPY)

		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			
Asset class		■ Greater than 0.70 ■ 0.30 to 0.70 ■ Less than 0.30																												
		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	0.43	1.00																											
	US Tsy Long	0.22	0.83	1.00																										
	US TIPS	0.09	0.62	0.60	1.00																									
	US Broadly Synd. Loans	-0.32	-0.38	-0.32	0.22	1.00																								
	US Agg	0.24	0.84	0.85	0.78	0.03	1.00																							
	US IG Corp	-0.02	0.44	0.52	0.71	0.47	0.83	1.00																						
	US MBS	0.35	0.86	0.74	0.63	-0.16	0.87	0.56	1.00																					
	US Preferred Stocks	-0.08	0.06	0.08	0.31	0.34	0.31	0.54	0.12	1.00																				
	US HY Corps	-0.21	-0.20	-0.15	0.37	0.84	0.25	0.64	0.05	0.53	1.00																			
	UK Linker	-0.02	0.23	0.29	0.59	0.39	0.48	0.57	0.31	0.33	0.47	1.00																		
	UK Gilts	0.08	0.33	0.35	0.53	0.21	0.51	0.51	0.39	0.25	0.32	0.84	1.00																	
	UK Corp	-0.09	0.04	0.05	0.44	0.54	0.36	0.61	0.19	0.41	0.61	0.76	0.86	1.00																
	Global Agg	0.18	0.60	0.51	0.71	0.15	0.75	0.71	0.62	0.39	0.38	0.64	0.68	0.61	1.00															
	Global Agg ex-US	0.14	0.45	0.34	0.60	0.17	0.59	0.59	0.47	0.37	0.38	0.62	0.67	0.63	0.97	1.00														
	Global Tsy	0.23	0.65	0.55	0.66	0.00	0.72	0.60	0.61	0.32	0.23	0.57	0.64	0.50	0.98	0.96	1.00													
	Global Sov	0.09	0.43	0.39	0.67	0.38	0.71	0.80	0.55	0.43	0.60	0.62	0.59	0.64	0.86	0.81	0.76	1.00												
	Global Corp	0.00	0.33	0.31	0.68	0.51	0.68	0.88	0.45	0.55	0.69	0.69	0.67	0.80	0.87	0.84	0.76	0.90	1.00											
	Global IG	-0.01	0.32	0.32	0.67	0.51	0.68	0.89	0.45	0.55	0.70	0.69	0.67	0.80	0.85	0.81	0.73	0.90	1.00	1.00										
	Eurozone Corp	0.02	0.16	0.06	0.47	0.38	0.39	0.56	0.25	0.42	0.56	0.59	0.60	0.72	0.82	0.88	0.74	0.80	0.87	0.86	1.00									
Eurozone Tsy	0.13	0.34	0.24	0.48	0.15	0.48	0.50	0.37	0.31	0.36	0.57	0.61	0.60	0.87	0.91	0.83	0.79	0.79	0.78	0.94	1.00									
Asian Dollar IG	0.02	0.47	0.45	0.74	0.47	0.76	0.84	0.62	0.35	0.60	0.56	0.50	0.56	0.67	0.56	0.56	0.82	0.80	0.81	0.56	0.52	1.00								
EM Agg	-0.08	0.15	0.16	0.57	0.62	0.53	0.77	0.38	0.43	0.81	0.52	0.40	0.58	0.60	0.55	0.46	0.83	0.80	0.80	0.64	0.53	0.82	1.00							
EM Agg Sov	-0.07	0.18	0.20	0.56	0.57	0.55	0.77	0.39	0.43	0.76	0.52	0.41	0.57	0.62	0.57	0.49	0.86	0.79	0.79	0.63	0.54	0.79	0.98	1.00						
China Policy Bk & Tsy	0.05	0.12	0.07	0.16	-0.03	0.13	0.11	0.16	0.08	0.05	0.16	0.23	0.22	0.28	0.31	0.29	0.14	0.20	0.18	0.24	0.25	0.05	0.11	0.14	1.00					
China RMB Credit	0.02	0.07	0.00	0.16	0.07	0.10	0.12	0.12	0.06	0.11	0.21	0.25	0.27	0.29	0.33	0.28	0.17	0.22	0.21	0.28	0.28	0.08	0.17	0.19	0.92	1.00				
Equities	Global Equity	-0.19	-0.30	-0.27	0.20	0.63	0.05	0.42	-0.10	0.49	0.77	0.40	0.35	0.62	0.34	0.39	0.20	0.52	0.60	0.60	0.61	0.43	0.37	0.65	0.63	0.16	0.21			
	Global ex-US Equity	-0.14	-0.26	-0.26	0.23	0.62	0.08	0.44	-0.05	0.49	0.77	0.43	0.39	0.66	0.41	0.47	0.28	0.57	0.65	0.65	0.68	0.51	0.41	0.69	0.66	0.19	0.24			
	US Broad Market	-0.22	-0.33	-0.28	0.15	0.61	0.01	0.37	-0.14	0.46	0.73	0.34	0.28	0.54	0.23	0.27	0.09	0.43	0.50	0.50	0.49	0.31	0.30	0.57	0.55	0.13	0.16			
	US Large Cap	-0.22	-0.33	-0.27	0.15	0.59	0.00	0.36	-0.14	0.46	0.71	0.34	0.28	0.53	0.23	0.27	0.10	0.42	0.49	0.49	0.48	0.31	0.29	0.56	0.55	0.13	0.16			
	US Mid Cap	-0.24	-0.33	-0.28	0.18	0.68	0.03	0.42	-0.13	0.48	0.78	0.35	0.28	0.54	0.25	0.29	0.11	0.44	0.54	0.54	0.50	0.31	0.34	0.61	0.58	0.13	0.18			
	US Small Cap	-0.22	-0.36	-0.34	0.09	0.62	-0.05	0.31	-0.18	0.41	0.71	0.26	0.22	0.48	0.16	0.21	0.03	0.34	0.43	0.42	0.23	0.25	0.51	0.48	0.12	0.16				
	EAFE Equity	-0.15	-0.26	-0.26	0.20	0.60	0.07	0.41	-0.06	0.48	0.74	0.42	0.38	0.65	0.39	0.45	0.25	0.54	0.63	0.63	0.66	0.50	0.38	0.65	0.63	0.16	0.20			
	Europe Equity	-0.14	-0.25	-0.26	0.18	0.58	0.06	0.40	-0.07	0.45	0.72	0.43	0.40	0.66	0.39	0.45	0.26	0.55	0.62	0.62	0.67	0.51	0.36	0.64	0.62	0.15	0.19			
	Eurozone Equity	-0.12	-0.23	-0.24	0.18	0.55	0.08	0.40	-0.05	0.46	0.71	0.42	0.38	0.63	0.40	0.46	0.27	0.56	0.62	0.62	0.68	0.53	0.36	0.64	0.62	0.14	0.17			
	UK Large Cap	-0.18	-0.31	-0.32	0.16	0.61	0.00	0.35	-0.10	0.42	0.70	0.42	0.41	0.68	0.32	0.39	0.19	0.46	0.57	0.57	0.61	0.42	0.32	0.59	0.57	0.18	0.22			
	UK Small Cap	-0.24	-0.32	-0.32	0.17	0.70	0.02	0.41	-0.10	0.43	0.76	0.44	0.43	0.72	0.32	0.38	0.18	0.46	0.59	0.59	0.60	0.40	0.36	0.60	0.57	0.16	0.21			
	Canada Equity	-0.17	-0.30	-0.26	0.27	0.67	0.05	0.42	-0.11	0.44	0.74	0.40	0.32	0.58	0.34	0.39	0.20	0.47	0.59	0.58	0.57	0.38	0.38	0.63	0.60	0.14	0.19			
	Japan Equity	-0.14	-0.22	-0.22	0.15	0.47	0.04	0.32	-0.05	0.41	0.58	0.26	0.22	0.46	0.24	0.28	0.14	0.37	0.44	0.44	0.43	0.30	0.30	0.48	0.45	0.13	0.17			
	EM Equity	-0.09	-0.20	-0.21	0.27	0.58	0.12	0.44	0.00	0.45	0.73	0.39	0.35	0.59	0.43	0.48	0.31	0.56	0.63	0.63	0.65	0.49	0.44	0.69	0.66	0.25	0.30			
	China Small Cap	0.04	-0.02	-0.06	0.20	0.24	0.12	0.25	0.07	0.14	0.34	0.23	0.23	0.31	0.20	0.20	0.13	0.28	0.32	0.32	0.29	0.23	0.32	0.35	0.31	0.19	0.23			
Pacific ex-JP Equity	-0.14	-0.23	-0.21	0.30	0.60	0.11	0.46	-0.04	0.47	0.73	0.39	0.36	0.62	0.41	0.46	0.28	0.53	0.64	0.64	0.65	0.47	0.43	0.67	0.64	0.20	0.24				
Alternatives	US REITs	-0.13	-0.07	0.02	0.33	0.54	0.25	0.48	0.08	0.50	0.68	0.40	0.33	0.47	0.36	0.35	0.26	0.52	0.54	0.54	0.44	0.33	0.43	0.57	0.58	0.10	0.09			
	Global REITs	-0.15	-0.11	-0.04	0.37	0.63	0.26	0.55	0.07	0.56	0.76	0.49	0.43	0.63	0.46	0.47	0.33	0.60	0.67	0.67	0.59	0.45	0.51	0.68	0.67	0.16	0.17			
	HFRI Hedge Funds	-0.22	-0.33	-0.31	0.23	0.73	0.04	0.46	-0.13	0.45	0.78	0.40	0.31	0.62	0.31	0.35	0.16	0.47	0.60	0.60	0.56	0.36	0.39	0.63	0.60	0.16	0.23			
	GS Commodities	-0.18	-0.35	-0.39	0.13	0.53	-0.18	0.12	-0.28	0.19	0.46	0.24	0.14	0.36																

Figure 9: 10-year correlations (JPY)

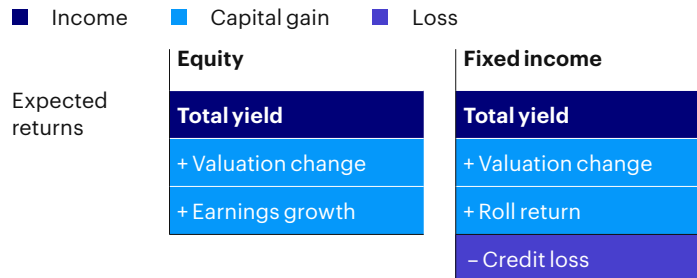


Source: Invesco, estimates as of March 31, 2022. Proxies listed in Figure 8. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 12 for information about our CMA methodology. These estimates reflect the views of Invesco Investment 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 10). 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 10: 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 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.

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 full amount 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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