Invesco Global Solutions

2019 Long-term capital market assumptions

Great British Pound (GBP)

Contents

Understanding Invesco's 2019 long-term capital market assumptions	1
Executive summary	2
Global market overview	3
About our capital market assumption methodology	9
Contributors	10

The document is intended only for Professional Clients in Continental Europe (as defined under Important Information); for Qualified Investors in Switzerland; for Professional Clients in Dubai, Ireland, the Isle of Man, Jersey and Guernsey, and the UK; for Institutional Investors in Australia; for wholesale investors (as defined in the Financial Markets Conduct Act) in New Zealand, for Professional Investors in Hong Kong; for Qualified Institutional Investors in Japan; for Institutional Investors and/or Accredited Investors in Singapore; for certain specific Qualified Institutions/Sophisticated Investors only in Taiwan and for Institutional Investors in the USA. The document is intended only for accredited investors as defined under National Instrument 45-106 in Canada. It is not intended for and should not be distributed to, or relied upon, by the public or retail investors.

Understanding Invesco's 2019 long-term capital market assumptions

Dear Investor,

Investing has always required a belief in the future. At the very least, it requires a belief that an asset will be worth more tomorrow than it is today. However, investing based only on the expectation of returns fails to consider that the future is uncertain. As Professor Elroy Dimson of Cambridge University once noted: "Risk means that more things can happen than will happen".

Only the clairvoyant investor can afford to disregard risk. The rest of us are faced with considering return, risk, and diversification in our investment decisions, taking into account our observations and experiences about the world, markets, and the evolution of asset prices. In short, our beliefs about the future are central to the success of our investment endeavours.

This is where Invesco can help. Given the importance of establishing reasoned expectations for the future performances of assets, Invesco's Global Solutions group devotes substantial resources to developing and updating long-term estimates of asset class returns, risk and correlations for use by investors around the world. Aggregating the expertise and experience of a diverse team of investment researchers and practitioners across the globe, the team focuses on developing estimates that have a solid foundation in theory but are also supported by practical experience. We complement these expectations with views from our Global Market Strategist office that provide insights regarding geopolitical and macroeconomic forces likely to influence capital markets going forward.

Our goal is to provide investors with forward-looking views that balance quantitative rigour with a qualitative perspective on the markets to help inform their beliefs as they face the uncertainty of the future in pursuing their investment objectives. We hope that you find our 2019 long-term capital market assumptions useful.

Best regards,

Martin L. Flanagan
President and CEO, Invesco Ltd.

Executive summary

- **2019 promises to be another year of opportunity and challenges**. We expect global growth to remain resilient but to slow across most major developed market (DM) and emerging market (EM) economies. However, economic policy is now more explicitly politicised than at any time in the post-Soviet/China-WTO era of globalisation, which threatens the structure of a global economy open for trade, corporate and financial investment. The uncertainties of Brexit; Eurozone (EZ) political risk; and US-China tension are already affecting financial markets and confidence.
- **We expect cyclical deceleration to continue yet to leave growth near or above trend in key economies** – especially in the US (2.5% real GDP growth) and EZ (1.7%), and still strong if slowing growth in major EMs, with China (6%) and India (7.4%). But the balance of risks is tilted to the downside, due to cyclical divergence that might cause another bout of dollar strength and tighter global financial conditions; and US-China, Brexit and EZ tensions threaten to undermine business and household confidence and deter, divert or delay investment across borders, and household consumption, especially of big-ticket or discretionary items like homes, cars and white goods.
- **The uncertain macro environment of growth/policy divergence and structural risks points to continued high market volatility and considerable differentiation in performance across geographies and asset classes.** This variability is likely to include both dollar strength and weakness in 2019 as Fed policy likely continues to tighten then plateau, with risks of delayed policy changes by the ECB, BoE and BoJ due to intra-EZ, Brexit or trade friction.
- As a result of our CMA estimates, we believe GBP returns hinge on Brexit, which could drive sterling to fall, stabilise or rebound. We expect the best risk-adjusted returns from global and UK large-cap equities; diversified and high-yielding fixed-income; nominal gilts to outperform inflation linked gilts; and in alternatives REITs, hedge funds and infrastructure to outperform commodities.

Global market overview

Macroeconomic overview

2019 promises to be another year of opportunities and challenges. The good news: Our base case is positive, with expansion resilient even as major economies continue to slow from above trend toward trend growth, which should contain inflation as major central banks normalise policy. We expect the US to grow 2.5%; Eurozone (EZ), 1.7%; Japan 1.0% vs. potential 2.0%, 1.5%, 1.0% respectively. We expect China to slow to 6% and India, 7.4%; Brazil and Russia to accelerate to 1.5-2.0%

The not so good news: cyclical and structural threats – ongoing growth/policy divergence and trade, investment, geopolitical friction across major economies. A cyclical challenge of 2018 may well persist in 2019: Europe, Japan and China may slow more than the US, leading their central bank decisions and market pricing to diverge from the Fed. We expect the US expansion to mature and set a new record as the longest post-WWII expansion. But the US growth rate and output level likely exceed potential, so the Fed is set to keep raising rates and cutting its balance sheet, even as US growth slows.

Structural risks span trade, investment, technology and migration, as well as national security issues. Economic policies are becoming more explicitly politicised than in the entire post-Soviet/China-WTO era of globalisation, threatening partial economic and financial fragmentation. Such risks may crystallise only in many years, or never materialise, but associated uncertainty is already biting. The UK has fallen from the fastest to among the slowest growing, highest inflation economy in the G7 on Brexit unknowns. US tariffs and fiscal stimulus seem to have brought forward global trade and US GDP growth. Italy's rejection of EZ fiscal rules is driving up its bond yields, contributing to a sharp growth slowdown and pressure on some banks due to losses on their bond portfolios. This backdrop implies continued elevation in market volatility, perhaps another round of dollar strength, a combination that could tighten global financial conditions and slow global growth, especially in EM economies.

Upside risks deserve attention too. Cyclically the oil price fall should support global demand by boosting spending among oil importers and reducing inflation pressures. A silver lining of gradual/partial global economic fragmentation, should say US-China tensions persist or escalate: Opportunities for diversification and discrimination across countries, sectors, firms would rise as economic cycles would be less synchronised and growth models could diverge, leading to differentiated financial cycles and return possibilities.

Implications

As we look ahead to 2019, we expect monetary policy to continue to normalise, which we believe will cause capital markets to continue to normalise as well. That means an erosion of the support that Fed policy has given to stocks globally. In this environment, we expect a continued reduction in correlations among stocks as fundamentals become more important, as well as continued volatility. In addition, this normalisation of US monetary policy suggests that US asset markets are prone to mean revert over the course of this unusual cycle, with downside risks stemming from trade tensions and geopolitics. Mean reversion would imply somewhat higher bond yields and discount rates for corporate cash flows and would probably be reflected in higher corporate credit and equity risk premia. In addition, the potential for even some fragmentation caused by geopolitical disruption would likely result in higher volatility and perhaps even reduced corporate earnings power if US firms have less access to global markets, including China – which has until now been expected to continue as a major driver of global growth and a major source of revenue and earnings growth for both US and other multinational firms. Even with these downside risks and volatility, we would expect US bonds to underperform US stocks, which we expect to post modest gains because of their greater exposure to the US economy and structurally greater insulation from frictions in trade and geopolitics based on our current macroeconomic outlook mentioned above. In the Eurozone and Japan, we expect continued support of risk assets because of more accommodative monetary policy, which could result in modest positive stock returns for those regions despite relatively low economic growth. In emerging markets, we expect the Fed-driven re-pricing to continue to spill over into global markets through a stronger dollar, higher US bond yields and tighter global financial conditions, pointing to more pressure on EM currencies, putting downward pressure on growth and upward pressure on inflation – a challenging scenario for EM equities, bonds and currencies. However, there is a

significant possibility that by mid-year, the Fed is likely to have moderated its normalisation as economic growth slows, which should result in some moderation in the investment implications mentioned above.

We expect unusual behaviour to continue across commodities with the tendency to a strong dollar, global divergence between the US and the risk of global growth downgrades tending to pull the overall commodity complex down. Base metals are among the commodities more exposed to these downside risks, driven by the deleveraging-led slowdown in China and the general downward pressures on global capex due to trade frictions. Against that, however, geopolitical risks and trade tensions hold out the prospect of continued divergences across commodities, notably in oil, where tensions in the Mid-East may cause renewed upward prices pressures. Soft commodities remain exposed to developments in US-China negotiations, with China's tariffs on US agricultural exports representing a potential bargaining chip in any negotiations that might lead to a reprieve or succumb to a new round of tensions or tariff increases.

In this environment, we believe exposure to risk assets is important for meeting long-term goals – especially given that an upward bias for stocks may continue to exist, although it is growing weaker. Attempting to mitigate downside risk will be critical, and that includes being well-diversified within equities and fixed income; that is also important given the divergence in growth in different economies. And, perhaps most important during this period of uncertainty, we believe that exposure to alternative investments can help with diversification and risk mitigation. That may include strategies such as market neutral portfolios and other lower-correlating asset classes, especially ones including those with income-producing potential.

United Kingdom Overview and Brexit

UK macro and market prospects are probably the most uncertain across major economies due to Brexit. At the time of writing, UK PM May's plan is essentially a "soft" Brexit – to maintain UK membership of the EU during the post-Article 50 notification period transition slated to run from end-March 2019 through December 2020 with a possible extension in case a new trade deal again proves elusive. We expect that ultimately there will be a soft Brexit both during and after the transition. However, this deal could fail in its December 11 UK parliamentary ratification vote, raising the risk of a "hard" Brexit with no transition, should the government fail to resurrect or revise the deal in time for a successful re-vote. A no-deal Brexit would severely disrupt UK trade and could precipitate a severe recession starting in Q1-2. Sterling could fall even further and quite sharply even from current historically cheap levels if the trade sector has to respond to a rise in tariffs and non-tariff barriers from EU to WTO levels. A successful vote on the other hand would probably cause a significant rally in sterling, reflecting a restoration of confidence and growth hopes.

For sterling investors, currency volatility is likely to persist in 2019 and undercut prospective risk-adjusted return in both global and domestic markets. Resolution of Brexit should improve the outlook from 2019 and after for domestic asset classes, but until then diversification and diversification/reduced home bias are called for.

Fixed income

As a result of our CMA estimates, higher yielding asset classes – US High-Yield, EM debt, EZ and globally diversified corporates are set to offer the highest risk-adjusted debt returns to sterling investors over the long run. UK gilts are expected to outperform linkers given weak domestic demand due to Brexit uncertainties.

Equities

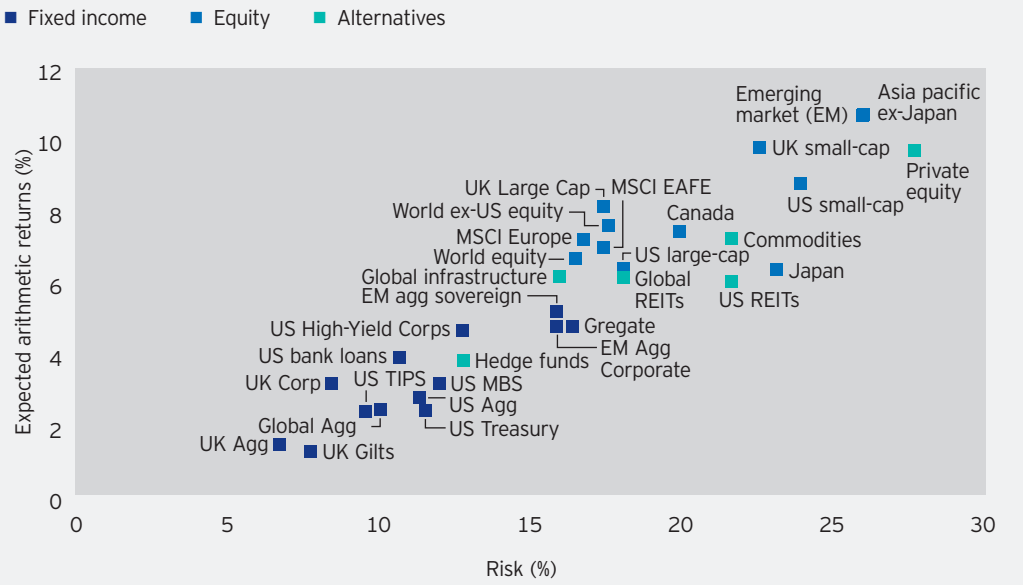
In conclusion of our CMA estimates, global equities and UK large cap equities are likely to outperform UK small cap equities over the long run, also reflecting a weak and volatile currency, and a slow domestic economy.

Alternatives

Based on our long-term CMA estimates, alternative asset classes should offer respectable risk adjusted return/diversification opportunities for sterling investors over the long run, notably overseas REITs and infrastructure, as well as hedge funds. Commodities and agriculture are likely to prove less attractive once again due to currency volatility and risk, given Brexit uncertainties.

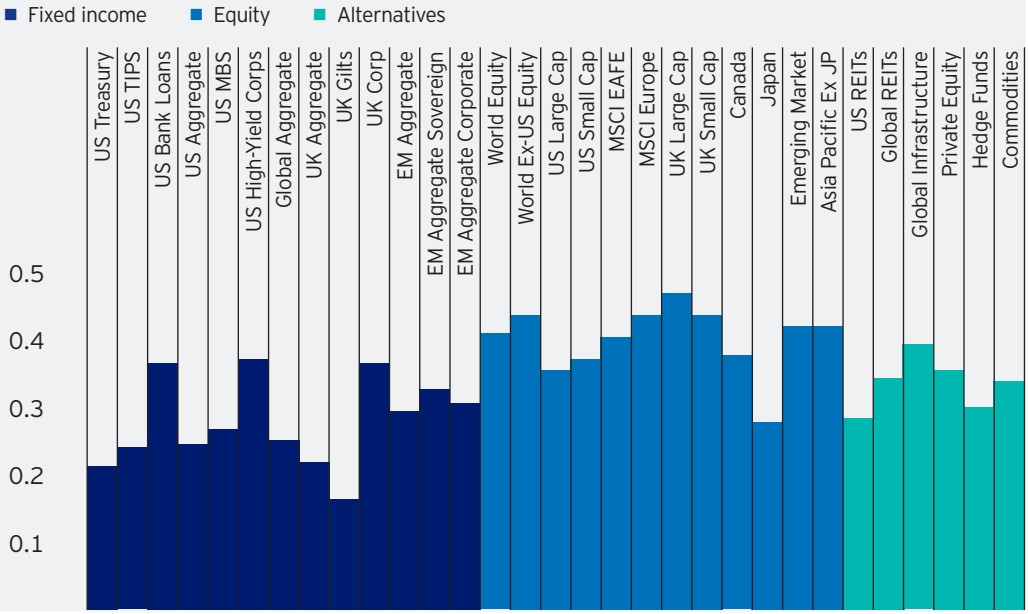
2019 Long-term capital market assumptions
Great British Pound (GBP)

Figure 1: 10-year asset class expectations (GBP)



Source: Invesco, estimates as of October 31, 2018. Proxies listed in figure 3. These estimates are forward looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 9 for information about our CMA methodology. Please see page 12 for additional CMA information. These estimates reflect the views of Invesco Global Solutions, the views of other investment teams at Invesco may differ from those presented here. (Agg: Aggregate).

Figure 2: 10-year asset class expected return-to-risk (GBP)



Source: Invesco, estimates as of October 31, 2018. Proxies listed in figure 3. These estimates are forward looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 9 for information about our CMA methodology. Please see page 12 for additional CMA information. These estimates reflect the views of Invesco Global Solutions, the views of other investment teams at Invesco may differ from those presented here.

Figure 3: 10-year asset class expected returns and volatility (GBP)

	Asset class	Index	Expected geometric return (%)	Expected arithmetic return (%)	Risk (%)
Fixed income	US Treasury Short	Barclays US Treasury Short	1.0	1.5	10.0
	US Treasury Intermediate	Bloomberg Barclays US Treasury Intermediate	1.5	2.1	11.0
	US Treasury Long	Bloomberg Barclays US Treasury Long	1.4	2.5	15.4
	US TIPS	Bloomberg Barclays US TIPS	1.8	2.3	9.6
	US Bank Loans	CSFB Leverage Loan Index	3.3	3.8	10.7
	US Aggregate	Bloomberg Barclays US Aggregate	2.1	2.7	11.4
	US Inv Grd Corps	Bloomberg Barclays US Investment Grade	2.3	3.0	11.9
	US MBS	Bloomberg Barclays US MBS	2.4	3.1	12.0
	US Preferred Stocks	BOA ML Fixed Rate Pref Securities	2.9	4.0	15.0
	US High-Yield Corps	Bloomberg Barclays US High Yield	3.9	4.6	12.8
	UK Linker	BofA Merrill Lynch UK Inflation-Linked Gilt	0.2	0.6	8.6
	UK Gilts	Bloomberg Barclays Sterling Aggregate Gilts	0.9	1.2	7.8
	UK Corp	Bloomberg Barclays Sterling Aggregate Non-Gilts - Corporate	2.7	3.1	8.5
	Global Aggregate	Bloomberg Barclays Global Aggregate	2.0	2.5	10.1
	Global Aggregate-Ex US	Bloomberg Barclays Global Aggregate- Ex US	1.8	2.3	10.2
	Global Treasury	Bloomberg Barclays Global Treasuries	1.9	2.5	11.3
	Global Sovereign	Bloomberg Barclays Global Sovereign	1.8	2.3	9.4
	Global Corporate	Bloomberg Barclays Global Corporate	2.4	2.7	8.6
	Global Inv Grd	Bloomberg Barclays Global Corporate Inv Grd	2.2	2.6	8.6
	Eurozone Corporate	Bloomberg Barclays Euro Aggregate Credit - Corporate	2.2	2.6	9.3
	Eurozone Treasury	Bloomberg Barclays Euro Aggregate Government - Treasury	2.5	3.1	10.7
	Asian Dollar Inv Grd	BOA Merrill Lynch ACIG	2.5	3.4	13.5
	EM Aggregate	Bloomberg Barclays EM Aggregate	3.5	4.8	16.4
	EM Aggregate Sovereign	Bloomberg Barclays EM Sovereign	3.9	5.1	15.9
	EM Aggregate Corporate	Bloomberg Barclays EM Corporate	3.6	4.8	15.9
	EM Corporate IG	Bloomberg Barclays Emerging Markets USD Aggregate - Corporate -IG	2.7	3.5	13.1
Equities	World Equity	MSCI ACWI	5.4	6.6	16.5
	World Ex-US Equity	MSCI ACWI Ex-US	6.1	7.5	17.6
	US Broad	Russell 3000	4.9	6.6	18.7
	US Large Cap	S&P 500	4.8	6.3	18.1
	US Mid Cap	Russell Midcap	5.6	7.5	20.4
	US Small Cap	Russell 2000	6.2	8.7	23.9
	MSCI EAFE	MSCI EAFE	5.5	6.9	17.4
	MSCI Europe	MSCI Europe	5.9	7.2	16.8
	Eurozone	MSCI Euro X UK	5.6	7.1	18.4
	UK Large Cap	FTSE 100	6.7	8.1	17.4
	UK Small Cap	FTSE Small Cap UK	7.5	9.8	22.6
	Canada	S&P TSX	5.6	7.4	19.9
	Japan	MSCI JP	3.9	6.3	23.1
	Emerging Market	MSCI EM	7.8	10.7	26.0
	Asia Pacific Ex JP	MSCI APXJ	7.8	10.7	26.0
	Pacific Ex JP	MSCI Pacific X JP	7.1	9.8	25.0
Alternatives	US REITs	FTSE NAREIT Equity	3.9	6.0	21.7
	Global REITs	FTSE EPRA/NAREIT Developed Index	4.6	6.1	18.1
	Global Infrastructure	S&P Global Infrastructure Index	5.0	6.1	16.0
	Private Equity	DJ Private Equity Total Return Index	6.4	9.7	27.8
	Hedge Funds	HFRI HF Index	3.0	3.8	12.8
	Commodities	S&P GSCI	5.0	7.2	21.6
	Agriculture	S&P GSCI Agriculture	0.1	2.5	22.3
	Energy	S&P GSCI Energy	7.6	12.3	33.6
	Industrial Metals	S&P GSCI Industrial Metals	4.7	7.0	22.4
	Precious Metals	S&P GSCI Precious Metals	2.2	3.9	19.1

Source: Invesco, estimates as of October 31, 2018. All total returns data is annual. These estimates are based on our capital market assumptions which are forward looking, are not guarantees, and they involve risks, uncertainties and assumptions. Please see page 9 for information about our CMA methodology. Please see page 12 for additional CMA information. These estimates reflect the views of Invesco Global Solutions, the views of other investment teams at Invesco may differ from those presented here.

Figure 4: 10-year correlations and risk ratios (GBP)

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

	Asset class	Fixed income																									
		US Treasury Short	US Treasury Intermediate	US Treasury Long	US TIPS	US Bank Loans	US Aggregate	US Inv Grd Corps	US MBS	US Preferred Stocks	US High-Yield Corps	UK Linker	UK Gilts	UK Corp	Global Aggregate	Global Aggregate-Ex US	Global Treasury	Global Sovereign	Global Corporate	Global Inv Grd	Eurozone Corporate	Eurozone Treasury	Asian Dollar Inv Grd	EM Aggregate	EM Aggregate Sovereign	EM Aggregate Corporate	EM Corporate IG
Fixed income	US Treasury Short	1.00																									
	US Treasury Intermediate	0.96	1.00																								
	US Treasury Long	0.75	0.87	1.00																							
	US TIPS	0.83	0.90	0.87	1.00																						
	US Bank Loans	0.78	0.69	0.49	0.70	1.00																					
	US Aggregate	0.94	0.99	0.90	0.93	0.74	1.00																				
	US Inv Grd Corps	0.84	0.89	0.86	0.91	0.77	0.95	1.00																			
	US MBS	0.97	0.99	0.85	0.90	0.74	0.99	0.91	1.00																		
	US Preferred Stocks	0.55	0.56	0.50	0.58	0.53	0.61	0.68	0.56	1.00																	
	US High-Yield Corps	0.57	0.52	0.40	0.62	0.84	0.61	0.73	0.57	0.60	1.00																
	UK Linker	0.27	0.37	0.52	0.53	0.34	0.43	0.49	0.36	0.35	0.40	1.00															
	UK Gilts	0.36	0.51	0.74	0.58	0.20	0.55	0.56	0.48	0.30	0.20	0.72	1.00														
	UK Corp	0.00	0.09	0.30	0.25	0.22	0.19	0.39	0.10	0.31	0.37	0.53	0.64	1.00													
	Global Aggregate	0.81	0.89	0.86	0.89	0.60	0.91	0.90	0.88	0.61	0.57	0.50	0.60	0.26	1.00												
	Global Aggregate-Ex US	0.60	0.71	0.72	0.74	0.41	0.73	0.74	0.69	0.53	0.47	0.50	0.57	0.28	0.95	1.00											
	Global Treasury	0.76	0.85	0.84	0.85	0.51	0.87	0.83	0.83	0.57	0.49	0.50	0.62	0.23	0.99	0.97	1.00										
	Global Sovereign	0.75	0.83	0.81	0.89	0.65	0.88	0.91	0.84	0.61	0.69	0.55	0.57	0.37	0.94	0.88	0.90	1.00									
	Global Corporate	0.75	0.82	0.80	0.88	0.69	0.88	0.95	0.82	0.69	0.73	0.55	0.58	0.45	0.94	0.88	0.89	0.96	1.00								
	Global Inv Grd	0.73	0.80	0.79	0.86	0.69	0.87	0.95	0.81	0.69	0.74	0.56	0.59	0.48	0.92	0.85	0.86	0.95	1.00	1.00							
	Eurozone Corporate	0.28	0.36	0.38	0.45	0.26	0.41	0.51	0.36	0.44	0.44	0.40	0.35	0.36	0.67	0.79	0.68	0.72	0.74	0.75	1.00						
	Eurozone Treasury	0.46	0.54	0.56	0.58	0.31	0.57	0.59	0.53	0.45	0.43	0.45	0.45	0.27	0.79	0.87	0.79	0.80	0.77	0.77	0.94	1.00					
	Asian Dollar Inv Grd	0.84	0.88	0.82	0.91	0.79	0.93	0.95	0.90	0.57	0.72	0.49	0.53	0.32	0.86	0.69	0.80	0.91	0.91	0.91	0.49	0.58	1.00				
	EM Aggregate	0.62	0.65	0.61	0.76	0.71	0.73	0.82	0.69	0.53	0.81	0.48	0.39	0.40	0.72	0.62	0.67	0.87	0.85	0.85	0.55	0.63	0.85	1.00			
	EM Aggregate Sovereign	0.64	0.67	0.65	0.77	0.69	0.75	0.83	0.71	0.54	0.79	0.50	0.43	0.40	0.75	0.65	0.71	0.89	0.85	0.86	0.55	0.66	0.85	0.99	1.00		
	EM Aggregate Corporate	0.56	0.59	0.56	0.74	0.72	0.68	0.80	0.64	0.50	0.83	0.49	0.39	0.40	0.69	0.62	0.61	0.83	0.83	0.84	0.61	0.57	0.86	0.96	0.91	1.00	
	EM Corporate IG	0.73	0.78	0.75	0.88	0.74	0.85	0.92	0.81	0.62	0.80	0.52	0.50	0.38	0.84	0.72	0.78	0.95	0.92	0.92	0.58	0.66	0.94	0.94	0.94	0.92	1.00
Equities	World Equity	0.16	0.09	0.02	0.19	0.42	0.17	0.31	0.15	0.41	0.65	0.21	-0.01	0.39	0.24	0.26	0.17	0.40	0.41	0.43	0.43	0.39	0.31	0.57	0.54	0.56	0.47
	World Ex-US Equity	0.04	-0.01	-0.04	0.12	0.32	0.07	0.23	0.04	0.35	0.58	0.21	-0.03	0.42	0.19	0.25	0.13	0.35	0.37	0.38	0.48	0.40	0.23	0.53	0.50	0.52	0.41
	US Broad	0.28	0.20	0.09	0.26	0.50	0.27	0.36	0.25	0.44	0.67	0.18	0.01	0.30	0.27	0.24	0.20	0.40	0.41	0.43	0.33	0.32	0.37	0.56	0.53	0.54	0.49
	US Large Cap	0.30	0.22	0.11	0.27	0.50	0.28	0.37	0.27	0.44	0.66	0.19	0.02	0.30	0.29	0.26	0.22	0.42	0.43	0.44	0.34	0.34	0.38	0.56	0.53	0.55	0.49
	US Mid Cap	0.23	0.15	0.06	0.24	0.50	0.22	0.34	0.20	0.42	0.68	0.20	0.01	0.33	0.24	0.22	0.16	0.38	0.39	0.41	0.34	0.29	0.35	0.55	0.52	0.55	0.47
	US Small Cap	0.18	0.09	0.00	0.15	0.41	0.15	0.24	0.14	0.34	0.59	0.13	-0.03	0.23	0.15	0.12	0.08	0.26	0.28	0.29	0.23	0.15	0.25	0.44	0.41	0.41	0.36
	MSCI EAFE	0.04	-0.01	-0.04	0.10	0.30	0.07	0.23	0.04	0.35	0.56	0.19	-0.04	0.43	0.18	0.24	0.12	0.34	0.36	0.37	0.47	0.39	0.21	0.50	0.47	0.49	0.39
	MSCI Europe	-0.03	-0.08	-0.11	0.02	0.24	0.00	0.15	-0.03	0.30	0.50	0.17	-0.05	0.43	0.12	0.19	0.06	0.27	0.29	0.31	0.46	0.37	0.14	0.43	0.41	0.42	0.32
	Eurozone	-0.02	-0.07	-0.10	0.03	0.23	0.01	0.15	-0.02	0.29	0.49	0.17	-0.05	0.41	0.13	0.21	0.08	0.29	0.30	0.31	0.48	0.40	0.14	0.43	0.41	0.41	0.32
	UK Large Cap	-0.05	-0.10	-0.13	0.01	0.24	-0.02	0.13	-0.05	0.26	0.47	0.15	-0.06	0.44	0.06	0.11	-0.01	0.21	0.24	0.26	0.34	0.24	0.12	0.40	0.37	0.38	0.28
	UK Small Cap	-0.20	-0.26	-0.26	-0.14	0.19	-0.18	-0.01	-0.21	0.16	0.44	0.05	-0.15	0.40	-0.12	-0.06	-0.18	0.02	0.08	0.09	0.20	0.04	-0.01	0.28	0.24	0.26	0.14
	Canada	0.04	-0.01	-0.05	0.14	0.33	0.06	0.20	0.04	0.28	0.54	0.15	-0.09	0.25	0.15	0.19	0.09	0.28	0.30	0.31	0.34	0.27	0.22	0.48	0.45	0.49	0.37
	Japan	0.23	0.18	0.14	0.25	0.37	0.24	0.34	0.22	0.38	0.49	0.19	-0.01	0.27	0.27	0.26	0.23	0.38	0.40	0.40	0.28	0.28	0.33	0.47	0.45	0.48	0.40
	Emerging Market	0.02	-0.02	-0.04	0.14	0.29	0.06	0.22	0.03	0.30	0.56	0.21	-0.01	0.37	0.18	0.24	0.14	0.34	0.34	0.36	0.42	0.39	0.23	0.53	0.51	0.51	0.41
	Asia Pacific Ex JP	0.07	0.03	0.01	0.16	0.31	0.11	0.26	0.07	0.34	0.56	0.19	0.01	0.39	0.20	0.24	0.16	0.35	0.37	0.38	0.39	0.37	0.26	0.51	0.49	0.51	0.41
	Pacific Ex JP	0.01	-0.02	-0.01	0.15	0.28	0.07	0.23	0.03	0.33	0.54	0.18	-0.01	0.41	0.19	0.25	0.15	0.36	0.37	0.38	0.44	0.36	0.24	0.52	0.49	0.50	0.41
Alternatives	US REITs	0.22	0.22	0.25	0.35	0.46	0.31	0.41	0.26	0.47	0.62	0.37	0.25	0.45	0.36	0.35	0.33	0.49	0.48	0.49	0.39	0.38	0.40	0.53	0.53	0.54	0.52
	Global REITs	0.13	0.13	0.18	0.30	0.41	0.23	0.38	0.17	0.48	0.63	0.36	0.22	0.55	0.33	0.36	0.29	0.48	0.49	0.51	0.47	0.43	0.38	0.58	0.56	0.57	0.52
	Global Infrastructure	0.20	0.21	0.25	0.36	0.42	0.30	0.44	0.25	0.50	0.65	0.40	0.22	0.47	0.43	0.49	0.39	0.56	0.58	0.59	0.63	0.58	0.42	0.63	0.62	0.61	0.58
	Private Equity	-0.18	-0.20	-0.21	-0.05	0.19	-0.13	0.03	-0.17	0.32	0.41	0.13	-0.08	0.37	-0.04	0.02	-0.09	0.13	0.15	0.17	0.33	0.15	0.05	0.28	0.24	0.32	0.18
	Hedge Funds	0.77	0.70	0.51	0.68	0.81	0.73	0.76	0.73	0.59	0.78	0.31	0.23	0.24	0.66	0.51	0.61	0.73	0.76	0.76	0.39	0.49	0.76	0.76	0.75	0.72	0.76
	Commodities	-0.04	-0.08	-0.14	0.05	0.16	-0.06	-0.01	-0.07	0.05	0.18	0.07	-0.16	-0.01	0.00	0.05	-0.03	0.04	0.05	0.04	0.16	0.06	0.02	0.14	0.10	0.18	0.08
	Agriculture	0.14	0.16	0.09	0.21	0.15	0.17	0.22	0.15	0.24	0.25	0.11	0.00	-0.01	0.26	0.29	0.25	0.28	0.28	0.27	0.29	0.26	0.21	0.26	0.24	0.29	0.27
	Energy	-0.12	-0.16	-0.20	-0.04	0.08	-0.14	-0.10	-0.15	-0.03	0.09	0.03	-0.18	-0.03	-0.10	-0.05	-0.13	-0.07	-0.06	-0.07	0.06	-0.05	-0.07	0.05	0.01	0.06	-0.02
	Industrial Metals	0.08	0.03	-0.07	0.13	0.27	0.06	0.12	0.05	0.17	0.33	0.08	-0.07	0.11	0.15	0.20	0.14	0.21	0.23	0.22	0.30	0.28	0.16	0.31	0.27	0.31	0.22
	Precious Metals	0.29	0.37	0.39	0.47	0.22	0.39	0.41	0.37	0.16	0.27	0.32	0.34	0.22	0.51	0.54	0.53	0.50	0.49	0.47	0.40	0.47	0.44	0.45	0.45	0.48	0.45

Source: Invesco, estimates as of October 31, 2018. Proxies listed in figure 3. These estimates are forward looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 9 for information about our CMA methodology. Please see page 12 for additional CMA information. These estimates reflect the views of Invesco Global Solutions, the views of other investment teams at Invesco may differ from those presented here.

Figure 4 (continued): 10-year correlations and risk ratios (GBP)

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

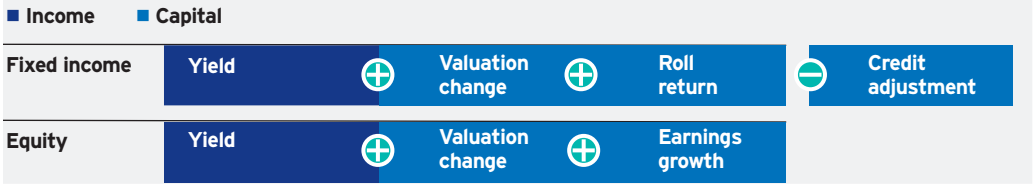
	Asset class	Equities															Alterntatives										
		World Equity	World Ex-US Equity	US Broad	US Large Cap	US Mid Cap	US Small Cap	MSCI EAFE	MSCI Europe	Eurozone	UK Large Cap	UK Small Cap	Canada	Japan	Emerging Market	Asia Pacific Ex JP	Pacific Ex JP	US REITs	Global REITs	Global Infrastructure	Private Equity	Hedge Funds	Commodities	Agriculture	Energy	Industrial Metals	Precious Metals
Fixed income	US Treasury Short																										
	US Treasury Intermediate																										
	US Treasury Long																										
	US TIPS																										
	US Bank Loans																										
	US Aggregate																										
	US Inv Grd Corps																										
	US MBS																										
	US Preferred Stocks																										
	US High-Yield Corps																										
	UK Linker																										
	UK Gilts																										
	UK Corp																										
	Global Aggregate																										
	Global Aggregate-Ex US																										
	Global Treasury																										
	Global Sovereign																										
	Global Corporate																										
	Global Inv Grd																										
	Eurozone Corporate																										
	Eurozone Treasury																										
	Asian Dollar Inv Grd																										
	EM Aggregate																										
	EM Aggregate Sovereign																										
	EM Aggregate Corporate																										
	EM Corporate IG																										
Equities	World Equity	1.00																									
	World Ex-US Equity	0.96	1.00																								
	US Broad	0.95	0.83	1.00																							
	US Large Cap	0.95	0.82	0.99	1.00																						
	US Mid Cap	0.92	0.83	0.96	0.94	1.00																					
	US Small Cap	0.81	0.73	0.88	0.83	0.93	1.00																				
	MSCI EAFE	0.95	0.99	0.83	0.82	0.82	0.72	1.00																			
	MSCI Europe	0.92	0.95	0.79	0.79	0.79	0.69	0.97	1.00																		
	Eurozone	0.90	0.94	0.78	0.77	0.78	0.69	0.96	0.99	1.00																	
	UK Large Cap	0.88	0.90	0.76	0.76	0.75	0.63	0.91	0.93	0.87	1.00																
	UK Small Cap	0.74	0.79	0.63	0.60	0.69	0.63	0.79	0.78	0.76	0.76	1.00															
	Canada	0.81	0.82	0.74	0.71	0.77	0.70	0.75	0.72	0.69	0.74	0.65	1.00														
	Japan	0.69	0.71	0.61	0.61	0.60	0.52	0.73	0.56	0.55	0.53	0.53	0.50	1.00													
	Emerging Market	0.84	0.90	0.70	0.69	0.73	0.64	0.82	0.77	0.76	0.73	0.71	0.79	0.58	1.00												
	Asia Pacific Ex JP	0.82	0.86	0.70	0.69	0.71	0.62	0.79	0.73	0.72	0.69	0.69	0.72	0.58	0.96	1.00											
	Pacific Ex JP	0.85	0.89	0.73	0.71	0.75	0.66	0.85	0.78	0.76	0.77	0.69	0.77	0.57	0.89	0.88	1.00										
Alternatives	US REITs	0.62	0.57	0.64	0.63	0.70	0.64	0.57	0.54	0.54	0.49	0.46	0.48	0.41	0.49	0.49	0.56	1.00									
	Global REITs	0.76	0.76	0.72	0.70	0.76	0.68	0.75	0.70	0.68	0.67	0.62	0.62	0.55	0.69	0.69	0.77	0.92	1.00								
	Global Infrastructure	0.83	0.85	0.73	0.73	0.74	0.60	0.84	0.81	0.79	0.76	0.57	0.72	0.59	0.76	0.72	0.78	0.69	0.81	1.00							
	Private Equity	0.82	0.83	0.72	0.71	0.74	0.67	0.84	0.81	0.81	0.75	0.79	0.64	0.63	0.69	0.66	0.72	0.61	0.74	0.66	1.00						
	Hedge Funds	0.66	0.57	0.71	0.70	0.69	0.63	0.55	0.47	0.47	0.44	0.34	0.56	0.56	0.55	0.56	0.51	0.45	0.49	0.59	0.28	1.00					
	Commodities	0.29	0.34	0.23	0.21	0.28	0.23	0.29	0.27	0.24	0.33	0.26	0.51	0.20	0.35	0.28	0.33	0.09	0.18	0.29	0.26	0.22	1.00				
	Agriculture	0.25	0.25	0.22	0.22	0.22	0.16	0.23	0.21	0.21	0.19	0.11	0.29	0.13	0.27	0.25	0.30	0.20	0.25	0.25	0.13	0.24	0.30	1.00			
	Energy	0.21	0.26	0.16	0.14	0.21	0.18	0.23	0.21	0.18	0.28	0.22	0.43	0.17	0.27	0.20	0.24	0.01	0.09	0.21	0.23	0.12	0.97	0.12	1.00		
	Industrial Metals	0.48	0.50	0.41	0.41	0.44	0.37	0.44	0.41	0.38	0.45	0.41	0.58	0.28	0.54	0.51	0.54	0.30	0.41	0.38	0.38	0.37	0.43	0.26	0.30	1.00	
	Precious Metals	0.15	0.19	0.09	0.09	0.12	0.07	0.13	0.08	0.08	0.09	-0.01	0.31	0.13	0.27	0.22	0.23	0.18	0.21	0.27	-0.06	0.35	0.22	0.28	0.11	0.33	1.00

Source: Invesco, estimates as of October 31, 2018. Proxies listed in figure 3. These estimates are forward looking, are not guarantees, and they involve risks, uncertainties, and assumptions. Please see page 9 for information about our CMA methodology. Please see page 12 for additional CMA information. These estimates reflect the views of Invesco Global Solutions, the views of other investment teams at Invesco may differ from those presented here.

About our capital market assumption 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 5). 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 5: Our building block approach to estimating returns



Fixed income returns are composed of:

- **Average yield:** The average of the starting (initial) yield and the expected yield for bonds.
- **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.
- **Valuation change (yield curve):** Estimated changes in valuation given changes in the Treasury yield curve.
- **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.
- **Long-term (LT) earnings growth:** The estimated rate in the growth of earning based on the long-term average real GDP per capita and inflation.
- **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.

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 longterm, 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 growth wealth over the long run.

Contributors

Duy Nguyen
CFA, CAIA
CIO, Head of Global Advisory Solutions

Jacob Borbidge
CFA, CAIA
Head of Research

Greg Chen
PhD
Quantitative Research Analyst

Christopher Armstrong
CFA, CAIA
Head of Manager Selection

Chang Hwan Sung
PhD, CFA, FRM
Director, Solutions Research, APAC

Kenneth Blay
Head of Solutions Thought Leadership

Kristina Hooper
Chief Market Strategist

Arnab Das
Global Market Strategist, EMEA

Contact

Mark Humphreys
Head of EMEA Client Solutions Development
Tel: +44 (0)20 7543 3537
Email: Mark_Humphreys@ldn.invesco.com

About Invesco Global Solutions

Invesco Global 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 behaviour 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 Global Solutions team consists of over 50 professionals, with 20+ years of experience across the leadership team. The team benefits from Invesco's on-the-ground presence in more than 20 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 full amount invested. Invesco Global Solutions develops CMAs that provide long-term estimates for the behaviour 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 a 10-year investment time horizon, 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.

Important information

The document is intended only for Professional Clients in Continental Europe; for Qualified Investors in Switzerland; for Professional Clients in Dubai, Ireland, the Isle of Man, Jersey and Guernsey, and the UK; for Institutional Investors in Australia; for wholesale investors (as defined in the Financial Markets Conduct Act) in New Zealand; for Professional Investors in Hong Kong; for Qualified Institutional Investors in Japan; for Institutional Investors and/or Accredited Investors in Singapore; for certain specific Qualified Institutions/ Sophisticated Investors only in Taiwan and for Institutional Investors in the USA. The document is intended only for accredited investors as defined under National Instrument 45-106 in Canada. It is not intended for and should not be distributed to, or relied upon, by the public or retail investors.

For the distribution of this document, Continental Europe is defined as Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland.

This does not constitute a recommendation of any investment strategy or product for a particular investor. Investors should consult a financial professional before making any investment decisions.

By accepting this document, you consent to communicate with us in English, unless you inform us otherwise. This overview contains general information only and does not take into account individual objectives, taxation position or financial needs. Nor does this constitute a recommendation of the suitability of any investment strategy for a particular investor. It is not an offer to buy or sell or a solicitation of an offer to buy or sell any security or instrument or to participate in any trading strategy to any person in any jurisdiction in which such an offer or solicitation is not authorised or to any person to whom it would be unlawful to market such an offer or solicitation. It does not form part of any prospectus. All material presented is compiled from sources believed to be reliable and current, but accuracy cannot be guaranteed. As with all investments, there are associated inherent risks. Please obtain and review all financial material carefully before investing. Asset management services are provided by Invesco in accordance with appropriate local legislation and regulations. The opinions expressed are those of Invesco Global Solutions team and may differ from the opinions of other Invesco investment professionals. Opinions are based upon current market conditions, and are subject to change without notice. Performance, whether actual, estimated, or backtested, is no guarantee of future results. Diversification and asset allocation do not guarantee a profit or eliminate the risk of loss.

Unless otherwise stated, all information is sourced from Invesco, in GBP and as of October 31, 2018.

Further information is available using the contact details shown overleaf.

This publication is

Issued in **Australia** by Invesco Australia Limited (ABN 48 001 693 232), Level 26, 333 Collins Street, Melbourne, Victoria, 3000, Australia which holds an Australian Financial Services Licence number 239916.

The information in this document has been prepared without taking into account any investor's investment objectives, financial situation or particular needs. Before acting on the information the investor should consider its appropriateness having regard to their investment objectives, financial situation and needs.

This document has not been prepared specifically for Australian investors. It:

- may contain references to dollar amounts which are not Australian dollars;
- may contain financial information which is not prepared in accordance with Australian law or practices;
- may not address risks associated with investment in foreign currency denominated investments; and
- does not address Australian tax issues.

Issued in **Austria** by Invesco Asset Management Österreich-Zweigniederlassung der Invesco Asset Management Deutschland GmbH, Rotenturmstraβe 16-18, 1010 Vienna, Austria.

Issued in **Belgium** by Invesco Asset Management SA Belgian Branch (France), Avenue Louise 235, B-1050 Bruxelles, Belgium.

Issued in **Canada** by Invesco Canada Ltd., 5140 Yonge Street, Suite 800, Toronto, Ontario, M2N 6X7.

Issued in **Denmark, Finland, France, Luxembourg, Norway** and **Portugal** by Invesco Asset Management SA, 16-18,rue de Londres, 75009 Paris, France.

Issued in **Dubai** by Invesco Asset Management Limited. PO Box 506599, DIFC Precinct Building No 4, Level 3, Office 305, Dubai, UAE. Regulated by the Dubai Financial Services Authority.

Issued in **Germany** by Invesco Asset Management Deutschland GmbH, An der Welle 5, 60322 Frankfurt am Main, Germany.

Issued in **Ireland** by Invesco Global Asset Management DAC, Central Quay, Riverside IV, Sir John Rogerson's Quay, Dublin 2, Ireland. Regulated in Ireland by the Central Bank of Ireland.

Issued in **Italy** and Greece by Invesco Asset Management SA, Sede Secondaria, Via Bocchetto 6, 20123 Milan, Italy.

Issued in **Japan** by Invesco Asset Management (Japan) Limited, Roppongi Hills Mori Tower 14F, 6-10-1 Roppongi, Minatoku, Tokyo 106-6114; Registration Number: The Director- General of Kanto Local Finance Bureau (Kin-sho) 306; Member of the Investment Trusts Association, Japan and the Japan Investment Advisers Association.

Issued in **Jersey** and **Guernsey** by Invesco International Limited, 2nd Floor, Orviss House, 17a Queen Street, St. Helier, Jersey, JE2 4WD. Invesco International Limited is regulated by the Jersey Financial Services Commission.

Issued in **The Netherlands** by Invesco Asset Management S.A., Dutch Branch, Vinoly Building, Claude Debussylaan 26, 1082 MD, Amsterdam, The Netherlands.

Issued in **New Zealand** by Invesco Australia Limited (ABN 48 001 693 232), Level 26, 333 Collins Street, Melbourne, Victoria, 3000, Australia which holds an Australian Financial Services Licence number 239916.

Issued in **Singapore** by Invesco Asset Management Singapore Ltd, 9 Raffles Place, #18-01 Republic Plaza, Singapore 048619.

Issued in **Spain** by Invesco Asset Management SA, Sucursal en España, C/ GOYA, 6 – 3º, 28001 Madrid, Spain.

Issued in **Switzerland** and Liechtenstein by Invesco Asset Management (Schweiz) AG, Talacker 34, 8001 Zurich, Switzerland.

Issued in **Sweden** by Invesco Asset Management S.A., Swedish Filial, Convendum, Jakobsbergsgatan 16, 111 43 Stockholm, Sweden.

Issued in **Taiwan** by Invesco Taiwan Limited, 22F, No.1, Songzhi Road, Taipei 11047, Taiwan (0800-045-066). Invesco Taiwan Limited is operated and managed independently.

Issued in **the United Kingdom** by Invesco Asset Management Limited which is authorised and regulated by the Financial Conduct Authority. Invesco Asset Management Ltd, Perpetual Park, Perpetual Park Drive, Henley-on-Thames, RG9 1HH, UK.

Issued in the **United States** of America by Invesco Advisers, Inc., Two Peachtree Pointe, 1555 Peachtree Street, N.E., Suite 1800, Atlanta, GA 30309, USA.

GL2/64248/PDF/040119