2024 Long-Term Capital Market Assumptions

Invesco Solutions | Japanese yen (JPY) | Q1 Update

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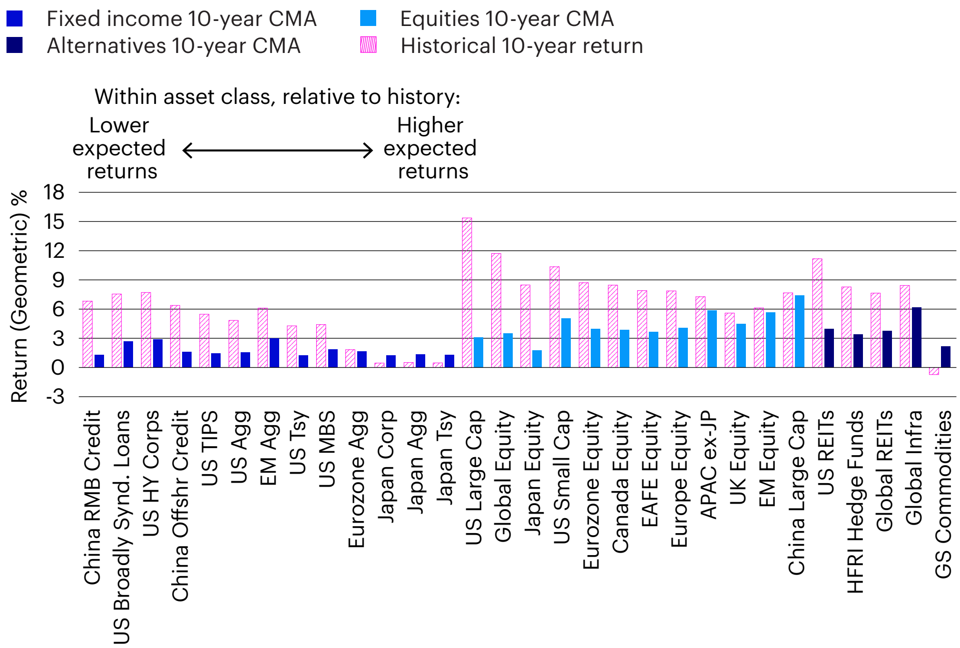
Executive Summary

Alessio de Longis, CFA®
Senior Portfolio Manager,
Head of Investments,
Invesco Solutions

Invesco Solutions provides forecasts for 170+ assets in over 20 currencies, including 10 private assets. For additional CMA data, views, or analysis, please reach out to your Invesco representative.

- The 21.5% rally of US large-cap equities over the past four months, driven by the recent AI boom, has been nothing short of spectacular. Typically, such velocity occurs after markets have experienced a recession and have begun pricing in the early stages of a recovery, with the only other instance in the post-WW2 era (1945) coinciding with the dot-com bubble.
- Concentration risk is one that occurs in many individual regional equity markets and rarely causes systemic issues for markets globally. However, it has led to significant sell-offs, like during the early 2000s in the US. Given the size of the US market currently, concentration in a handful of equities like the "Magnificent 7" poses risks for global multi-asset investors as drawdowns can occur even without a specific catalyst.
- While we are not claiming that this instance of concentration risk will be a harbinger of the next recession, it is a risk we are intently focusing on and diversifying away from through non-market capitalization weighted equity strategies, like factors and global equities outside of the US.

Figure 1: Expectations relative to historical average (JPY)



Source: Invesco, estimates as of December 31, 2023. Proxies listed in **Figure 8**. These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 11 for information about our CMA methodology. These estimates reflect the views of Invesco Solutions; the views of other investment teams at Invesco may differ from those presented here.

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Asset Allocation Insights

Scott Hixon, CFA®
Senior Portfolio Manager,
Head of Research,
Invesco Global Asset Allocation

Marc Shmerling, CFA®
Director, Investment Research
Invesco Solutions

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

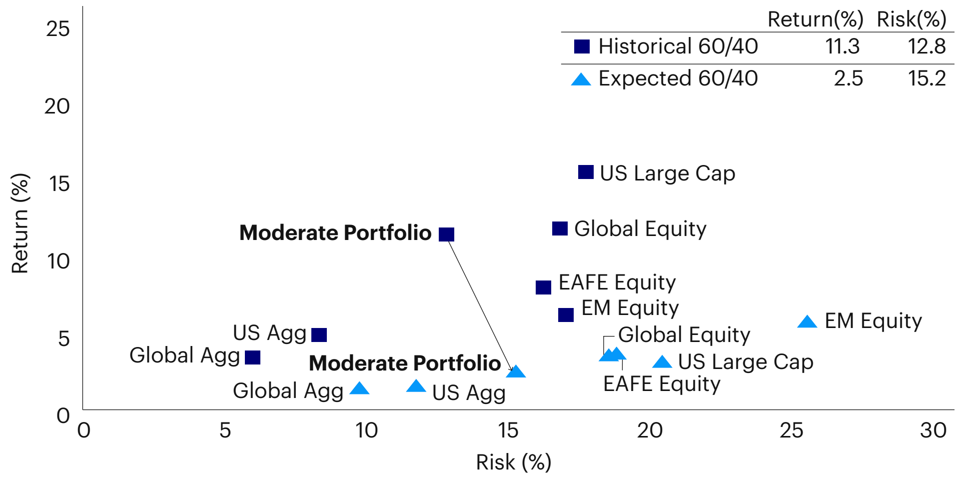
Strategic perspective

The 21.5% rally of US large-cap equities over the past four months[1], driven by the recent AI boom, has been nothing short of spectacular. Typically, such velocity occurs after markets have experienced a recession and have begun pricing in the early stages of a recovery, with the only other instance in the post-WW2 era (1945) coinciding with the Dot-com bubble[2] after the Fed had fanned the flames of equity markets by cutting rates in an expansion. That was also the last time the upper bound of the federal funds target rate was at 5.5% and it was not soon after cutting that the Fed had to resume hiking once again. While there was no recession in 2023, the year prior came close enough to triggering a technical recession[3] that equity markets had a period of weakness to recover from once recession risk began to fade. In fact, it was only in the second half of 2023 that economists began reducing their forecast of a near-term recession, reducing it from 65% to 40% today[4]. So, are US equities merely recovering from a painful "almost-recession" or are they in a bubble? It is certainly difficult to tell. What is clear is that there are risks forming beyond the US equity market for multi-asset investors globally.

Concentration risk is one that occurs in many individual regional equity markets and rarely causes systemic issues for markets globally, however it has led to significant selloffs like during the early 2000's in the US. For example, the top 10 largest stocks within Germany are 60% of the total market cap, while concentration in Taiwan is even more pronounced with the single largest security weighing over 40% of its market cap. US equities are much less concentrated than these markets, with the top 10 stocks weighing a collective 33%, however the US is by far the largest equity market at around $47 trillion in market cap, while Germany and Taiwan, despite being ranked 9th and 11th globally in terms of market size, are only $1.5 trillion and $1.2 trillion, respectively. To put it into perspective for a global, moderate investor, US large-cap equities are 60% of global equity market capitalization, and thus 36% of a global 60/40 portfolio. Indeed, the stocks known as the "Magnificent 7"[5] are now 28% of the US equity market with a combined price-to-earnings (P/E) ratio of 38x, compared to the US market with a P/E of 22x, and a world ex-US P/E of 14.5x. Continuing this math, a global moderate investor now has seven securities with very high valuations that take up roughly 10% of their total multi-asset portfolio, are found in one industry[6], and are based in one country. While we are not claiming that this instance of concentration risk will be a harbinger of the next recession, it is a risk we are intently focusing on and diversifying away from through non-market capitalization weighted equity strategies, like factors, such as smaller capitalization size and value, and global equities outside of the US. Whether we are witnessing a post-recession rally or the blowing of a large bubble, equity investors can both position themselves for a recovery and reduce concentration risk at the same time.

1 Source: Bloomberg L.P., four months ending Feb. 29th, 2024.
2 We thank Jim Reid and Henry Allen of Deutsche Bank for highlighting this analysis.
3 A technical recession is when there are two consecutive quarters of negative growth, however many other indicators, like strong labor markets, industrial production, and consumption, prevented the NBER from calling a recession in 2022.
4 As measured by consensus forecasts from Bloomberg Economics as of Feb. 29th, 2024.
5 Composed of Microsoft, Apple, Amazon, Alphabet, Meta, Nvidia, and Tesla.
6 All of the Magnificent 7 can be considered technology companies despite being labeled within the communications or consumer discretionary sectors.

Figure 2: Comparing historical and expected risk and return for a moderate 60/40 portfolio (JPY)



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1Q24 CMA Observations (10Y, USD)

Equities: Our approach to capital market assumptions (CMAs) aims to highlight deviations from reasonable long-term estimates of expected returns, which the US large-cap equity market has defied for quite some time. Due to high valuations, our estimate for the US over the next ten years is expected to be around half of the returns exhibited over the past decade, 6.4% versus 12%. Over the past quarter, our CMAs for global equities are lower by roughly 0.5% due to higher valuations within the US. Two possible options for diversifying a portfolio's equity exposure include investing in global equities outside of the US, which are expected to return 7.5%, and US small-cap equities which have a CMA of 8.3%. Our CMAs for emerging markets (EM) and China are even higher, 9% and 10.7%, due to faster growth rates than in developed markets and improved valuations over the past quarter.

Fixed Income: This quarter, our fixed income CMAs are lower by around 0.9% due to lower current yields, a negative valuation change from an expected shift up in the yield curve, and slightly higher expected spreads. However, the longer-term story surrounding fixed income remains the same: Our CMAs for fixed income are higher than they have been in quite a while. With expected returns of around 4%, fixed income is significantly more attractive relative to equities as well, especially when compared to higher yielding credit assets. Of note is that we have recently instituted a new methodology for our cash CMA, which is now based on an estimate of the long-term real rate derived from the forward market curve after adjusting for the term premium.

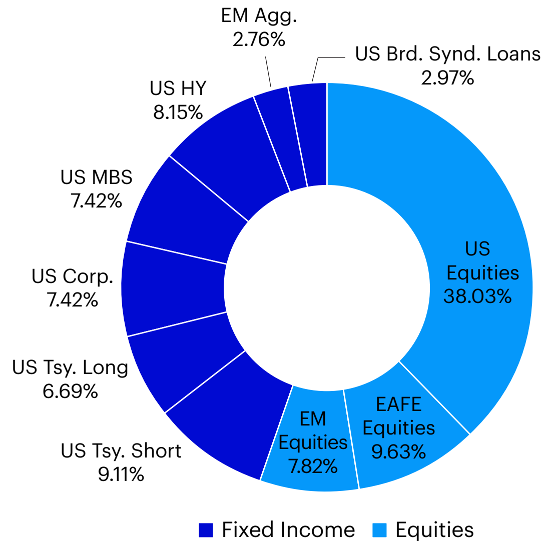
Our new cash CMA has the US dollar expected to yield 3.5%, which is around 1.5% lower than previous estimates. This has resulted in a reduction in the CMA for floating rate assets, like broadly syndicated loans, which rely on our cash estimate within their building blocks.

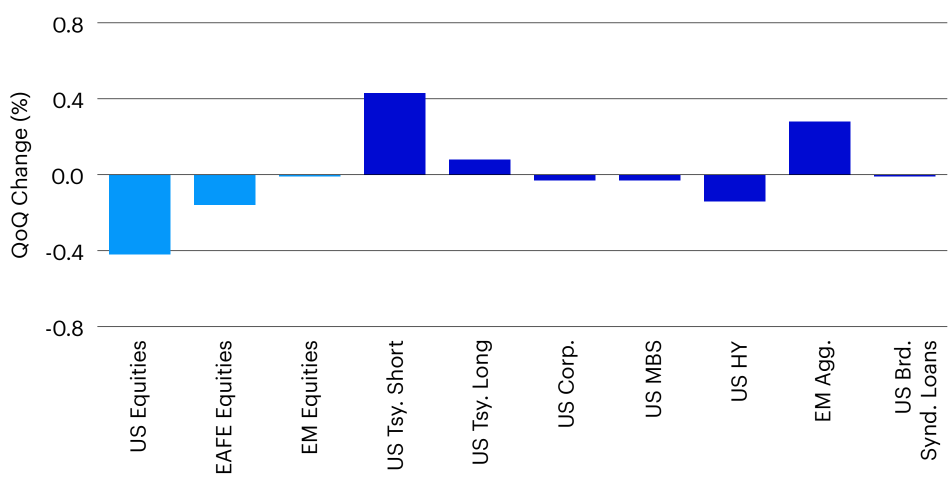
The strategic asset allocation (SAA) displayed here is denominated in USD and is representative of our CMA's applied in a hypothetical portfolio context for global investors.

There are many considerations for investors beyond CMA's when it comes to asset allocation decisions. To learn more about our investment process or discuss your own portfolio needs, please reach out to your Invesco Solutions representative.

Strategic asset allocation trends:

Figure 3: 1Q24 SAA rebalance (USD)





Source: Invesco Solutions, as of December 31, 2023. Proxies listed in **Figure 8**. These estimates reflect the views of Invesco 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:** Compared to a global 60/40 benchmark, our strategic portfolio (5-10Y) is slightly overweight fixed income relative to equities. Overall, our portfolio has not shifted significantly into or out of any asset classes this quarter.
- **Within equities:** We are overweight EM and US large-cap equities while underweight DM ex-US equities due to a lower expected risk/return ratio. Slight reduction in US equity exposure this quarter.
- **Within fixed income:** Presently overweight both Treasuries and risky credit. Neutral duration compared to our benchmark. Slight increase in short-term Treasuries and EM aggregate bonds.

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

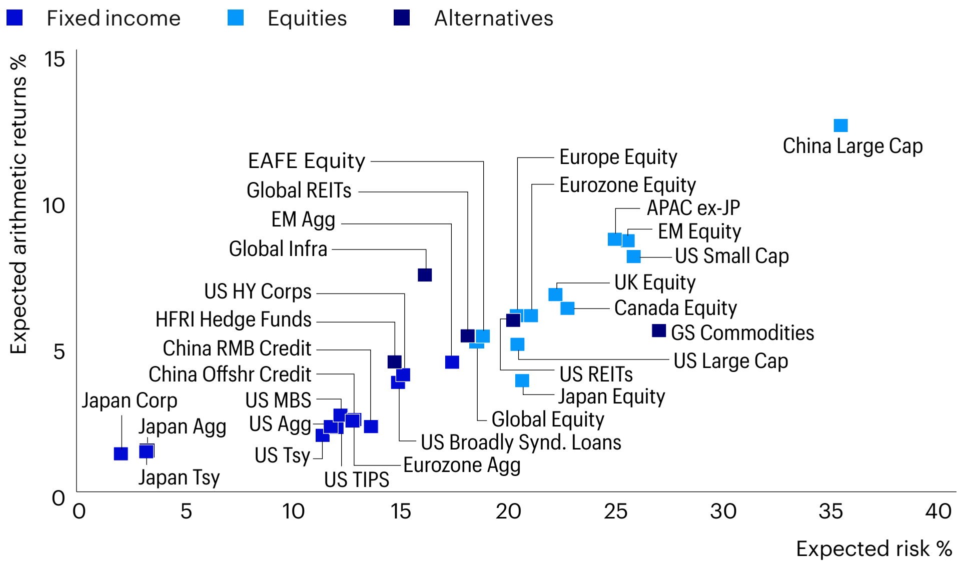

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Figure 5: CMA difference: 5-year minus 10-year assumptions (JPY)

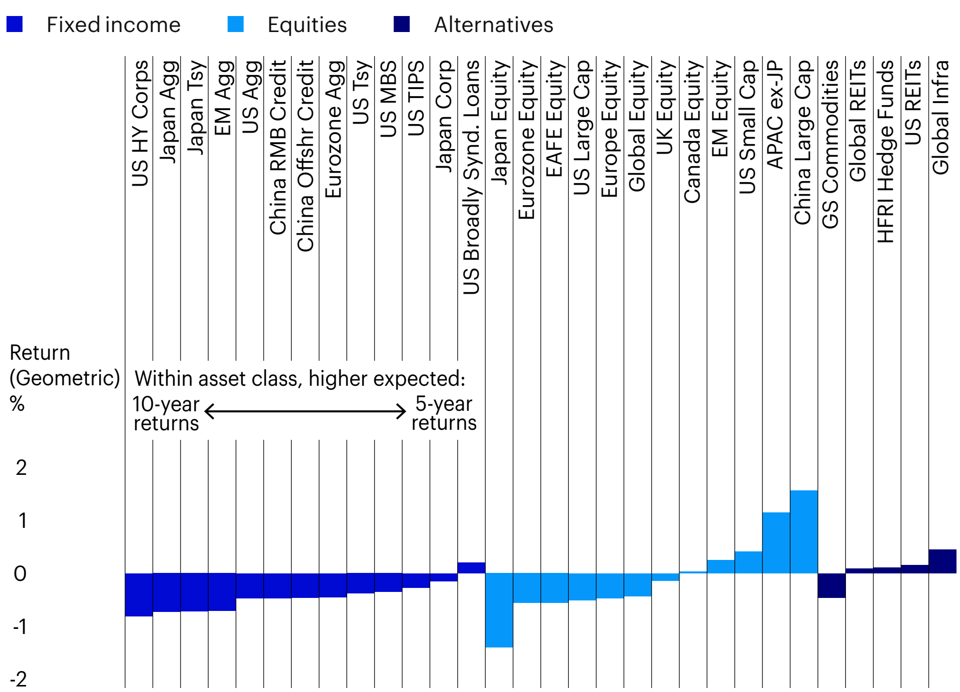

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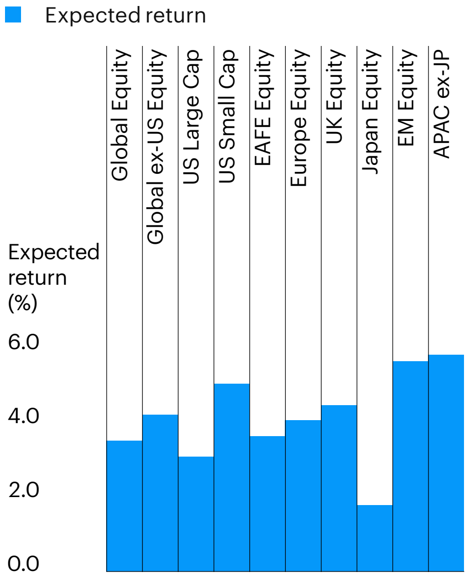
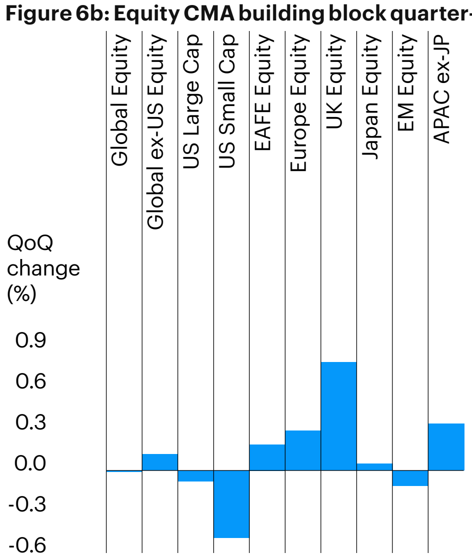
Figure 6a: Equity CMA building block contribution (JPY) (%)



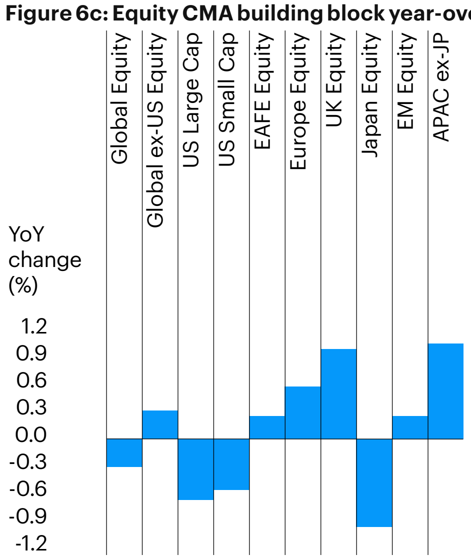
	Dividend yield	Buyback yield	LT earnings growth	Expected inflation	Valuation change	Currency Adj. (IRP)
Global Equity	2.00	0.74	1.95	2.04	-0.42	-2.83
Global ex-US Equity	3.00	0.00	2.00	1.66	-0.35	-2.10
US Large Cap	1.41	1.17	1.93	2.27	-0.46	-3.27
US Small Cap	1.47	0.78	3.38	2.27	0.35	-3.27
EAFE Equity	3.11	0.00	1.42	1.33	-0.71	-1.51
Europe Equity	3.23	0.00	1.52	1.89	-0.83	-1.74
UK Equity	3.86	0.00	1.71	2.14	-0.33	-2.92
Japan Equity	2.24	0.00	0.78	-0.79	-0.43	0.00
EM Equity	2.72	0.00	3.38	2.32	0.50	-3.32
APAC ex-JP	2.71	0.00	3.10	2.30	0.96	-3.27

Figure 6b: 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	-0.15	-0.08	0.02	0.09	-0.38	0.50
Global ex-US Equity	-0.18	0.00	-0.01	0.13	-0.26	0.44
US Large Cap	-0.12	-0.14	0.03	0.06	-0.45	0.55
US Small Cap	-0.20	-0.09	0.04	0.06	-0.85	0.55
EAFE Equity	-0.15	0.00	0.02	0.03	-0.21	0.49
Europe Equity	-0.18	0.00	0.01	0.04	-0.28	0.69
UK Equity	-0.06	0.00	0.03	0.07	0.03	0.72
Japan Equity	-0.01	0.00	0.03	-0.08	0.11	0.00
EM Equity	-0.28	0.00	-0.06	0.37	-0.37	0.22
APAC ex-JP	-0.05	0.00	-0.07	0.30	-0.12	0.28

Figure 6c: 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	-0.24	-0.02	0.13	-0.03	-0.42	0.26
Global ex-US Equity	-0.13	0.00	0.23	-0.09	-0.13	0.42
US Large Cap	-0.25	-0.07	0.07	0.00	-0.60	0.19
US Small Cap	-0.06	-0.01	0.20	0.00	-0.88	0.19
EAFE Equity	-0.03	0.00	0.13	-0.09	-0.24	0.48
Europe Equity	0.08	0.00	0.29	-0.02	-0.42	0.64
UK Equity	0.04	0.00	0.21	-0.06	0.48	0.32
Japan Equity	-0.36	0.00	-0.44	-0.26	0.09	0.00
EM Equity	-0.46	0.00	0.46	-0.09	0.06	0.28
APAC ex-JP	-0.12	0.00	0.74	-0.08	0.23	0.27

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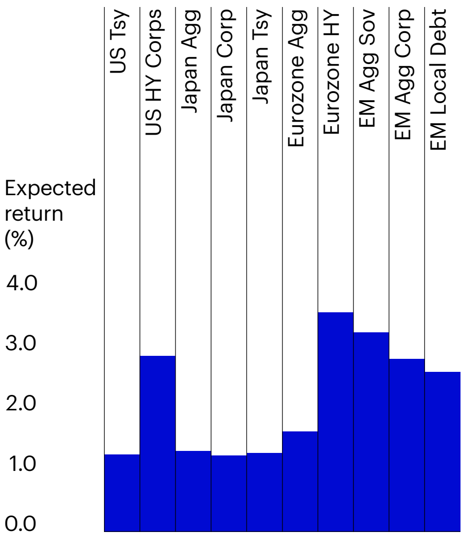
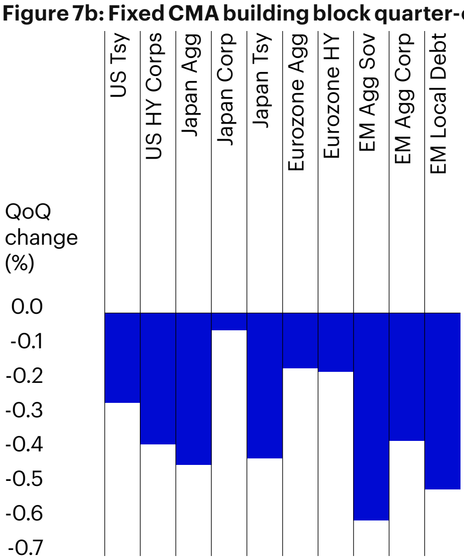
Figure 7a: Fixed CMA building block contribution (JPY) (%)



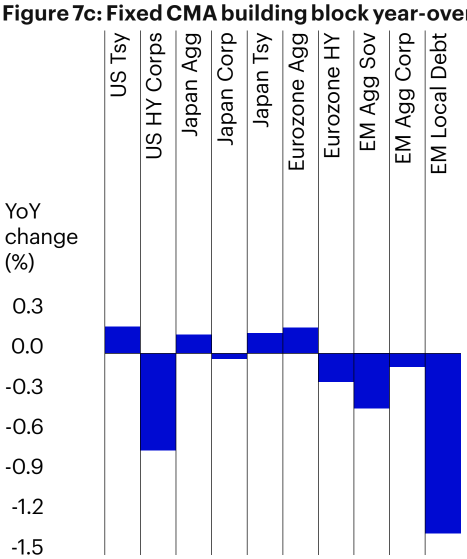
	Average yield	Roll return	Valuation change (yield curve)	Valuation change (OAS)	Credit loss	Currency Adj. (IRP)
US Tsy	3.98	0.45	0.12	0.00	0.00	-3.27
US HY Corps	8.25	-0.03	0.18	-0.54	-1.69	-3.27
Japan Agg	1.12	1.23	-0.99	-0.01	0.00	0.00
Japan Corp	1.02	0.65	-0.24	0.07	-0.24	0.00
Japan Tsy	1.07	1.23	-0.99	0.00	0.00	0.00
Eurozone Agg	2.90	0.44	0.09	-0.08	-0.30	-1.39
Eurozone HY	6.47	-0.14	0.25	-0.29	-1.26	-1.39
EM Agg Sov	7.34	0.42	0.04	-0.07	-1.16	-3.27
EM Agg Corp	7.40	0.28	0.15	-0.56	-1.14	-3.27
EM Local Debt	6.37	0.56	-0.18	0.00	0.00	-4.11

Figure 7b: 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	-0.33	0.03	-0.52	0.00	0.00	0.55
US HY Corps	-0.48	0.03	-0.36	-0.12	0.00	0.55
Japan Agg	0.48	0.14	-1.05	0.00	0.00	0.00
Japan Corp	0.42	0.01	-0.48	0.01	-0.01	0.00
Japan Tsy	0.50	0.14	-1.05	0.00	0.00	0.00
Eurozone Agg	-0.28	0.11	-0.64	-0.06	0.04	0.66
Eurozone HY	-0.46	0.02	-0.27	-0.13	0.00	0.66
EM Agg Sov	-0.45	0.06	-0.59	-0.18	0.00	0.55
EM Agg Corp	-0.47	0.03	-0.44	-0.12	0.09	0.55
EM Local Debt	0.00	-0.09	-0.57	0.00	0.00	0.14

Figure 7c: 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	0.30	0.17	-0.46	0.00	0.00	0.19
US HY Corps	-0.19	-0.05	-0.38	-0.39	0.10	0.19
Japan Agg	0.26	0.36	-0.48	0.00	0.00	0.00
Japan Corp	0.33	-0.03	-0.36	-0.03	0.05	0.00
Japan Tsy	0.27	0.36	-0.48	0.00	0.00	0.00
Eurozone Agg	-0.06	0.15	-0.59	-0.07	0.05	0.72
Eurozone HY	-0.44	-0.08	-0.19	-0.29	0.06	0.72
EM Agg Sov	0.09	0.03	-0.46	-0.27	0.01	0.19
EM Agg Corp	-0.10	0.18	-0.42	-0.44	0.50	0.19
EM Local Debt	-0.19	-0.18	-0.47	0.00	0.00	-0.50

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Figure 8: 10-year asset class expected returns, risk, and return 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	0.2	0.9	1.9	12.1	0.08
	US Tsy IM	BBG US Tsy IM	0.7	1.3	0.8	11.2	0.12
	US Tsy Long	BBG US Tsy Long	0.5	1.4	0.9	13.9	0.10
	US TIPS	BBG US TIPS	1.5	2.2	1.1	12.0	0.18
	US Broadly Synd. Loans	CSFB Leverage Loan	2.7	3.7	5.3	14.8	0.25
	US Agg	BBG US Agg	1.5	2.2	1.3	11.7	0.19
	US IG Corp	BBG US IG	1.7	2.4	1.8	12.4	0.20
	US MBS	BBG US MBS	1.9	2.6	1.4	12.2	0.21
	US Preferred Stocks	BOA ML Fixed Rate Pref Securities	2.0	3.0	3.4	14.4	0.20
	US HY Corps	BBG US HY	2.9	4.0	4.3	15.1	0.26
	UK Linker	BofA ML UK Inflation-Linked Gilt	0.3	1.4	1.1	14.7	0.09
	UK Gilts	BBG Sterling Agg Gilts	1.7	2.4	0.9	12.0	0.20
	UK Corp	BBG Sterling Agg Non-Gilts Corp	2.4	3.6	2.2	16.4	0.22
	Global Agg	BBG Global Agg	1.4	1.9	1.2	9.7	0.19
	Global Agg ex-US	BBG Global Agg ex-US	1.5	1.9	1.3	9.2	0.21
	Global Tsy	BBG Global Tsy	1.5	1.8	1.0	8.1	0.22
	Global Sov	BBG Global Sov	1.4	2.1	1.5	12.6	0.17
	Global Corp	BBG Global Corp	1.9	2.7	2.0	13.0	0.21
	Global IG	BBG Global Corp IG	1.9	2.9	2.0	14.0	0.21
	Eurozone Corp	BBG Euro Agg Credit Corp	1.6	2.6	2.2	14.8	0.18
	Eurozone Tsy	BBG Euro Agg Gov Tsy	1.7	2.5	1.3	12.6	0.20
	Asian Dollar IG	BOA ML AC IG	1.9	2.9	2.1	14.2	0.20
	EM Agg	BBG EM Agg	3.0	4.4	3.8	17.4	0.25
	EM Agg Sov	BBG EM Sov	3.3	4.5	4.1	16.2	0.28
	China Policy Bk & Tsy	BBG China PB Tsy TR	0.9	1.8	0.5	12.9	0.14
	China RMB Credit	BBG China Corporate	1.3	2.2	1.2	13.6	0.16
Equities	Global Equity	MSCI ACWI	3.5	5.1	-0.1	18.5	0.28
	Global ex-US Equity	MSCI ACWI ex-US	4.2	5.9	0.9	19.1	0.31
	US Broad Market	Russell 3000	3.1	5.2	-0.6	21.0	0.25
	US Large Cap	S&P 500	3.1	5.0	-0.7	20.4	0.25
	US Mid Cap	Russell Midcap	4.0	6.3	-0.4	22.8	0.28
	US Small Cap	Russell 2000	5.1	8.0	-1.0	25.8	0.31
	EAFE Equity	MSCI EAFE	3.7	5.3	1.6	18.8	0.28
	Europe Equity	MSCI Europe	4.1	6.0	1.5	20.4	0.29
	Eurozone Equity	MSCI Euro ex-UK	4.0	6.0	1.7	21.0	0.29
	UK Large Cap	FTSE 100	4.2	6.4	1.1	22.0	0.29
	UK Small Cap	FTSE Small Cap UK	5.4	8.6	1.1	27.1	0.32
	Canada Equity	S&P TSX	3.9	6.2	0.7	22.7	0.27
	Japan Equity	MSCI JP	1.8	3.8	2.2	20.6	0.18
	EM Equity	MSCI EM	5.7	8.6	-0.6	25.5	0.34
	China Small Cap	CSI 500	6.5	12.3	-0.2	37.6	0.33
	Pacific ex-JP Equity	MSCI Pacific ex-JP	4.9	7.9	1.0	26.1	0.30
Alternatives	US REITs	FTSE NAREIT Equity	4.0	5.8	0.7	20.2	0.29
	Global REITs	FTSE EPRA/NAREIT Developed	3.8	5.3	1.3	18.1	0.29
	HFRI Hedge Funds	HFRI HF	3.4	4.4	-	14.7	0.30
	GS Commodities	S&P GSCI	2.2	5.5	-	27.0	0.20
	Agriculture	S&P GSCI Agriculture	0.7	3.4	-	24.0	0.14
	Energy	S&P GSCI Energy	3.8	10.3	-	39.5	0.26
	Industrial Metals	S&P GSCI Industrial Metals	1.4	4.4	-	25.3	0.17
	Precious Metals	S&P GSCI Precious Metals	-4.4	-2.7	-	18.6	-0.15

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Figure 9: 10-year correlations (JPY)

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

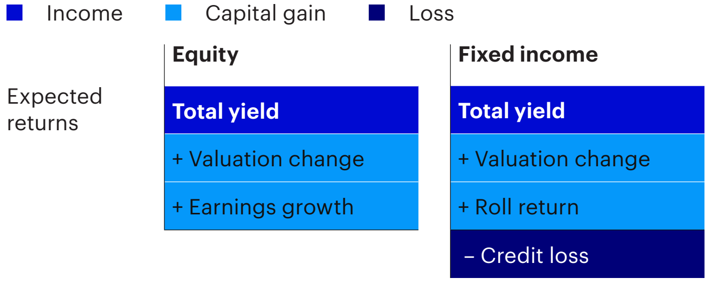
	Asset class	US Tsy IM	US TIPS	US Broadly Synd. Loans	US Agg	US IG Corp	US HY Corps	US Muni	US HY Muni	Global Agg	Global Agg ex-US	EM Agg	China RMB Credit	Global Equity	China Large Cap	US Large Cap	US Mid Cap	US Small Cap	EAFE Equity	UK Large Cap	Canada Equity	Japan Equity	EM Equity	Global REITs	Global Infra	GS Commodities	HFRI Hedge Funds
		Fixed income												Equities										Alternatives			
Fixed income	US Tsy IM	1.00																									
Fixed income	US TIPS	0.69	1.00																								
Fixed income	US Broadly Synd. Loans	-0.26	0.27	1.00																							
Fixed income	US Agg	0.88	0.79	0.10	1.00																						
Fixed income	US IG Corp	0.62	0.76	0.43	0.89	1.00																					
Fixed income	US HY Corps	0.06	0.52	0.81	0.42	0.69	1.00																				
Fixed income	US Muni	0.61	0.64	0.29	0.80	0.78	0.51	1.00																			
Fixed income	US HY Muni	0.37	0.56	0.54	0.62	0.68	0.59	0.85	1.00																		
Fixed income	Global Agg	0.72	0.76	0.19	0.86	0.83	0.52	0.69	0.55	1.00																	
Fixed income	Global Agg ex-US	0.60	0.68	0.20	0.73	0.73	0.52	0.59	0.48	0.98	1.00																
Fixed income	EM Agg	0.35	0.66	0.62	0.65	0.83	0.82	0.66	0.67	0.72	0.68	1.00															
Fixed income	China RMB Credit	0.32	0.32	0.09	0.40	0.36	0.22	0.33	0.28	0.49	0.50	0.32	1.00														
Equities	Global Equity	0.02	0.42	0.63	0.34	0.57	0.81	0.38	0.45	0.53	0.56	0.71	0.29	1.00													
Equities	China Large Cap	0.01	0.16	0.27	0.17	0.29	0.34	0.15	0.22	0.27	0.29	0.37	0.32	0.43	1.00												
Equities	US Large Cap	0.01	0.39	0.59	0.32	0.53	0.77	0.34	0.40	0.45	0.46	0.62	0.24	0.97	0.36	1.00											
Equities	US Mid Cap	-0.03	0.39	0.67	0.31	0.55	0.82	0.37	0.44	0.44	0.45	0.66	0.24	0.95	0.36	0.96	1.00										
Equities	US Small Cap	-0.09	0.29	0.61	0.22	0.44	0.75	0.27	0.35	0.34	0.36	0.56	0.22	0.87	0.34	0.89	0.95	1.00									
Equities	EAFE Equity	0.04	0.40	0.60	0.34	0.56	0.78	0.39	0.44	0.55	0.59	0.72	0.31	0.96	0.43	0.88	0.87	0.80	1.00								
Equities	UK Large Cap	-0.05	0.33	0.61	0.24	0.47	0.74	0.32	0.41	0.46	0.51	0.64	0.28	0.90	0.41	0.82	0.82	0.75	0.95	1.00							
Equities	Canada Equity	-0.03	0.41	0.66	0.29	0.53	0.78	0.33	0.44	0.48	0.51	0.68	0.27	0.89	0.41	0.84	0.87	0.80	0.86	0.86	1.00						
Equities	Japan Equity	0.07	0.34	0.48	0.33	0.50	0.65	0.35	0.36	0.46	0.47	0.61	0.29	0.80	0.35	0.73	0.72	0.68	0.84	0.72	0.67	1.00					
Equities	EM Equity	0.05	0.40	0.57	0.34	0.55	0.73	0.36	0.45	0.55	0.59	0.74	0.38	0.85	0.57	0.72	0.75	0.68	0.85	0.79	0.81	0.70	1.00				
Alternatives	Global REITs	0.13	0.52	0.63	0.45	0.65	0.80	0.47	0.54	0.58	0.58	0.74	0.29	0.86	0.32	0.82	0.86	0.78	0.84	0.79	0.80	0.68	0.74	1.00			
Alternatives	Global Infra	0.15	0.52	0.57	0.44	0.62	0.75	0.49	0.53	0.58	0.59	0.71	0.27	0.84	0.33	0.80	0.80	0.69	0.83	0.81	0.82	0.64	0.73	0.84	1.00		
Alternatives	GS Commodities	-0.29	0.12	0.52	-0.13	0.09	0.46	-0.01	0.20	0.11	0.19	0.31	0.10	0.49	0.18	0.42	0.47	0.44	0.50	0.60	0.62	0.34	0.47	0.39	0.47	1.00	
Alternatives	HFRI Hedge Funds	-0.15	0.32	0.73	0.19	0.49	0.78	0.29	0.46	0.38	0.41	0.65	0.26	0.89	0.47	0.83	0.89	0.85	0.86	0.83	0.88	0.71	0.82	0.77	0.74	0.61	1.00

Source: Invesco, estimates as of December 31, 2023. Proxies listed in **Figure 8.** These estimates are forward-looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 11 for information about our CMA methodology. These estimates reflect the views of Invesco 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 assumptions: Methodology update 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 of 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 rates of returns on deposits in different currencies because any excess return on deposits will be offset by changes in the relative value of currencies.

For 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 normalize 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 optimization 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 optimization 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.

Contributors

Invesco Solutions

Alessio de Longis
CFA®
Senior Portfolio Manager, Head of Investments, Invesco Solutions

Scott Hixon
CFA®
Senior Portfolio Manager, Head of Research, Invesco Global Asset Allocation

Marc Shmerling
CFA®
Director, Investment Research
Invesco Solutions

Greg Chen
PhD, CFA®
Senior Analyst

Chang Hwan Sung
PhD, CFA®, FRM
Portfolio Manager, Solutions Research, APAC

Debbie Li
CFA®
Senior Analyst

Yu Li
PhD
Quantitative Research Analyst

Invesco Solutions Thought Leadership

Drew Thornton
CFA®
Head of Solutions Thought Leadership

Invesco Solutions

Invesco 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.

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インベスコ・アセット・マネジメント株式会社
金融商品取引業者　関東財務局長（金商）第306号
加入協会　一般社団法人投資信託協会
一般社団法人日本投資顧問業協会

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