Invesco

The Big Picture
Investing in an uncertain world

The Big Picture
Investing in an uncertain world

Is this a buying opportunity or the half-way stage in a larger slump? The truth is we don't know, so we have constructed a range of scenarios that see the S&P 500 anywhere between 1400 and 3000 in 12 months. A probability-weighted approach, adjusted for the recent change in cross-asset correlations, leads to a bar-bell approach in our Model Asset Allocation that favours gold and cash among defensive assets and real estate and commodities among cyclicals. Investment-grade credit (IG) is favoured under all scenarios. Regionally, we are now Overweight UK, Japanese and EM assets.

Model asset allocation

In our view:

- Equities offer good returns in optimistic scenarios but we prefer other cyclicals. We go more Underweight.
- Real estate is among our favoured cyclical assets. We stay at Maximum.
- Corporate high-yield (HY) is under threat in the worst outcomes. We reduce to zero.
- Corporate investment-grade (IG) is favoured in all scenarios. We stay at Maximum.
- Government debt is unattractive and less diversifying. We remain Underweight.
- Emerging markets (EM) is still the sovereign space with the best potential. We stay at Maximum.
- Cash returns are low but stable and de-correlated. We remain Overweight.
- Gold has lost some of its froth and could still rise in the worst scenarios. We go Overweight.
- Commodities are now cheap (especially oil). We increase to Maximum.
- Currency hedges are not needed.

Assets that we consider good value on a long-term basis include:

- Oil (we always highlighted $20 per barrel as the target in a recession)
- Sterling (at 1.15, GBPUSD is close to historical lows)
- Real estate (the global REITS yield is now 5.5%)

Figure 1 – Projected 12-month asset class total returns by global GDP scenario
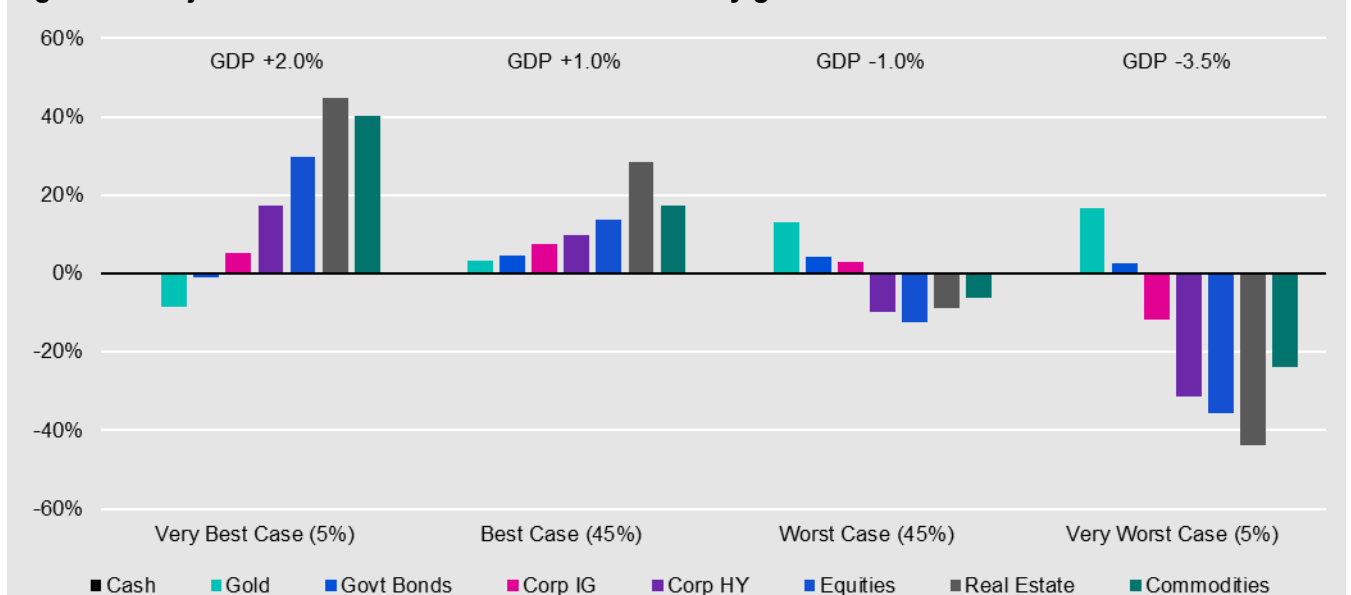
Notes: based on local currency returns. Figures in parenthesis are our subjective probabilities. GDP data shows projected global GDP growth in 2020. Cash is an equally weighted mix of USD, EUR, GBP and JPY. As of 16 March 2020. There is no guarantee these views will come to pass. See Appendices for definitions, methodology and disclaimers. Source: BAML, MSCI, GSCI, FTSE, Refinitiv Datastream and Invesco

Table of contents

	Summary and conclusions: investing in an uncertain world
Extreme uncertainty leads us to a scenario approach	This is not the year we were expecting nor do we know how it will end. Anything seems possible. Given the degree of uncertainty we have resorted to four scenarios, ranging from deep global recession to simple deceleration. We have run asset class optimisations based on all four and also on a probability-weighted average.
We adopt a barbell approach in the search for diversification	However, cross-asset correlations are rising, so judgement remains more important than ever as we strive for diversification. The result is a barbell approach: Overweight the "defensive" cash and gold but also Overweight the more cyclical commodities and real estate. Investment Grade (IG) credit was the one constant maximum allocation asset across all scenarios and we do likewise in our Model Asset Allocation. Geographically, we favour UK, Japanese and emerging market (EM) assets.
It is easy to panic	How do you invest in a world where a deadly virus is forcing a global shutdown, where the oil price is collapsing for other reasons and where policy makers are taking extreme measures to soften the blow? This extreme uncertainty has been reflected in the volatility and rising correlations displayed by financial markets. It is easy to panic and run for the hills (both literally and by adopting an extremely defensive portfolio stance) but it is not obvious which assets now offer diversification. Cash seems to be the one asset that has remained decorrelated but that could change if the banks have problems.
What could stem the panic?	However, we can imagine three potential panic circuit breakers: first, a peaking of non-Chinese Covid-19 cases and deaths; second, a policy response that provides shock and awe to financial markets and protects the cash flows of businesses and households and, finally, the development of a viable vaccine (and treatments).
The policy response is key	Given that an effective and approved vaccine appears to be at least 12 months away, hope rests with efforts to quell the outbreak and the fiscal and monetary responses to the consequent economic crisis. We await signs that the outbreak is coming under control, so for now we are all relying on a suitable policy response. Reminiscent of the Global Financial Crisis (GFC), such policy initiatives are arriving thick and fast and in ever increasing sizes. For example, the Bank of England has introduced changes that could provide £300bn of loan financing, equivalent to 13% of 2019 GDP.
Fiscal deficits could rise to 10%-20% of GDP, thus requiring QE	However, such efforts to facilitate loan growth depend upon the willingness of the banks and their customers to enter such arrangements. It looks increasingly as though governments will have to step in to replace normal sources of income. For example, Denmark has promised Covid-19 impacted businesses that it will cover 75% of employee salaries (up to a limit) over the next three months if they promise not to make staff redundant. We think such measures will become widespread but at a cost: if all incomes had to be covered by the government for three months that would imply extra government spending of 25% of full-year GDP (assuming all workers are in the private sector, which they are not). It is therefore not far-fetched to imagine that budget deficits could reach 10%-20% of GDP this year, a level more associated with war. No wonder government bond yields have risen sharply in recent days and that central banks are now announcing big asset purchase programmes (the BOE, ECB and Fed, for example).
2020 global GDP growth could be anywhere from -3.5% to +2.0%	So, economies may shutdown but governments and central banks could help avert the worst recessionary outcomes. We therefore consider four scenarios that range from a very best case of global GDP growth slowing to 2% in 2020 (versus an original expectation of 3%) all the way down to a very worst case of Spanish flu proportions with global GDP shrinking by 3.5% in 2020. Under the latter, we assume that financial markets would behave as they did during the GFC (in terms of yield curves, spreads, equity multiples etc.).
With 12-month S&P targets between 1400 and 3000	It is perhaps more instructive to translate that into 12-month market forecasts. Under the very best-case scenario, we imagine the S&P 500 would be at 3000 in 12 months, with gold at $1325 per ounce and Brent crude at $45 per barrel. On the other hand, under the very worst-case scenario, we imagine the S&P 500 at 1400, gold at $1750 and Brent at $20 (close to where it dropped on 18 March 2020).

IG is favoured in all scenarios	So, how do we position ourselves in the face of such uncertainty? Not surprisingly, the best-case scenarios suggest that equity-like assets and commodities will outperform, while the reverse is true for the worst-case hypotheses (see **Figure 1**). Optimisations then favour high-yield (HY) credit, real estate and commodities (but not equities) in the best-case outcomes and gold and government bonds in the worst-case eventualities (see **Figure 26**). IG is favoured in all scenarios.
Optimisation suggests a barbell approach	When using our probability-weighted projected returns, **Figure 31** shows that the optimiser suggests a barbell approach that favours gold, IG, real estate and commodities (government debt would be neutral and HY and equities would be Underweight).
But beware changing correlations	However, those optimisation processes are based on historical correlations and we have observed a marked change in such correlations over recent weeks (see **Figure 23**). In our opinion, this implies that gold and government bonds are no longer the strong diversifiers that they once were, so we are not slavishly following those optimisation results. In particular, rather than being at the maximum in gold, we are sharing the diversifying burden between **cash** and **gold**, both of which are at an Overweight 5% in our Model Asset Allocation (see **Figures 2** and **3**).
And low government bond yields	Further, given the extreme lows reached by developed world **government bond** yields (and the risk of escalating supply), we have decided to remain Underweight that asset class. As shown in **Figure 3**, we continue to favour emerging market (EM) government debt (we like the spread versus the developed world and EM currencies have weakened) and UK gilts (the UK economy seems precarious and sterling is now extremely cheap).
We favour IG over HY	Among less-volatile fixed income groups, we are maximum allocated to **corporate IG**, which seems to represent a good combination of risk, reward and diversification. Based on our projected returns, we favour US, UK and EM markets (the latter has been added to our framework in this edition). On the other hand, we are zero-weighted in **Corporate HY**. Though spreads have widened, they could go much further in the worst outcomes.
Real estate and commodities are our favoured cyclical assets	Turning to the more cyclical assets, we remain at the maximum allocation to **real estate** (though the Neutral and policy range have been increased) and we are moving to the maximum allocation to **commodities** (with oil close to $20 we think the sustainable downside is limited). On the other hand, we have gone further Underweight in **equities** (while also reducing the Neutral position and policy range). Though we expect strong performance in the best scenarios, and believe that some equity markets are now in cheap terrain (the UK and Japan, for example), we think there are more efficient ways to gain that cyclical exposure (real estate and commodities, say).
Weak sterling makes UK assets cheap	From a regional perspective, we find ourselves now Overweight UK, Japanese and EM assets, with the main Underweight in the Eurozone.

Figure 2 – Expected total returns (annualised, local currency) and Model Asset Allocation*

	Probability-Weighted 1-year Total Return	Neutral Portfolio	Policy Range		Model Asset Allocation	Position Vs Neutral
Cash & Gold	3.8%	5%	0-10%	↑	10%	Overweight
Cash	-0.1%	2.5%	0-10%		5%	Overweight
Gold	7.8%	2.5%	0-10%	↑	5%	Overweight
Government Bonds	3.9%	30%	10-50%	↑	20%	Underweight
Corporate IG	4.3%	10%	0-20%		20%	Overweight
Corporate HY	-0.6%	5%	0-10%	↓	0%	Underweight
Equities	0.2%	40%	20-60%	↓	30%	Underweight
Real Estate	8.9%	8%	0-16%		16%	Overweight
Commodities	5.7%	2%	0-4%	↑	4%	Overweight

*This is a theoretical portfolio and is for illustrative purposes only. It does not represent an actual portfolio and is not a recommendation of any investment or trading strategy. Arrows show direction of change in allocations. Note we have made several structural changes. The Neutral allocation to Real Estate has been increased to 8% (from 3%) and that for equities reduced to 40% (from 45%). Policy ranges have been adjusted accordingly. Allocation changes are not indicated (arrows) if they were the result of changes in Neutral allocations. See appendices for definitions, methodology and disclaimers. There is no guarantee that these views will come to pass. Source: Invesco

Model asset allocation*

Figure 3 – Model asset allocation (22/03/2020)

	Neutral	Policy Range		Allocation	Position vs Neutral	Hedged	Currency
Cash	**5%**	**0-10%**	↑	**10%**			
Cash	2.5%			5%			
Gold	2.5%		↑	5%			
Bonds	**45%**	**10-80%**	↓	**40%**			
Government	30%	10-50%	↑	20%			
US	10%		↑	9%			
Europe ex-UK (Eurozone)	8%			0%			
UK	2%		↑	3%			
Japan	8%			4%			
Emerging Markets	2%			4%			
Corporate IG	10%	0-20%		20%			
US Dollar	5%			10%			
Euro	2%		↓	2%			
Sterling	1%		↑	4%			
Japanese Yen	1%		↓	1%			
Emerging Markets	1%		↑	3%			
Corporate HY	5%	0-10%	↓	0%			
US Dollar	4%		↓	0%			
Euro	1%		↓	0%			
Equities	**40%**	**20-60%**	↓	**30%**			
US	24%		↑	14%			
Europe ex-UK	6%		↓	2%			
UK	3%		↑	6%			
Japan	3%		↓	6%			
Emerging Markets	4%		↓	2%			
Real Estate	**8%**	**0-16%**		**16%**			
US	2%		↑	5%			
Europe ex-UK	2%			2%			
UK	1%		↑	1%			
Japan	2%		↑	5%			
Emerging Markets	1%		↑	3%			
Commodities	**2%**	**0-4%**	↑	**4%**			
Energy	1%		↑	2%			
Industrial Metals	0.3%			1%			
Precious Metals	0.3%			0%			
Agriculture	0.3%		↑	1%			
Total	**100%**			**100%**			

Currency Exposure (including effect of hedging)							
USD	49%		↑	47%			
EUR	20%		↓	7%			
GBP	7%		↑	16%			
JPY	15%		↑	18%			
EM	8%		↓	13%			
Total	**100%**			**100%**			

*This is a theoretical portfolio and is for illustrative purposes only. It does not represent an actual portfolio and is not a recommendation of any investment or trading strategy. Cash is an equally weighted mix of USD, EUR, GBP and JPY. Currency exposure calculations exclude cash. Arrows show direction of change in allocations. Note that in this edition we have made several structural changes. First, the Neutral allocation to Real Estate has been increased to 8% (from 3%) and that for equities has been reduced to 40% (from 45%). The policy ranges have been adjusted accordingly. Second, we have now added Emerging Markets to the Corporate IG section. Allocation changes are not indicated (arrows) if they simply resulted from the changes in Neutral allocations. See appendices for definitions, methodology and disclaimers. Source: Invesco

Since we last wrote

We published the 2020 outlook (On a wing and a prayer) in November 2019, since when a lot has changed. **Figure 4** shows the global asset class returns since then (as of 12 March 2020) and full regional detail is shown in **Appendix 2**. Given recent volatility, we are showing data as of 12 March 2020, rather than the normal end of month cut-off.

The world is unrecognisable versus what we expected for this year

Though risk-assets did not initially show much concern about the Covid-19 outbreak, that changed during March and **Figure 4** shows the extent of losses in equity-like and commodity assets since 31 October 2019. The bad news for us is that in the 2020 outlook, we expected the best returns to come from real estate and equities, though we were slightly underweight equities (for diversification reasons). Being Underweight in both gold and government bonds was clearly the wrong thing to do. What next?

**Figure 4 – Global asset class total returns since 31/10/19 (local currency, %) ***
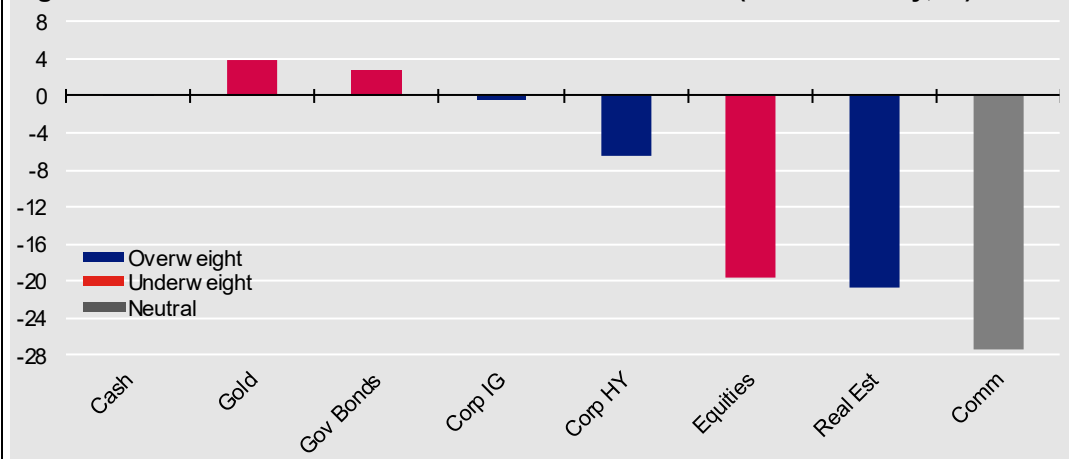
*31/10/19 to 12/03/20. Colours represent model allocations during this period. See appendices for definitions and disclaimers. Past performance is no guarantee of future results. Source: Refinitiv Datastream and Invesco

Have risk asset prices fallen enough?

We must now evaluate whether anything has changed that could necessitate a change in our projections and allocations. Asset class yields have diverged, with cash and government yields falling (until recent days), while others have risen (see **Figure 5**). In the absence of any other changes this would suggest even more of a preference for equity-like assets (based on long-term return potential). However, other things have changed and we are now less optimistic about the global growth outlook and are more fearful of recession. The question is whether the change in financial asset prices has been enough to compensate for the less optimistic projections.

Figure 5 – 4m change in global yields (bps)
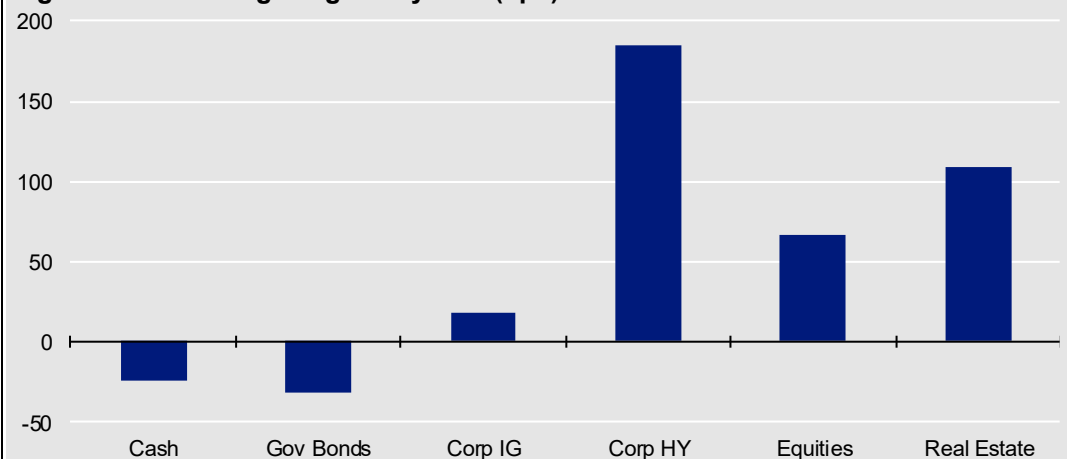
From 31/10/19 to 12/03/20. See appendices for definitions and disclaimers. Past performance is no guarantee of future results. Source: Refinitiv Datastream and Invesco

What do Invesco's 10-year CMAs say?

Taking a step back: focusing on the next decade using Invesco's CMAs
Before worrying about the potential cyclical effects of Covid-19, we thought it worth stepping back and looking at the long-term prospects. Invesco Investment Solutions recently published their 10-year capital market assumptions (as of 31 December 2019) and we thought it might be interesting to put them into our asset allocation framework and run them through our optimisation process. **Figure 6** shows their projected returns for global asset classes in a range of currency bases (their framework differs from ours, so we have had to adapt some of their categories – for instance, we use their US Treasury Short category to represent cash and precious metals for gold).

Figure 6: Invesco 10-year capital market assumptions (global assets, % ann.)

	USD	EUR	GBP	CHF
Cash & Gold	2.5	0.4	1.4	0.1
Cash - US Treasury Short	1.8	-0.3	0.7	-0.5
Gold	3.1	1.0	2.0	0.7
Government Bonds	1.9	-0.2	0.8	-0.4
Corporate IG	2.5	0.4	1.4	0.1
Corporate HY - US HY	4.1	2.0	3.0	1.8
Equities	6.0	3.9	4.9	3.7
Real Estate	5.0	2.9	3.9	2.6
Commodities	5.4	3.3	4.3	3.0

Note: Estimates as of 31 December 2019 and based on the 10-year capital market assumptions published by Invesco Investment Solutions in 2020 Long-Term Capital Market Assumptions – Q1 Update. The USD version of the CMAs is reproduced in Appendix 3. The above table uses the geometric expected return version for global asset classes ("gold" is based on the projections for precious metals and the "Cash & Gold" category shows the average of those two assets). These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here. There is no guarantee that these views will come to pass.
Source: Invesco Investment Solutions

Cash & gold, HY and equities dominate CMA based optimal portfolios

Not surprisingly, the further we move along the risk spectrum, the higher the projected returns. With one exception: real estate. That is interesting because it remains one of our favoured asset classes. Combining those projections with measures of volatility and diversification (our 10-year historical covariance matrices) gives the results shown in **Figure 7.** Though results vary by currency base and depending on what is maximised (Sharpe Ratio or returns), there are some broad themes: the combination of cash & gold is given a maximum allocation, while real estate is largely given a zero allocation. Equities and HY are largely Overweighted, while IG is largely Underweighted.

Figure 7: Optimised global allocations based on Invesco's 10-year CMA projected returns

	Neutral Portfolio	Policy Range	Maximise Sharpe Ratio				Maximise Return			
			USD	EUR	GBP	CHF	USD	EUR	GBP	CHF
Cash & Gold	5%	0-10%	10%	10%	10%	10%	10%	10%	10%	10%
Cash	2.5%	0-10%	10%	0%	10%	0%	8%	7%	10%	5%
Gold	2.5%	0-10%	0%	10%	0%	10%	2%	3%	0%	5%
Government Bonds	30%	10-50%	43%	10%	10%	10%	29%	29%	16%	28%
Corporate IG	10%	0-20%	15%	0%	0%	0%	0%	0%	0%	1%
Corporate HY	5%	0-10%	10%	10%	10%	6%	10%	10%	10%	10%
Equities	40%	20-70%	21%	66%	69%	70%	51%	47%	62%	45%
Real Estate	8%	0-16%	0%	0%	0%	0%	0%	0%	0%	2%
Commodities	2%	0-4%	0%	4%	1%	4%	0%	4%	2%	4%

Note: optimisations are based on the 10-year projected returns published by Invesco Investment Solutions in 2020 Long-Term Capital Market Assumptions – Q1 Update, as shown in **Figure 6** above. Optimisations are performed by the Asset Allocation Research team using our historical 10-year covariance matrices (for each currency). "Gold" is based on the projections for precious metals and the "Cash & Gold" category shows the sum of allocations for those two assets). "Maximise Sharpe Ratio" optimisations are performed by maximising the Sharpe Ratio subject not violating the constraints implied by the policy ranges shown in the table. "Maximise Return" optimisations are performed by maximising return subject to the policy range constraints but also subject to the standard deviation of returns not exceeding that of the Neutral Portfolio (as shown in **Figure 3**). Though based on the projected returns provided by Invesco Investment Solutions, these optimal allocations do not represent their views, nor those of any other investment team at Invesco. See appendices for definitions, methodology and disclaimers.
Source: Invesco Investment Solutions, Invesco

Are we facing global recession?

Economic data is virtually useless right now

In an ideal world, economic and corporate data flows would inform our judgements about the economic cycle. Unfortunately, data for periods prior to February 2020 are largely irrelevant and that for the period during which economies are shut down is virtually useless. More important is how quickly economies recover; how long it takes activity to return to normal levels; when, if ever, lost output is recovered and how much, if any, permanent damage is done (in terms of bankruptcies etc.).

A technical recession is possible; policy may determine how deep

We still do not know the damage suffered by the Chinese economy during the first quarter of 2020. However, with declines of 20.5% in retail sales and 24.5% in fixed asset investment (both y-o-y for the months of January and February taken together), we suspect that GDP will have declined during Q1. We think other economies will go through a similar process during late Q1 and early Q2. On this basis, a technical recession (two quarters of negative growth) is a possibility at the global level, with full year growth depending on how rapidly normality is restored and lost production recovered. Today's policy choices will determine the extent of the downturn and the speed of the recovery.

The structure of the US economy may be an advantage

Even the finance industry could freeze. It is not beyond the bounds of possibility that stock exchanges and other financial trading venues are forced to close. This would not be the first time: for example, the New York Stock Exchange (NYSE) closed for a week in September 2001 (after the attack on the World Trade Centre) and was also closed for four months in 1914 after the outbreak of WW1, as were all other major global exchanges (though transactions did occur off market). However, in general, we would expect service sectors to be less impacted than industrial sectors. On this basis, the US economy looks to be better placed than most, especially given the relative lack of dependence on trade flows (see **Figure 8**).

Figure 8: Value added by broad sector for major economies in 2018 (% of GDP)

	World	US	China	Japan	Eurozone	UK	India
Agriculture	3.4	0.9	7.2	1.2	1.6	0.6	14.6
Industry	25.4	18.2	40.7	29.1	21.9	17.5	26.8
Manufacturing	15.6	11.2	29.4	20.7	14.7	8.8	14.8
Services	65.0	77.4	52.2	69.1	66.0	71.0	49.1
Exports (% of GDP)	30.1	12.2	19.5	18.5	45.9	30.0	19.7

Note: value added does not add up to 100% as some components are not shown. Exports are not part of value added but show exposure to global trade. All data for 2018 except for value added for World, US and Japan which are for 2017. As of 16 March 2020. Source: World Bank, Refinitiv Datastream and Invesco

Some sectors cannot operate in these circumstances

Some economic activities are impossible under current circumstances. Travel (domestic and international) is severely limited, large gatherings are forbidden and social distancing is imposed. Travel & leisure is an obvious casualty, with airlines, hotels and restaurants severely disrupted (it is the worst performing global equity sector year-to-date, apart from energy, according to Datastream indices). The same applies to those parts of the entertainment industry that are played to audiences (sport, theatre, cinemas). However, the reverse is true for those parts of the media sector that provide home entertainment, especially those that provide access to movies and catalogues of popular TV series.

Other types of value added will become difficult due to the absence of workers (either because of lock downs or the need to look after children due to school closures, say). Some service sector activities can be done just as well from home (the writing of this document, for example) but many industrial activities require a physical presence. For instance, factories need a certain minimal staffing to be able to operate and that may become impossible to ensure. In extreme circumstances, this could apply to the production of necessities (electricity, gas, water and food, for example).

But some will see a rise in demand

On the other hand, some companies and sectors will benefit from this situation: medical equipment manufacturers (ventilators, say), toilet paper makers, hand sanitiser producers and food manufacturers and retailers (as panic buying emerges). Year-to-date stock market performance shows relatively strong performance from the following sectors: retailers, food, beverage & tobacco and personal care, drug & grocery stores.

Unsurprisingly, the healthcare sector has done even better, given the search for an effective vaccine and the need for public sector healthcare providers to procure private sector resources.

A more granular approach

Trying to assess the vulnerability of an economy requires more granular information than is available in **Figure 8**. Using national accounts data, **Figure 9** is our attempt to provide just that, based largely on value-added data provided by national data sources. We show the data for China and Italy as they have both imposed lock downs and for the US, which is the world's largest economy and may eventually go through the same experience (New York is among cities that have already started the process).

Figure 9: Economic value added by sector (% of national total)

	US	China	Italy
Agriculture, forestry & fishing	0.8	7.4	2.2
Extractive industries	1.6	7.1	0.3
Construction	4.1	7.2	4.3
Industry	13.0	32.0	19.3
Manufacturing	11.4		16.6
Utilities	1.6		2.7
Trade, transport, hotel & catering	14.7	15.8	21.6
Retail & wholesale trade	11.5	9.7	
Transport and warehousing	3.2	4.3	
Airline transport	0.7		
Hotels & catering		1.8	
Information and communication	5.5		3.7
Finance & insurance	7.4	7.8	4.8
Real estate activities	13.3	7.0	13.7
Other services	25.4	16.2	30.1
Professional, business, admin	12.6		9.6
Education, healthcare, social	8.7		16.4
Arts, entertainment, recreation	4.1		4.1
Government	12.2		
Other	2.1		
Total negatively impacted	**42.8**	**28.1**	**32.5**
Total positively impacted	**32.5**	**9.7**	**16.4**

Notes: As of 2018 for US data and 2019 for both China and Italy. "Negatively impacted" are those sectors that believe could be negatively impacted by the economic dislocation resulting from Covid-19 in terms of lower volumes and/or prices. "Positively impacted" are those sectors that we believe could be positively impacted by higher volumes or prices as a result of Covid-19. In the US, hotel & catering activity is included in the arts & entertainment category. In Italy, defence activity is included in the education, healthcare and social category. As of 16 March 2020. Source: US Bureau of Economic Analysis, National Bureau of Economic Statistics of China, National Institute of Statistics, Italy, Refinitiv Datastream and Invesco

More sectors are at risk than could benefit

The colour coding in **Figure 9** shows our attempt to isolate those sectors we believe most likely to be negatively or positively impacted by the economic dislocation from Covid-19, either due to volumes (airlines, say) or prices (finance, say). On this basis, more economic activity is likely to be negatively than positively impacted, which is no surprise (most sectors are likely to suffer in some way, though perhaps less so).

But vulnerable industries such as airlines are a small part of the economy

Interestingly, the obvious casualties (airlines, hotels & catering and arts & entertainment) are small within the context of the full economy. Nevertheless, companies in these sectors will need a lot of support if they are to survive this downturn. Airlines are an obvious example of where large government support may be needed (loans, nationalisation) but equally critical will be attempts to help households and small businesses such as restaurants, pubs and hairdressers.

How will GDP growth be impacted?

In order to better understand what could happen to global GDP growth numbers, we have run some simple simulations, based on assumptions about the quarter-by-quarter impact. In all cases, the baseline is an assumed 3% growth rate in 2020 and 2021 (like that of 2019). Also, all scenarios assume a 5% deficit in 2020 Q1 versus baseline, to allow for the loss of GDP in China and the later impact in Italy.

A scenario-based
approach

From there, the scenarios differ, as shown in **Figure 10**. The very worst-case scenario assumes a sharp loss of activity during 2020 Q2, with a further loss (versus baseline) in Q3, even though some recovery is implicit versus Q2. It is not until Q4 that GDP goes above baseline, as the world attempts to make up for output that was lost during the earlier part of the year. Though it is assumed lost output is recovered, it is also assumed that productive capacity is damaged by the economic chaos brought by Covid-19 and that global GDP will remain 2% below baseline over the coming years ("thereafter").

Figure 10: Assumed variation versus baseline global GDP level forecast

	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	Thereafter
Very Best	-5%	-15%	7%	10%	3%	0%	0%
Best	-5%	-20%	7%	10%	5%	3%	-1%
Worst	-5%	-20%	0%	10%	10%	5%	-2%
Very Worst	-5%	-25%	-5%	10%	10%	10%	-2%

Note: the baseline forecast is for 3% GDP growth in each year, with growth equally spread throughout the year. The numbers in the table show the percentage variation in the level of GDP versus what would have been seen in the baseline. These scenarios are for illustrative purposes only and are not forecasts. Source: Invesco

At the other extreme, the very best scenario assumes less of a loss during Q2 (15%) and immediate recovery of lost output from Q3 onwards. It is also assumed there is no long-term damage to the economy. This scenario effectively assumes that China represents a good template for the rest of the world, with the virus brought under control within a few months and economic activity returning to normal within 3-6 months (as now appears to be slowly happening based on indicators such as coal consumption and steel output).

At the very best 2020
global GDP growth
could be 2.3%; at the
very worst -3.4% but
with a big rebound

Figure 11 shows how these quarterly profiles translate into annual growth rates and the results are interesting. First, the implied calendar year growth rates in 2020 range from 2.3% in the very best case down to -3.4% in the very worst. However, 2021 sees a big rebound in all cases but especially in the very worst case. This is important from a financial market perspective, because no matter how bad things become in 2020, there may be a return to strong growth rates in 2021. Indeed, we believe there is a good chance that the worse it becomes this year, the stronger will be the growth next year. Financial markets are likely to anticipate that rebound at some stage, in our opinion.

Getting away from
calendar year forecasts
looks better

However, calendar year growth rates are of no interest to financial markets. What matters is what happens in the future. Such an approach requires us to look at growth starting in 2020 Q2 and this is what is done in the final three columns of **Figure 11**. The assumed decline in global GDP during 2020 Q1 depresses the 2019/20 growth rate to 1.7% in all cases (from 2019 Q2 to 2020 Q1). Looking ahead, the 12-month growth rates are not so dramatic, running from 1.8% in the very worst case to 5.7% in the very best case (remembering that 3% is the baseline). By the end of our 12-month forecast horizon, things could be feeling a lot better.

But the recovery may
not be "V" shaped

That sounds encouraging but several **caveats** are in order: first, these are simulations; second, they all assume a "V" shaped recovery in economic activity, which may be too optimistic, especially if the virus re-emerges when lock-downs come to an end; finally, feedback loops via the financial system could accentuate the downturn.

Figure 11: Summary of implied global GDP growth rates by scenario (%)

|	2019	2020	2021	2019/20	2020/21	2021/22
Very Best	3.0	2.3	4.5	1.7	5.7	1.7
Best	3.0	1.0	6.6	1.7	4.9	2.4
Worst	3.0	-0.8	9.8	1.7	4.4	2.6
Very Worst	3.0	-3.4	14.1	1.7	1.8	6.5

Note: these growth rates are based on the quarterly profiles shown in **Figure 10**. 2019/20, 2020/21, 2021/22 show the growth rates for the year starting 2019 Q2, 2020 Q2 and 2021 Q2, respectively. These scenarios are for illustrative purposes only and are not forecasts. Source: Invesco

Watch profits and investment….

Monitoring the situation
We always emphasise the cyclical importance of profits and investment. Unfortunately, going into this crisis, both were showing signs of weakness (see **Figure 12**). We would expect to see further weakening over the coming quarter or two but would look for acceleration as a sign that the worst of the economic downturn is behind us.

**Figure 12 – Global profit and investment growth (% y-o-y)**
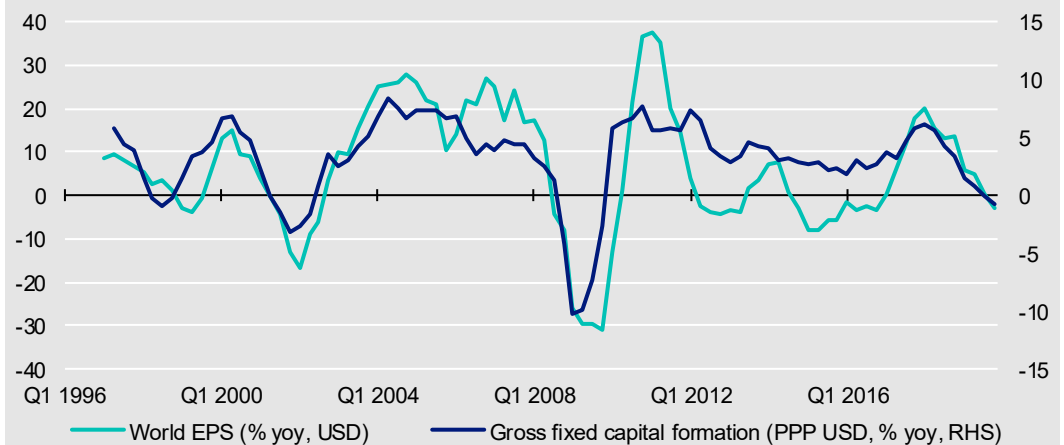
Note: Quarterly data from 1996 Q2 to 2019 Q4. World EPS growth is based on the MSCI World Index (price index and price/earnings ratios used). Gross fixed capital formation is taken from OECD national accounts data aggregated across a sub-set of countries which have already reported 2019 Q4 data (Australia, Brazil, Canada, India, Indonesia, Japan, Poland, South Korea, Sweden, Switzerland, Turkey, UK and US). As of 12 March 2020. Source: MSCI, OECD, Refinitiv Datastream and Invesco

…and export growth

Also, given the potential damage to the global trading system, we believe it would be useful to keep an eye on export developments. **Figure 13** suggests that global export growth was close to zero at the turn of the year (although there was a hint of an upturn in year-on-year growth in December and January). We have no doubt this will now move into negative territory and will be interested to see when there is a sign of improvement.

Freight indicators to the fore

Figure 13 – Global exports (% y-o-y, measured in SDRs)
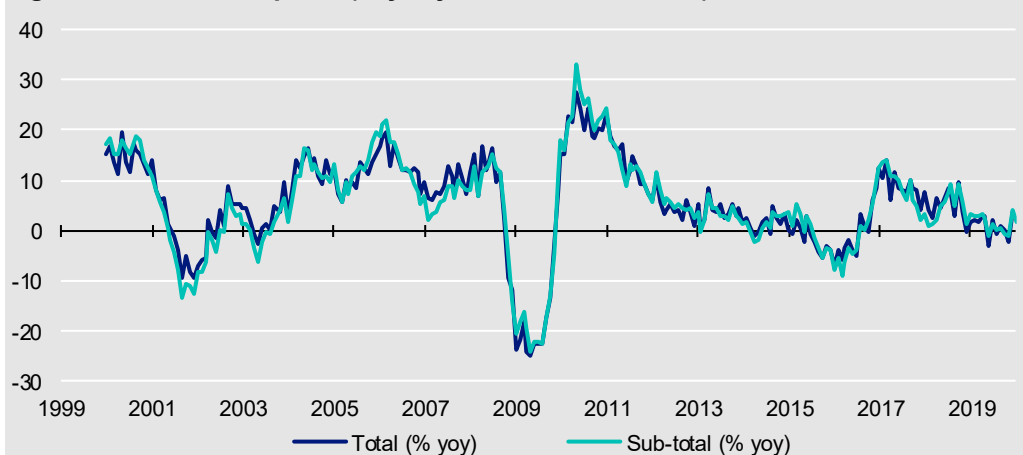
Note: the chart shows year-on-year growth in the aggregate of exports measured in SDRs (IMF Special Drawing Rights) across a range of major economies (Australia, Brazil, Canada, China, Eurozone, India, Japan, Mexico, Russia, South Korea, Sweden, Switzerland, Taiwan, UK and US) . "Total" is the aggregate across all countries. "Sub-total" is measured over the subset of countries for which the latest month of data (January 2020) is available, with the historical data based only on those countries. Monthly data from January 2000 to January 2020. Source: Refinitiv Datastream and Invesco.

The problem with the above indicators is that they are reported with a lag, so business surveys and high frequency indicators are more likely to be used in the near term, especially anything that reflects conditions in the freight business. One such commonly used indicator is the Baltic Exchange Dry Index, which shows the cost of transporting raw materials around the world.

Baltic Dry and equities during the GFC

We are sceptical about the predictive power of the Baltic Dry index but **Figure 14** suggests it was at least a coincident indicator of equity market turning points during the GFC. Even better, it seemed to bottom three months before the MSCI World index.

**Figure 14 – The Baltic Exchange Dry Index and MSCI World (2005-2010)**
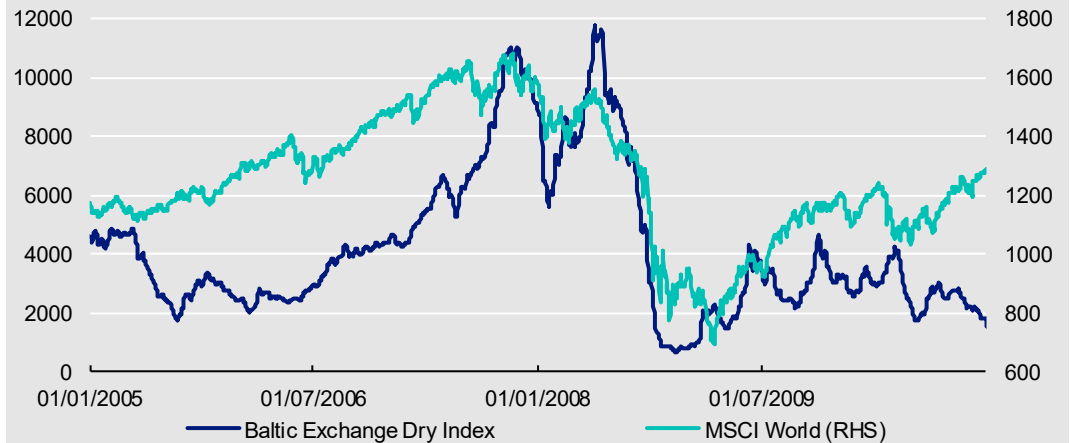
Note: the chart shows daily data from 1 January 2005 to 31 December 2010. Past performance is no guide to future returns. Source: Refinitiv Datastream and Invesco.

The Baltic Dry led equities down this time and has turned up

Admittedly, that relationship is at best loose (and most such indices were correlated during the GFC). However, there has been a similar correlation over the most recent five-year period, though the Baltic Dry index remains the more volatile of the two (see **Figure 15**). Interestingly, the Baltic Dry index peaked in September 2019, since when it has fallen 75%. It is inconceivable that it was predicting Covid-19 but it may have been reacting to the weakness of global data as shown in **Figures 12** and **13**. Even more intriguing, the Baltic Dry index seemed to bottom on 10 February 2020. Could that be a sign of hope? It may be but we think it is too soon to know.

Figure 15 – The Baltic Exchange Dry Index and MSCI World (2015-2020)
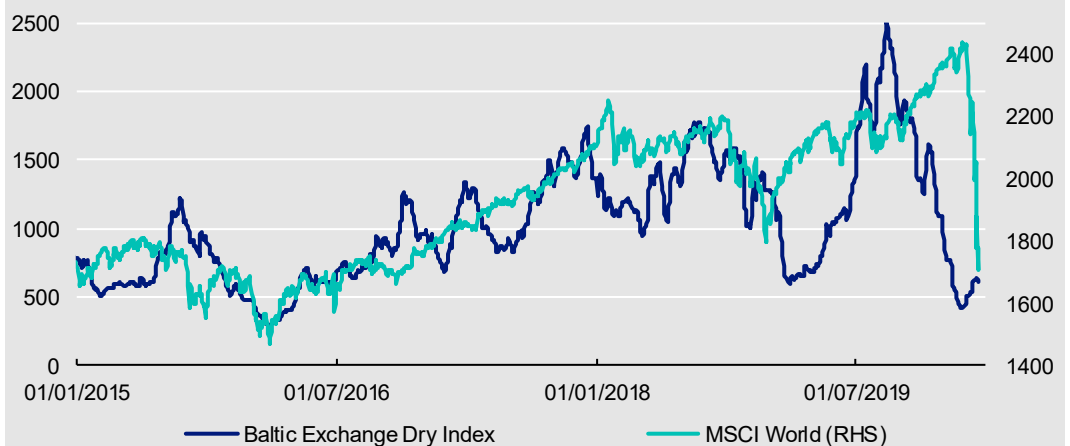
Note: the chart shows daily data from 1 January 2015 to 17 March 2020. Past performance is no guide to future returns. Source: Refinitiv Datastream and Invesco.

Otherwise, indicators that we are likely to monitor are monthly PMIs and business surveys (with a focus on the ISM surveys in the US and the IFO survey in Germany); weekly jobless claims data in the US (the labour market is a lagging indicator but it is one of the more reliable high-frequency indicators, in our opinion); monthly US retail sales and durable goods orders; monthly Chinese activity indicators (retail sales, industrial production and investment spending); profit indicators from around the world and bankruptcy data (Japan has a reasonably up to date series, for example). Given our focus on profits, we shall also be watching industrial production data, as we have often shown that production tends to lead profits by around six months.

Financial dislocation is clear

Are risky assets cheap?
The degree of dislocation in financial markets is shown by the Global Risk Appetite Cycle Indicator (GRACI) provided by Invesco's Investment Solutions team, as shown in **Figure 16**. This is a summary measure of the performance of riskier versus safer asset classes.

**Figure 16 – Global risk appetite and the global business cycle**
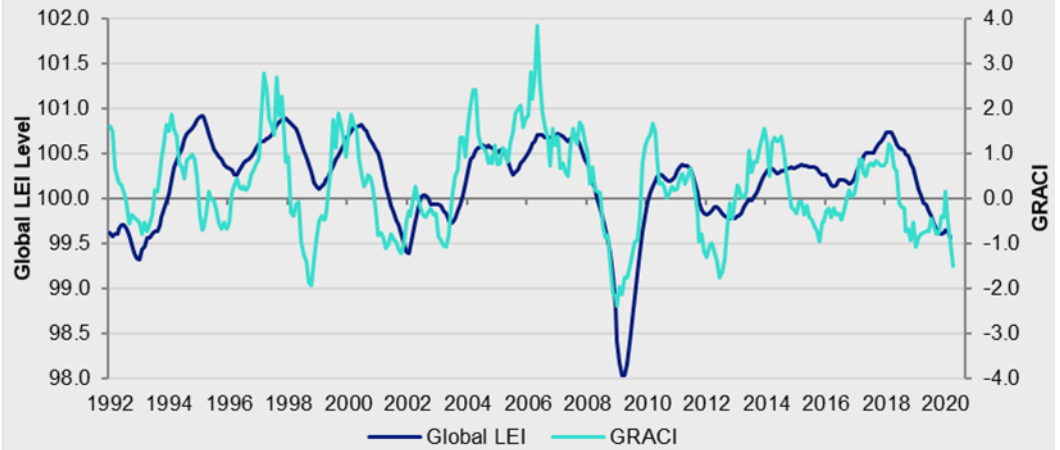
Note: monthly data from January 1992 to March 2020 (as of 15 March 2020). Both Global LEI (Leading Economic Indicator) and GRACI (Global Risk Appetite Cycle Indicator) are provided by Invesco Investment Solutions (IIS). Global LEI is a weighted average of leading indicators for 23 countries (both developed and emerging). GRACI is a measure of relative risk-adjusted performance between riskier and safer asset classes (it measures how much investors have been rewarded, on average, for taking an incremental unit of risk in global financial markets on a trailing medium-term basis). A rising index signals improving market sentiment and vice-versa. Past performance does not guarantee future results.
Source: Federal Reserve, BEA, Moody's, Invesco Investment Solutions

Are low-yielding perceived "safe" assets really that safe?

Valuations show a similar pattern, with the yield on "safer" fixed income assets at historical lows, while that on HY credit is close to historical norms and those on equity and real estate assets are above historical norms (see **Figure 17**, with full regional detail in **Appendix 1**). Such valuation measures may not tell us much about the immediate future, especially at a time of extreme economic uncertainty, but they do show that the comparison across assets has become more extreme. Just as the Covid-19 outbreak has shown the importance of safety cushions when valuing assets, the fact that yields on "quality" government debt are at extreme lows just as government debt appears likely to rise sharply may be a warning. Note that equity and real estate yields are well above their regional government and IG counterparts.

**Figure 17 – Global yields within historical ranges (%)**
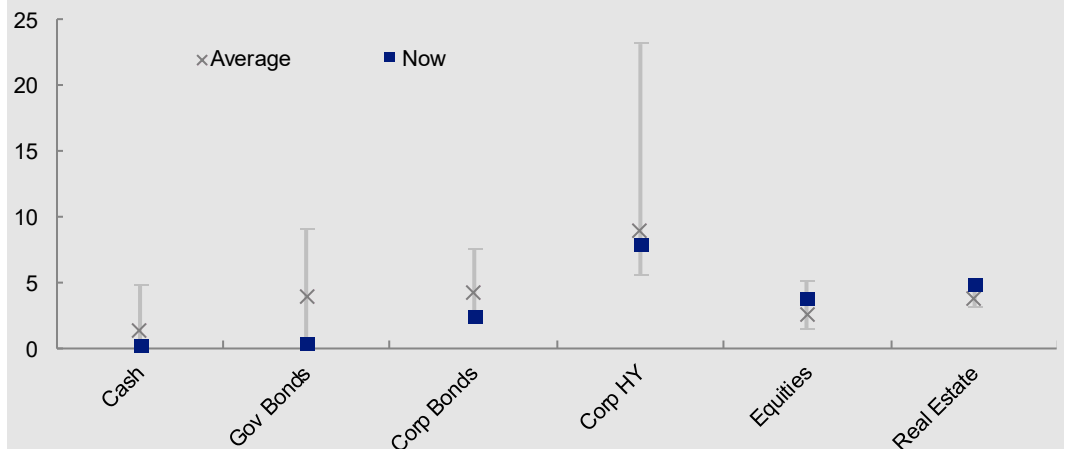
Start dates are: cash 1/1/01; govt bonds 31/12/85; corp bonds 31/12/96; corp HY 31/12/97; equities 1/1/73; REITs 18/2/05. See appendices for definitions, methodology and disclaimers. As of 12 March 2020.
Source: Refinitiv Datastream and Invesco

US treasury yields have never been so low

Figure 18 shows that US treasury yields have never plumbed the depths seen over recent weeks, not during the Great Depression nor during WW2 when the Fed was setting bond yields. This is not a good starting point, especially as returns over the medium term are highly correlated to yield (and if held to maturity they are in line with the yield to maturity at the time of purchase).

**Figure 18 – US 10-year yields since 1790 (%)**
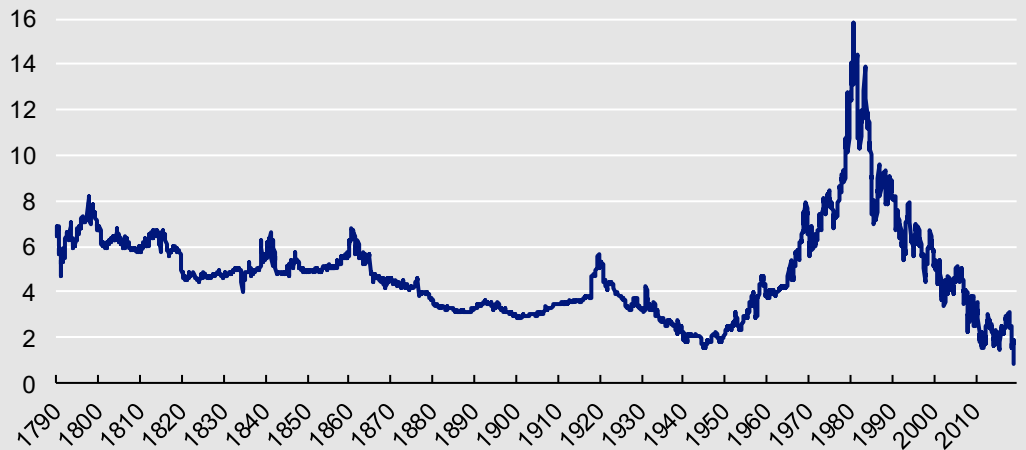
Data is monthly, from December 1790 to March 2020 (as of 16 March 2020). Past performance is no guarantee of future results. Source: Global Financial Data, Refinitiv Datastream and Invesco

And HY spreads are in recession territory

At the same time, the yield on US HY credit has moved higher, thus causing the spread versus treasury yields to rise to a level rarely seen outside of the GFC (see **Figure 19**). As suggested by **Figure 19**, future returns on US HY are often at their highest when spreads are at their widest (when nobody else is interested). The problem is that a deep recession could push that spread even wider so that short-term losses may be incurred before longer term gains are realised.

Figure 19 – The yield on US high-yield and future returns

US High Yield YTM (%) — Total return over next 5 years (ann., %) — Spread vs treasuries (bps, RHS)
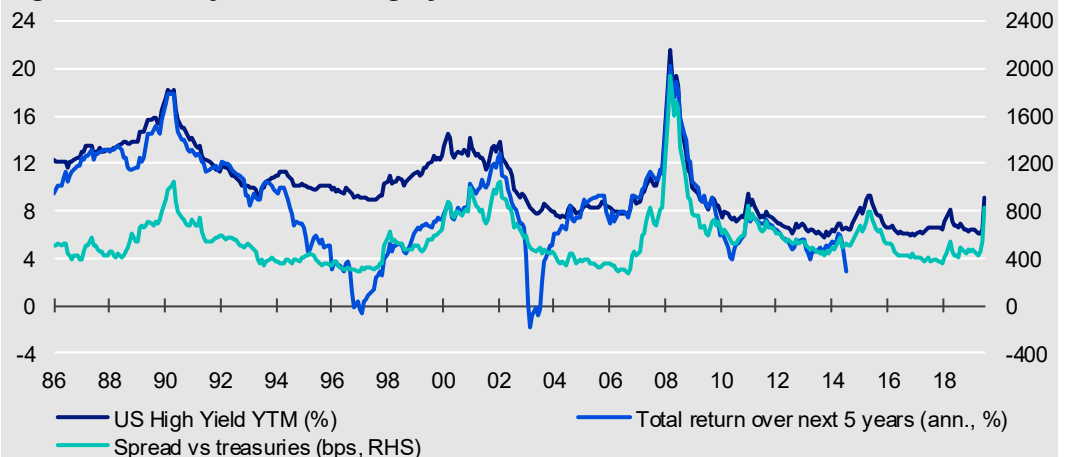
Note: based on monthly data from September 1986 to March 2020 (as of 16 March 2020). Based on the BofAML US High Yield and US Treasury Indices. "Spread versus treasuries" is the yield on US High Yield minus that on the US Treasury. "Total return" is the annualised five-year total return on the US High Yield Index. Past performance is no guarantee of future results. Source: BofAML, Refinitiv Datastream and Invesco

As are EM spreads

The same applies to EM government debt. As shown in **Figure 20**, the spread on USD denominated EM debt versus US treasury yields is wider than at any point since 2003, apart from during the GFC. In fact, **Appendix 1** suggests that EM corporate bonds offer a similarly generous spread versus those of the developed world. Most EM assets seem to offer wider spreads than is usual versus developed markets.

**Figure 20 – EM hard currency government yield spread (%)**

Note: Monthly data from February 2003 March 2020 (as of 16 March 2020). Yield spread is the yield-to-worst on the Bloomberg Barclays EM USD Aggregate 7-10 Year Index minus the yield on 10-year US treasury notes. Past performance is no guarantee of future returns. Source: Barclays Bloomberg, Refinitiv Datastream and Invesco.

The Shiller PE is down a lot but US equities are not cheap

Not surprisingly, given the dramatic decline in prices, equity price-earnings (PE) ratios have collapsed. Of course, the problem is that prospective earnings are also collapsing, making simple PE ratios next to useless. Therefore, we have always preferred some form of cyclically adjusted PE (CAPE), where a 10-year moving average of earnings is used to give a more stable denominator. **Figure 21** shows that the Shiller PE for the US market has fallen quite sharply, from a recent peak of 32 to 23 (as of 12 March 2020). However, that is still quite elevated (the long-term average is 17) and from such starting points, US equities have usually generated moderate returns over the next 10 years (although in recent decades, those returns have at least been positive).

Figure 21 – S&P 500 Shiller PE and future returns (%)
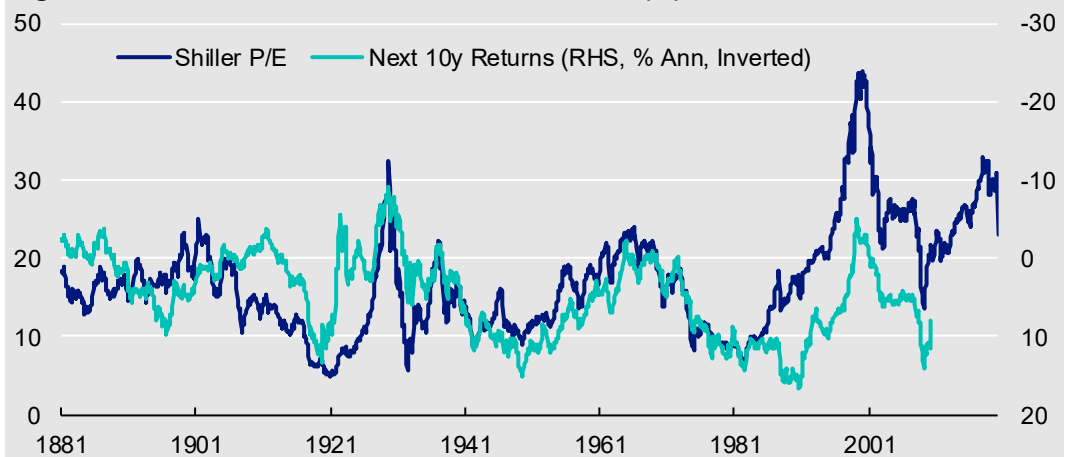
Monthly data from January 1881 to 12 March 2020. Past performance is no guide to future returns. See appendices for definitions and disclaimers. Source: Robert Shiller and Invesco

However, other equity regions do look cheap

The US market may not look cheap based on its CAPE but other equity regions do. **Figure 22** shows that our CAPE ratios are at or very close to historical lows for all regions except the US. With CAPEs falling toward 10 in some regions (notably EM), we think equity markets are attractive on a long-term basis. However, we doubt that will stop them getting cheaper over the coming months if there is a deep global recession.

But real estate looks even better

As suggested later in the projected returns in **Figure 31**, we find real estate even more attractive than equities in all scenarios except "very worst case". This is because yields on real estate (REITS) have risen dramatically over recent weeks, offering the chance of attractive returns in all but the very worst outcomes (in our opinion).

Figure 22 – Historical ranges for CAPEs
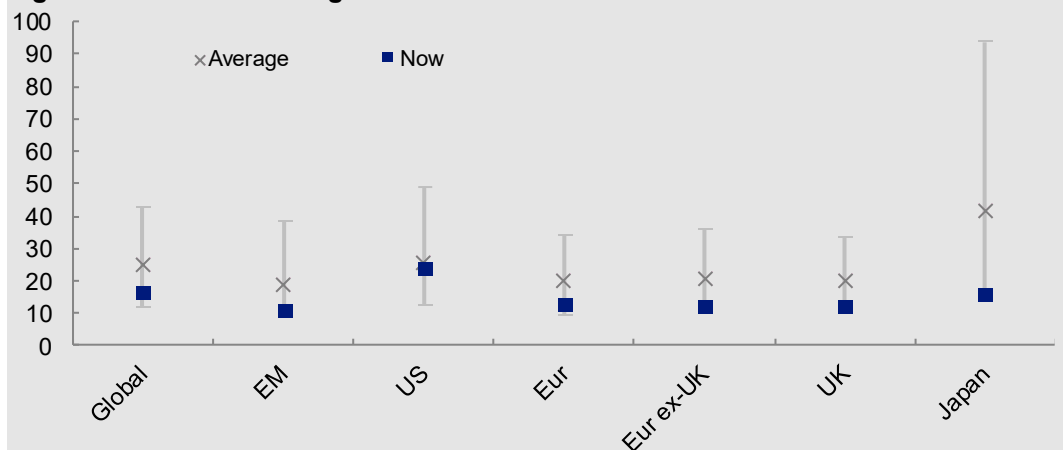
Note: CAPE = Cyclically Adjusted Price/Earnings and uses a 10-year moving average of earnings. From 1983 (except for EM from 2005). As of 12 March 2020. Source: Refinitive Datastream and Invesco

A word about correlations

Portfolio diversification relies on imperfect correlations (the lower the better). During times of stress, asset correlations often rise and that is now happening (see **Figure 23**).

Correlations are rising, making diversification harder

The average pairwise correlation between global equities and other global assets has gone from the lower end of the historical range (recent bottom of -0.15 on 21 February 2020) to the upper end (recent peak of 0.48 on 12 March 2020). Among the assets most correlated to equities are REITS (recent correlation peak of 0.96), HY (0.92), and commodities (0.90). Those assets consequently offer little in the way of diversification versus equities (those correlations are not always positive).

Gold seems to have stopped being a diversifier

Figure 23 also shows the abrupt change in the correlation between equities and gold, from a recent low of -0.79 on 24 February 2020 to a recent high of 0.46 on 12 March 2020. This suggests that gold has ceased to be the diversifier that we would normally expect it to be. More hopeful is the fact the government bonds, IG credit and cash have continued to have little (and frequently negative) correlation with equities, making them better diversifiers, in our opinion. That said, in recent days the spectre of rising government debt has pushed down those debt prices, with a knock-on effect on equities.

Figure 23 – 20-day correlations versus global equities
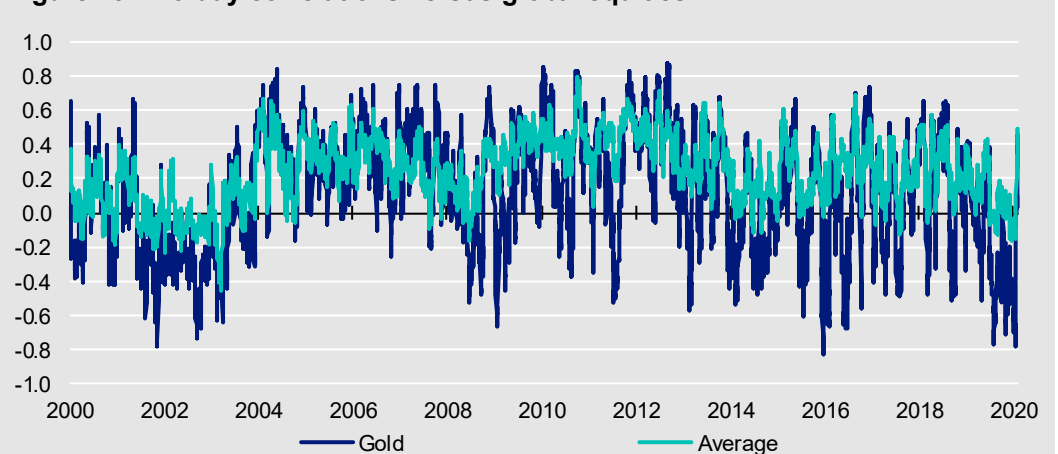
Note: Based on daily data from 1 January 2000 to 17 March 2020. Calculated as rolling correlations between daily total returns on the Datastream World Index (equities) and other global asset groups. "Average" shows the average pairwise correlation between equities and government debt (BoAML Global Government Bond Index), IG (BoAML Global Corporate Index), HY (BoAML Global High Yield Index), Real Estate (FTSE EPRA NAREIT Developed Index), Commodities (S&P GSCI Commodity Total Return Index), Gold (London Bullion Market Spot Price) and Cash (BoAML 0-3 Month US Treasury Bill Index). All in US dollars. Past performance is no guarantee of future returns. Source: BoAML, FTSE EPRA, S&P GSCI, Refinitive Datastream and Invesco

Coronavirus scenarios for 2020

At this stage we usually talk about our projected returns and have just one scenario. However, given the uncertainty surrounding the Covid-19 outbreak, that is no longer possible. We do not know how serious this will become nor the effect on the global economy. Even worse, economic data flows have become harder to interpret and/or are meaningless. For that reason, we now consider four scenarios along with our subjective probabilities (**Figure 24** shows the results, as of 12 March 2020, and **Appendix 4** shows the underlying assumptions):

A scenario-based approach

The most optimistic scenario still implies only 2% global GDP growth

- **Very best case (5% probability):** 2.0% global GDP growth in 2020 (versus our previous estimate of 3.0%). This assumes the global outbreak is contained as rapidly as in China and, with the onset of the Northern Hemisphere spring and summer, the outbreak is well under control by mid-year. We believe this would imply a short, sharp shock to the global economy, with quick recovery and little effect on growth over the next year or so. This implies a slight worsening of our 12-month asset class assumptions about policy rates, yield curves, credit spreads, default rates, commodity prices and equity/real estate yields/growth.

A more realistic best case assumes 1% GDP growth

- **Best case (45% probability):** 1.0% global GDP growth in 2020. This assumes a deeper Q2 slump in global GDP. Also, we allow for the potentially disruptive financial effect of the sharp fall in the price of oil. Policy makers (central banks and governments) are assumed to offset some of the short-term economic consequences, providing lifelines to distressed corporates and households. Though there is a GDP growth deficit in 2020, we assume that 2021 growth will be boosted beyond the 3.0% we had originally expected. Effectively, this causes displacement of some economic activity and profits from 2020 into 2021. Though this causes us to downgrade our 12-month assumptions, we suppose the worst of the impact on market risk-premia will be over within the 12-month forecast period.

Recession is possible (-1.0% GDP growth)

- **Worst case (45% probability):** -1.0% global GDP growth in 2020. Covid-19 develops into a serious pandemic that is not halted by warming temperatures and that proves difficult to control, with vaccines and cures not available until 2021. This could involve widespread loss of life and the closure of much economic activity for a prolonged period, provoking global recession. Recovery of lost output does not occur until the end of 2020 and into 2021.

A Spanish flu like scenario could see -3.5% GDP growth and GFC conditions

- **Very worst case (5% probability):** this assumes a dramatic escalation of Covid-19 to Spanish flu proportions. The World Bank estimated in 2014 that such an outbreak could reduce global GDP by 5% and we assume a 2020 growth rate of -3.5% (versus the original +3%). The downturn could be exacerbated by high debt ratios and the impotence of many central banks. Our asset class assumptions for this scenario assume a return to GFC conditions.

Figure 24: Projected 12-month asset class total returns by global GDP scenario
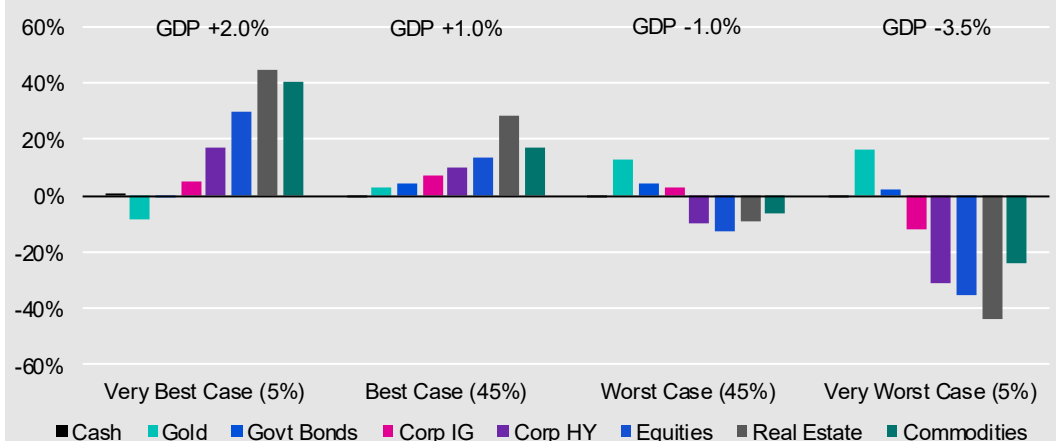
Notes: based on local currency returns. Figures in parenthesis are our subjective probabilities. GDP data shows projected global GDP growth in 2020. Cash is an equally weighted mix of USD, EUR, GBP and JPY. As of 16 March 2020. There is no guarantee that these views will come to pass. See Appendices for definitions, methodology and disclaimers. Source: BAML, MSCI, GSCI, FTSE, Refinitiv Datastream and Invesco

S&P 500 could fall to 1400 in an extreme scenario

The 12-month projected returns shown in **Figure 24** are based on an aggregation of regional estimates. It is not surprising that the worst-case equity-like asset projections are quite dramatic (doubly so given they were based on closing prices on 16 March 2020, when markets plummeted). For example, they are consistent with an S&P 500 12-month target of 1950 in a worst-case scenario and 1400 in a very worst-case outcome (see **Figure 25**). We doubt these would represent the low point in equity markets and other similar assets: it is our presumption that even under worst-case scenarios, markets would be in recovery mode within a year.

Oil is already close to our $20 downside target

It is worth mentioning that the worst-case commodity downside is limited relative to that of equities because the oil price has already been depressed by the rise in Saudi output and we view $20 as the downside 12m target. The strength of gold also plays a role.

Conversely, we expect healthy equity-like returns under the very best-case scenario, though bear in mind the starting point is 16 March 2020. Commodities are expected to be particularly rewarding, given that we imagine a rebound in the oil price (if only to $45).

Gold and sovereign debt expected to do the best in an extreme recession

Of course, the reverse is true for the more defensive assets: we expect gold to do better under the worst-case scenarios than under the best case, though it is interesting that even gold has fallen during recent market turmoil. Sovereign debt returns are projected to be modest under all scenarios because the yields have already fallen a great deal and we see limited further downside. However, we see little prospect of huge losses on sovereign debt, even in the best-case scenario. IG credit is expected to produce positive returns in all but the worst of scenarios. Note that the projected cash returns are positive but too small to be seen in **Figure 24**.

Figure 25 – Market forecasts by scenario

	Current (16/03/20)	Very Best Case	Best Case	Worst Case	Very Worst Case
Central Bank Rates					
US	0.25	0.50	0.25	0.00	0.00
Eurozone	-0.50	-0.60	-0.70	-0.80	-1.00
China	4.35	4.00	3.75	3.50	2.50
Japan	-0.10	-0.20	-0.30	-0.50	-0.70
UK	0.25	0.50	0.00	0.00	0.00
10y Bond Yields					
US	0.73	1.50	0.00	0.00	0.50
Eurozone	-0.46	-0.60	-1.00	-1.00	-1.00
China	2.74	3.00	2.75	2.50	2.50
Japan	0.01	0.00	-0.25	-0.30	-0.25
UK	0.44	0.50	-0.25	0.00	0.25
Exchange Rates/US$					
EUR/USD	1.12	1.10	1.12	1.20	1.30
USD/CNY	6.99	7.30	7.10	7.20	7.50
USD/JPY	105.87	110.00	105.00	100.00	90.00
GBP/USD	1.23	1.25	1.25	1.25	1.20
USD/CHF	0.94	1.00	0.95	0.90	0.85
Equity Indices					
S&P 500	2386	3000	2650	1950	1400
Euro Stoxx 50	2450	2900	2550	1950	1350
FTSE A50	12694	14700	12800	10800	7650
Nikkei 225	17002	25000	20000	16000	11000
FTSE 100	5151	7200	6000	4800	4300
Commodities (US$)					
Brent/barrel	28	45	35	25	20
Gold/ounce	1502	1375	1550	1700	1750
Copper/tonne	5276	5800	5000	4000	3000

Notes: There is no guarantee that these views will come to pass. See Appendices for definitions, methodology and disclaimers. Source: Refinitiv Datastream and Invesco

The UK was already burdened by Brexit when Covid-19 struck	**Figure 25** shows how those projections translate into market forecasts. A few words of explanation may be needed. First, it is assumed that in the very best-case scenario, those central banks that have recently cut interest rates (the Fed and the BOE), partially or wholly reverse those moves. This is then assumed then to have a knock-on effect on bond yields (along with assumptions about the slope of respective yield curves). In the case of the UK, the movements in the yield curve add to the assumed BOE rate changes until we get to the worst-case scenarios. Even in the best-case scenario, we assume the UK economy carries the extra burden of Brexit, which we think will also play a role in depressing corporate profits and dividends (along with the recent drop in the oil price).
Yield curves could steepen in the worst-case scenarios under the weight of debt issuance	The projected behaviour of bond yields in that tail-risk worst case scenario may seem odd. Though we assume most central banks cut rates (with the Fed and the BOE not crossing the zero-bound), we assume that yield curves steepen (as they did during the GFC): first, because markets anticipate the eventual economic upturn and, second, because the assumed higher government debt burden increases real yields (we assume that asset purchases would dampen this effect).
An optimisation framework	**Figure 26** shows how those projected returns translate into optimal allocations across global assets, for each of the four scenarios. Those optimal allocations are calculated using our 12-month projected returns and a historical five-year covariance matrix (all in local currency terms) and by maximising returns subject to volatility being no higher than for our Neutral asset allocation.

There is a logical split among those optimal allocations: the combination of HY, real estate and commodities are preferred in the two best-case scenarios, while gold and government bonds are preferred in the two worst-case scenarios. |
| IG credit is preferred in all scenarios | The three constants among the optimal allocations are the zero cash position (except for the very best-case), the below Neutral equity allocation and the maximum allocation to IG credit. Though the latter is never projected to offer the best returns, it would appear to offer a nice combination of risk, reward and diversification. |
| Equities below neutral in all cases | The other interesting feature of the optimal allocations is that the equity asset class is always given a below-Neutral weighting. This may seem odd in the two best-case scenarios but HY, real estate and commodities appear to offer a more efficient way to achieve the returns offered by equities (based on our projections).

Regular readers may notice that we have boosted the Neutral real estate allocation from 3% to 8%, while reducing that of equities from 45% to 40%. Hopefully, this gives a more balanced starting point to our asset allocation work. |

Figure 26 – Projected 12m local currency total returns and optimised allocations for global assets

	Neutral	Policy Range	Projected Returns				Optimised Allocations			
			Very Best Case	Best Case	Worst Case	Very Worst Case	Very Best Case	Best Case	Worst Case	Very Worst Case
Cash & Gold	5%	0-10%	-4.2%	1.5%	6.5%	8.2%	10%	0%	10%	10%
Cash	2.5%	0-10%	0.0%	-0.1%	-0.1%	-0.2%	10%	0%	0%	0%
Gold	2.5%	0-10%	-8.5%	3.2%	13.2%	16.5%	0%	0%	10%	10%
Gov Bonds	30%	10-50%	-0.9%	4.4%	4.1%	2.5%	15%	25%	50%	50%
Corp IG	10%	0-20%	5.2%	7.5%	2.8%	-11.9%	20%	20%	20%	20%
Corp HY	5%	0-10%	17.1%	9.8%	-9.7%	-31.3%	10%	10%	0%	0%
Equities	40%	20-60%	29.7%	13.7%	-12.5%	-35.5%	25%	25%	20%	20%
Real Estate	8%	0-16%	44.8%	28.5%	-8.8%	-43.9%	16%	16%	0%	0%
Commodities	2%	0-4%	40.3%	17.2%	-6.4%	-23.9%	4%	4%	0%	0%

Notes: Based on local currency returns (for both the one-year projected returns and five-year historical covariance matrix). "Neutral" shows our neutral asset allocation. Cash is an equally weighted mix of USD, EUR, GBP and JPY. Optimised allocations are derived by maximising returns while not exceeding the volatility of the Neutral Portfolio. See appendices for definitions, methodology and disclaimers.
Source: Invesco

Which scenario?	**How will we know which scenario is unfolding?** It is virtually impossible to know how damaging the Covid-19 outbreak will be, in terms of the cost to human life, economies and financial markets.
Easy to fear the worst	As economies are successively shut down it is easy to imagine the global economy and financial markets spiralling towards our very worst-case scenario, with global GDP falling by 3.5% in 2020 and the S&P 500 falling to 1400 in 12 months (and possibly lower in the meantime).
But there are possible circuit breakers	So why is that not our base-case? We can think of several factors that could short-circuit that downward spiral:

1. The pandemic is brought under control, either because of extreme containment actions or because the virus fades when the weather improves (as hoped).
2. Governments and central banks implement suitable policies: first, with an element of shock and awe to stem market panic and, second, with polices to support corporate and household cash flows during the economic downswing.
3. The discovery of an effective vaccine.

	Bringing the pandemic under control
China has shown the way	China has pretty much brought its Covid-19 outbreak under control (see **Figure 27**), though we don't know whether that will remain the case when its economy normalises.
But others are yet to follow	Unfortunately, many other parts of the world are now experiencing a rapid increase in cases and some (especially Italy and Iran) have seen a substantial number of deaths. An important sign that the battle against Covid-19 is being won will come when countries such as Italy, Iran and Spain see a decline in daily cases and deaths. Given doubts about the comprehensiveness of testing, we believe that attention will increasingly focus on deaths rather than cases (the former obviously coming with a lag to the latter).
	Figure 27 shows that cases and deaths outside of China continue to accelerate, so this important turning point has not yet been reached. Until it is, we suspect financial markets will remain susceptible to periodic bouts of volatility. The longer it takes, the more severe we believe will be the economic and market consequences.
The outbreak remains troublesome	If Covid-19 cases had continued to track those of swine flu in 2009-10, the situation would have been bad enough (see **Figure 28**). However, they have recently been increasing even faster than that and with a much higher case fatality rate (deaths/cases) of 4.2% versus 0.4% for swine flu at the same stage of that outbreak, though rising to 1.25% by the time cases ceased to be recorded (all based on WHO data).

Figure 27 – Covid-19 daily cases and deaths
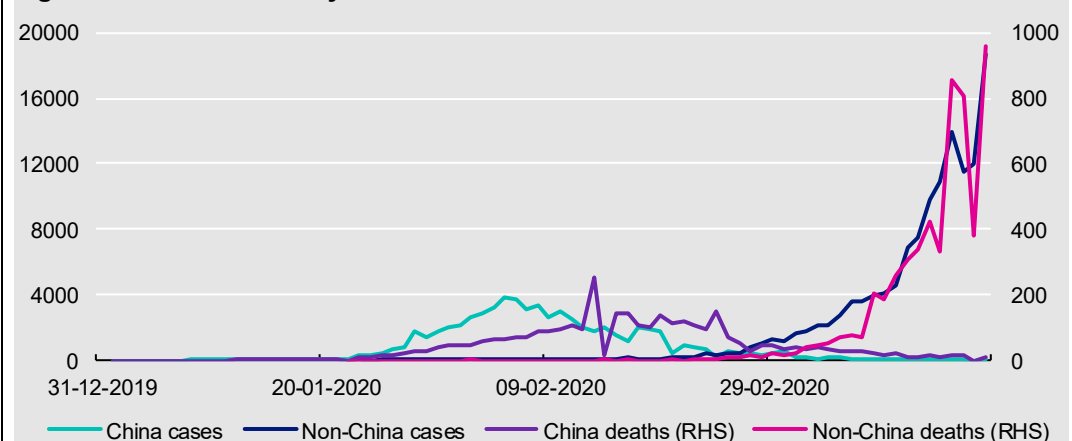
Note: daily data from 31 December 2019 to 19 March 2020 with geometric interpolation until 21 January 2020. Discontinuities are due to changes in the way some countries report their data. Source: WHO and Invesco

Cases are no doubt massively understated

Given the difficulty of distinguishing between Covid-19 and other ailments, we suspect the true number of cases is much higher than officially reported. This could mean that the fatality rate is much lower than WHO data currently suggests but it could also imply that the number of Covid-19 linked deaths is being understated. For example, though the global number of lab-tested swine flu deaths was 18,500, the US Centers for Disease Control and Prevention reckoned the actual number was in the 151,700-575,500 range.

Figure 28 – Covid-19 and swine flu compared
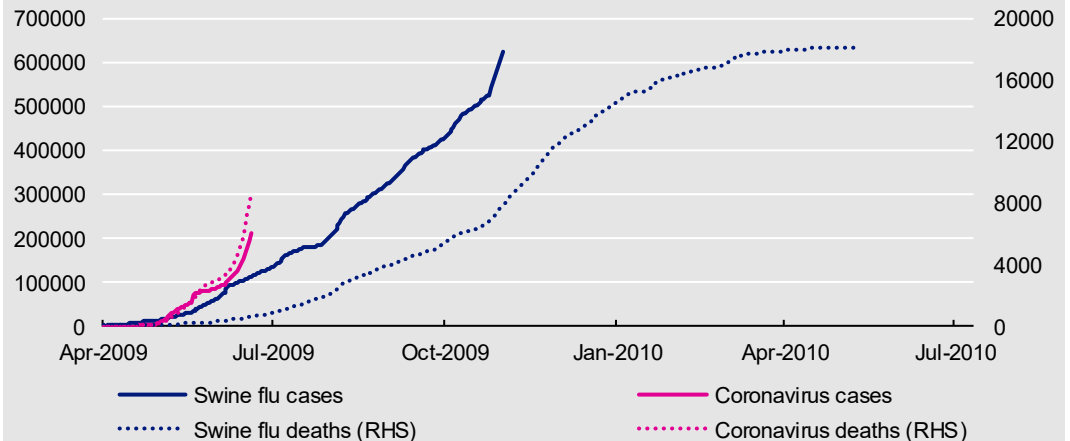
Note: Swine flu data is daily from 27 April 2009 to 4 June 2010 (data on number of cases ended on 27 November 2009). Data was not always available daily: such gaps have been filled by simple interpolation. Covid-19 (Coronavirus) data is daily from 31 December 2019 to 19 March 2020 with geometric interpolation until 21 January 2020. Covid-19 data is superimposed on the swine flu data as though 31 December 2019 was 27 April 2009. All data based on WHO situation reports. Source: WHO and Invesco.

So far deaths are concentrated among the old and infirm

Early data from China (up to 11 February 2020, as supplied by China's Centre for Disease Control) suggests that case fatality rates vary markedly across age groups, from 0% in the 0-9 year range, rising to 0.4% for 40-49 year olds and peaking at 14.8% for the over-80s (with a notable pick-up beyond the age of 60). That same data also showed a big difference depending upon underlying health conditions, rising from 0.9% for those with no health condition to 7.3% for those with diabetes and peaking at 10.5% for those with a history of cardiovascular disease. Naturally, many of those in the over-80 age group had pre-existing health conditions.

Approaches have varied but even the UK is now falling in-line

Countries are adopting different approaches to the control of the disease. China, Italy and now Spain have been draconian in shutting down their economies (or parts thereof). Other countries, such as the US, India and the Czech Republic have closed their borders to arrivals from some or all countries (in the case of the US after initially adopting a relaxed approach). The UK appears to be an outlier among European countries in that it was slow to close schools but it is now getting more in-line. The UK approach is to not take those actions until extremely necessary and also to allow the spread of the virus among the general population (while protecting the vulnerable) in the belief that it will build "herd immunity" for the next outbreak (expected next winter). Only time will tell which approach has been the most effective (in terms of lives saved and at what economic cost).

Policymakers to the rescue?
Policymakers have two main tasks: first, to combat Covid-19 and, second, to minimise the economic damage caused by both the virus itself and by the fight against it.

Healthcare spending will rise in most places

The struggle to limit the human cost of this outbreak requires direct healthcare spending (testing kits, sanitisers, masks and other protective gear, beds, ventilators, staff etc.). In extreme cases it may require capital spending in the form of new hospital buildings. In many countries this will imply higher public spending, a timely example being the provisions made in the recent UK budget with a £5bn NHS emergency response fund (and a promise to spend whatever it takes) and the US Congress $8.3bn emergency spending bill. These are not huge amounts but we believe they will grow with time.

| Policies are coming thick and fast | More impressive are the measures being taken to limit short term suffering and long-term damage from the inevitable economic slowdown as the virus is dealt with. The recipe for policy makers is quite simple: ensure as little damage as possible to the cash flow of businesses and households, either by direct government intervention or by central banks enabling banks to temporarily shoulder the burden of their clients. Examples include: |

- Reduce or eliminate taxes on companies and/or give rebates on previously paid tax (the UK is reducing business rates to zero on small businesses for the next 12 months, Italy is delaying tax payments by a few months).
- Protect household incomes by making sick pay more easily available (as in the UK and the US), extending unemployment benefits (as in Italy), allowing parents time off to look after children at reduced pay (Italy) and banning the firing of employees for two months (Italy).
- Ban evictions when lack of ability to pay rent is related to Covid-19 job loss or income decline (multiple US cities).
- Give debt moratoria by suspending interest and principal payments (the mortgage and loan moratorium for SMEs in Italy until the end of 2020 and the 18-month moratorium for household mortgages when a job is lost or income falls by one-third)
- Help banks to provide more loans to their clients by providing short-term liquidity (Fed, ECB and PBOC), reducing reserve requirement ratios (PBOC), eliminating countercyclical liquidity and capital buffers (BOE, Fed and ECB) and targeting funding for SMEs (BOE, PBOC)

| Budget deficits could rise to 20% of GDP | Some of these measures will have a direct cost to the government: Italy is expecting to issue an additional €25bn worth of bonds in 2020 as a result of such measures, the UK Chancellor announced a Covid-19 related £18bn fiscal loosening in his recent budget (and now a £300bn loan guarantee scheme) and the US Congress has already approved an $8.3bn package, with more to come. We believe these amounts will grow and that we could see public sector deficits at levels not seen since WW2 (20% of GDP, say). |

| Central banks are also key | We also expect large support from central banks via the banking sector. The size and scope of that help is unknown as it depends upon the decisions of banks and their clients. If this set of policies does work, it will imply a sizeable rise in bank lending. For example, the BOE estimates that its new polices have created the potential for £300bn worth of loans, which is around 13.5% of 2019 GDP. |

Figure 29 – QE5 balance sheet growth and asset returns
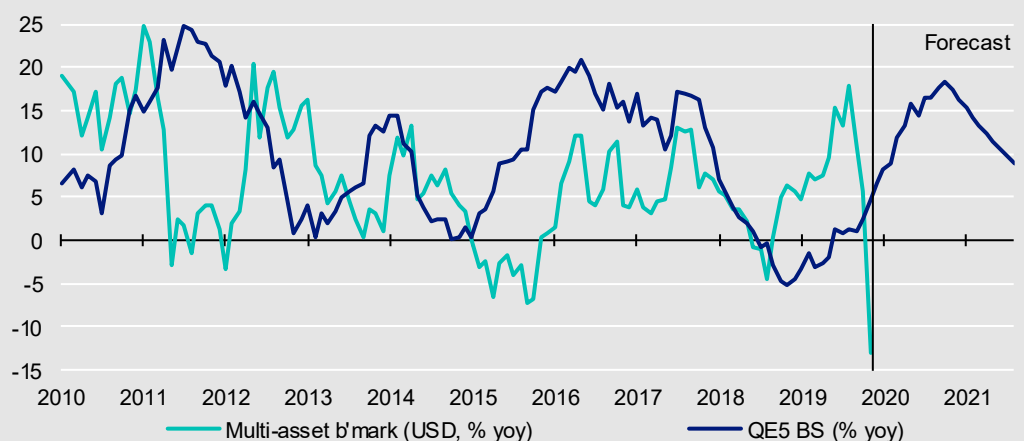
Note: QE5 BS is the aggregate balance sheet of Fed, ECB, BOE, BOJ and SNB in USD, rebased to 100 in May 2006. Forecast considers asset purchase plans of the central banks but ignores other sources of growth. The Fed has announced $700bn of purchases, which we assume occur smoothly over 2020, with a halving of purchases in 2021. The ECB has announced plans to purchase €1.1 trillion of assets in 2020 and we assume a halving of purchases thereafter. The BOJ has announced a doubling of the rate of ETF purchases: we assume $45bn asset purchases per month in 2020 and $30bn per month in 2021. The BOE has announced £200bn of purchases (we assume they occur smoothly during 2020, with a halving of the rate in 2021). The SNB has announced no plan but we assume $10bn per month in 2020, with a halving of those rates in 2021. The multi-asset benchmark is a fixed weighted index based on the Neutral asset allocation of Invesco's Asset Allocation Research team. From January 2010 to December 2021. As of 19 March 2020. Past performance is no guarantee of future results. Source: BOE, Refinitiv Datastream and Invesco

|	
It's not about rate cuts	Nearly 40 central banks have cut interest rates so far during 2020, including the Fed, the BOE and the PBOC (according to Central Bank Rates). However, we suspect that such cuts by major developed world central banks will have limited economic effect. Indeed, both times the Fed has cut rates this year outside of its normal meeting cycle, it seems to have frightened financial markets.
What they do with their balance sheets is more important	We suspect the effectiveness of central banks will depend upon the expansion of their balance sheets and not the level of their interest rates. As well as enabling the banking sector to create loans through liquidity provision and regulatory changes, central bank asset purchases are also likely to play a role (the Fed, BOE, ECB and BOJ have indicated they will either initiate new programmes or increase those that already exist). **Figure 29** shows that we expect an acceleration of those central bank balance sheets and it will be interesting to see if the past relationship with asset returns is maintained. Indeed, it could be argued that asset values ran well ahead of what was justified by central bank balance sheet expansion in 2019, which has perhaps made the subsequent crash more painful.
Time for modern monetary theory (MMT)?	In particular, the rise in government bond yields over recent days is a sign of market concern about future debt issuance. Central banks may have to use asset purchases to control that rise in yields (or turn to financing governments directly, thus cutting out the markets).
Vaccines can take a decade to be approved	**Finding a vaccine will take time** The bad news is that it can typically take a decade for a new vaccine to achieve regulatory approval. First, the vaccine must be developed, which is often a matter of trial and error. Second, clinical trials on a limited number of humans need to prove that it is safe (usually taking three to four months). Third, clinical trials are then needed to prove that it is effective (taking up to eight months). Finally, comes the regulatory approval process, which can be complex for vaccines that use new technology.
But a fast start has been made in the search for a Covid-19 vaccine	The good news is that candidates have already been identified for Covid-19 in an unprecedentedly short period of time (partly because of work conducted on SARS and MERS and partly because China quickly shared details of the virus, allowing researchers in other countries to start the work in January). The first stage of clinical trials for one such candidate (developed by the US National Institute of Allergy and Infectious Diseases and at the biotechnology company Moderna, Inc.) have already started in Seattle. Researchers in other countries are at a similar stage, including in China and Israel.
Though it is still probably at least 12 months away	Despite the obvious urgency that will be applied to the regulatory process, most experts believe an effective and approved vaccine will not be available for at least 12 months. Nevertheless, steps in the right direction could eventually be supportive of financial markets.

Diversification more important than ever

Model Asset Allocation: investing in an uncertain world

Diversification is more important than ever, though the diversifying properties of assets tend to change at times of stress. Rather than making point projections, we are using a probability weighted version of the four scenarios described earlier (as per **Figure 26**).

Figure 30 – Return versus risk for global assets (probability weighted returns)
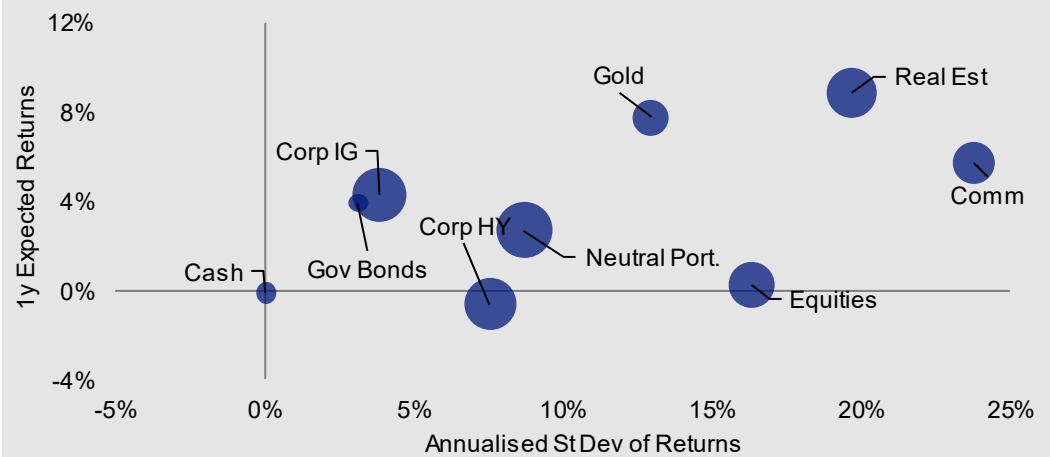
Based on annualised local currency returns, using the probability weighted average projected return (averaged across four scenarios described in earlier sections) and a historical covariance matrix. Size of bubbles is in proportion to average historical pairwise correlation with other assets. Cash is an equally weighted mix of USD, EUR, GBP and JPY. Neutral portfolio weights shown in **Figure 31**. As of 16 March 2020. There is no guarantee that these views will come to pass. See Appendices for definitions, methodology and disclaimers. Source: BAML, MSCI, GSCI, FTSE, Refinitiv Datastream and Invesco

Balancing risk and reward

Figure 30 shows our 12-month probability weighted global asset class projections and historical volatilities (based on five years of data), with cross asset correlations indicated by the size of the bubbles. This framework allows a balancing of risk and reward (we optimise for global asset class weights and then manually allocate across the regions within each asset class). The optimiser is useful but judgement is the final ingredient.

The optimised allocations are shown in **Figure 31**. Though we show the outcome for maximising the Sharpe Ratio, we prefer to focus on the maximisation of returns (with volatility no higher than for the Neutral Portfolio). We are raising the Neutral allocation to real estate (from 3% to 8%) and lowering that for equities (from 45% to 40%).

Figure 31 – Optimised allocations for global assets (using local currency returns)

	Neutral Portfolio	Policy Range	Optimisation results Sharpe Ratio	Max Return	Model Asset Allocation*	
Cash & Gold	5%	0-10%	10%	10%	↑	10%
Cash	2.5%	0-10%	0%	0%		5%
Gold	2.5%	0-10%	10%	10%	↑	5%
Government Bonds	30%	10-50%	50%	30%	↑	20%
Corporate IG	10%	0-20%	20%	20%		20%
Corporate HY	5%	0-10%	0%	0%	↓	0%
Equities	40%	20-60%	20%	20%	↓	30%
Real Estate	8%	0-16%	0%	16%		16%
Commodities	2%	0-4%	0%	4%	↑	4%

Notes: Based on local currency returns (for both the one-year projected returns and five-year historical covariance matrix). Based on a probability weighted version of the returns generated by the four scenarios described earlier. Cash is an equally weighted mix of USD, EUR, GBP and JPY. "Sharpe Ratio" shows the results of maximising the Sharpe Ratio. "Max Return" maximises returns while not exceeding the volatility of the Neutral Portfolio. *This is a theoretical portfolio and is for illustrative purposes only. It does not represent an actual portfolio and is not a recommendation of any investment or trading strategy. Note that in this edition we have made several structural changes: The Neutral allocation to Real Estate is raised to 8% (from 3%) and that for equities lowered to 40% (from 45%). The policy ranges have been adjusted accordingly. We have also added Emerging Markets to the Corporate IG section. Allocation changes are not indicated (arrows) if they simply resulted from the changes in Neutral allocations. See appendices for definitions, methodology and disclaimers. Source: Invesco

Barbell approach suggested

The results of the optimisation process suggest a barbell approach with at one end the more defensive set of gold, government bonds and IG credit and at the other the more volatile collection of real estate and commodities (with equities at the minimum end of our policy range).

Breakdown in correlations implies caution in applying optimisation results

However, as we have already mentioned, the breakdown in the usual cross asset relationships leads us to be more wary than usual of the optimisation outcomes. For this reason, we are not slavishly following those conclusions. As indicated in **Figure 31** our model asset allocation is at the maximum allowed 10% for the combination of **cash and gold** but with an equal split between the two (rather than being focused entirely on gold). This follows from the fact that gold is currently positively correlated with equity-like assets, thus not offering the usual degree of diversification (see **Figure 23**).

Hence, we remain underweight government bonds…

…but like EM

Despite the optimisation process telling us to be at a Neutral 30% in **government bonds**, we have decided to remain at an Underweight 20%. This is partly because government deficits are likely to rise substantially this year, thus increasing the supply of bonds at a time when yields in the developed world are at multi-century lows. We still favour emerging market debt (see **Figure 3**), especially given the widening of the yield spread versus developed markets (see **Figure 20**) and the weakening of EM currencies (see **Figure 32**). Among developed world government debt markets, we prefer gilts, partly because sterling has weakened so much (see later).

Figure 32 – US dollar trade weighted index versus EM currencies

Note: daily data from 2 January 2006 to 13 March 2020 for the US Federal Reserve US Nominal Dollar Emerging Market Index. Past performance is no guide to future results.
Source: US Federal Reserve, Refinitiv Datastream and Invesco

We are maximum allocated to IG, focused on US, UK and EM

Where we have followed the suggestion of the optimiser is to be maximum allocated to **IG credit**. As seen in **Figure 26** it is the only asset class where the optimiser suggested a maximum allocation in each one of our four scenarios. It clearly offers a good balance between risk, reward and diversification, even when we allow for a sharp rise in credit spreads in the worst scenarios (see the assumptions in **Appendix 4**). We are focused on the US, UK and EM IG markets, given that is where we predict the best returns over the next 12 months.

Also maxed out on real estate, especially US, Japan and EM

We are also maximum allocated to **real estate**. This represents no change in stance, although the allocation has gone from 6% to 16% as a result of the increase in our Neutral position from 3% to 8% (and the maximum allowed position has gone from 6% to 16%). Based on our 12m projected returns, our favoured real estate markets are the US, EM and Japan.

Oil is close to our long-held $20 target

We are also maximum allocated to **commodities**. This 4% position is an increase from the Neutral 2% position that we held last time. This will clearly, be a mistake if our worst scenarios come to pass but as oil is now close to the $20 target that we have always identified as a possibility during recession, we think the downside is limited. We also

favour agricultural goods, as food is one of the few products that will continue to be in demand (and where supply could be constrained under the worst scenarios).

HY spreads have widened but could go much further

We started the year with the maximum 10% allocation to **high yield**, with the caveat that we would cut positions if recession became imminent (see the scenario analysis in our 2020 Outlook Big Picture document). Well we are there. Though spreads have widened, we think they could go much further in the worst of our scenarios and **Figure 30** shows that on a probability weighted basis, our projections do not favour this asset class. We are now zero allocated.

Equities cut to more underweight – we prefer other cyclical assets

Likewise, the **equity** position is taken further Underweight, though the extent of that change is exaggerated by the reduction of the Neutral allocation (the counterpart to the increase in real estate). The new position is 30% versus a Neutral 40%, whereas the old position was 40% versus a Neutral 45%. **Figure 30** shows why we prefer other assets such as IG, gold and real estate. We believe that equities will do well in the best-case scenarios but not as good as real estate or commodities. Though most equity market CAPEs are at record lows, that is not the case for the US and it is the one equity market that we struggle to find attractive. We remain Underweight US equities but are now equally concerned about their Eurozone counterparts (not for the valuations but because an economy that was already weak is now being hit hard by Covid-19, given its large exposure to global trade and an increasing number of countries in lock-down). On the positive side, we expect the best returns to be earned on UK and Japanese equities. We have recently emphasised our belief that Japanese corporates were in a better position than most to maintain dividend payments in times of trouble due to the below normal dividend pay-out ratio (the reverse is true in the Eurozone).

But UK equities look cheap

The argument in favour of UK equities is somewhat different. On the negative side, the UK economy was already weakened by the Brexit process, with more to come (in our opinion). This suggests it was already enfeebled when Covid-19 struck. Adding to the problems is the importance of resource related stocks in major UK stock indices, a problem that became acute when the oil price collapsed. Further, the UK economy is heavily weighted towards finance and volatile markets do not help sentiment towards banks and insurers. However, the dividend yield on UK stocks is now above 6% and sterling has just collapsed (with GBPUSD falling to 1.15 on 18 March 2020 – see **Figure 33**). UK equity assets look cheap (distressed) to us, with a lot of bad news priced in, and the weakness of sterling should help protect overseas earnings. For this reason, we are now moving to the maximum allowed allocation.

Looking at the summary currency exposures shown in **Figure 3** we are now overexposed to sterling, the Japanese yen and emerging markets. This is a natural consequence of our regional asset preferences. We are very underexposed to the euro.

Figure 33 – UK sterling versus US dollar (GBPUSD)

Note: monthly data from January 1975 to March 2020 (as of 18 March 2020). Past performance is no guide to future results. Source: Bank of England, Refinitiv Datastream and Invesco

Appendices

Appendix 1: Global valuations vs history

Regional yields within historical ranges
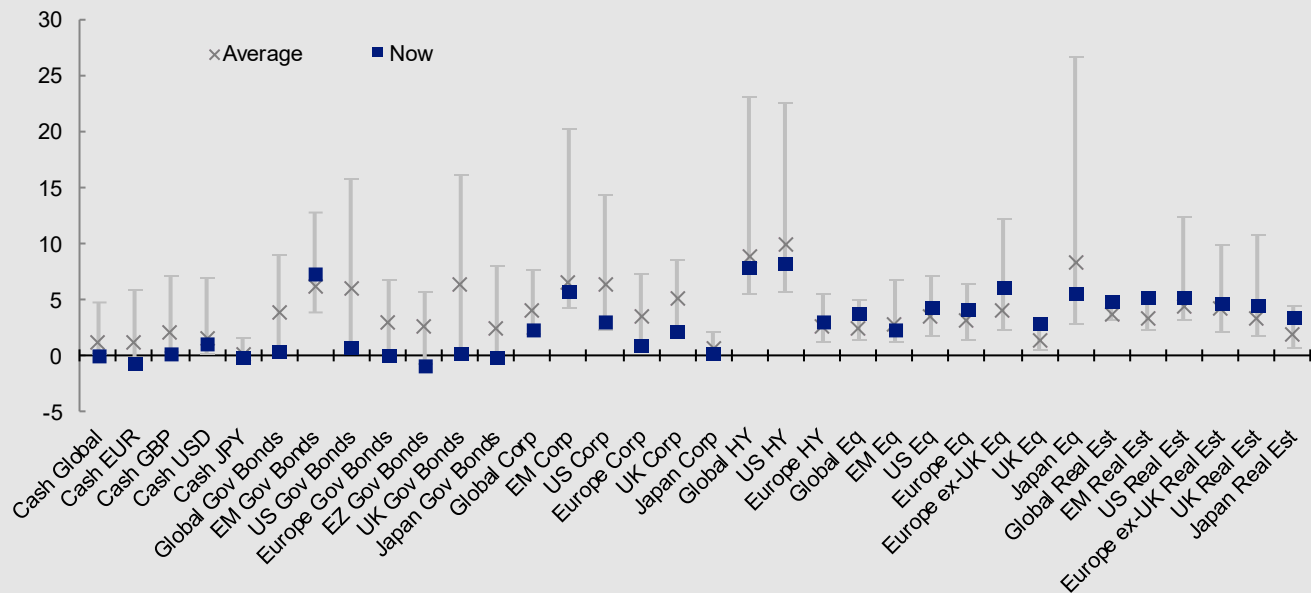
Notes: As of 12 March 2020. Past performance is no guarantee of future results. See appendices for definitions, methodology and disclaimers. Source: Bloomberg Barclays, BofAML, FTSE, JP Morgan, Refinitiv Datastream, Invesco

Appendix 2: Asset class total returns

Data as at 12/03/2020	Index	Current Level/RY	Total Return (USD, %)				Total Return (Local Currency, %)			
			4m	YTD	12m	5y*	4m	YTD	12m	5y*
Equities										
World	MSCI	429	-19.2	-23.9	-12.6	2.9	-18.6	-23.0	-11.9	3.2
Emerging Markets	MSCI	883	-14.8	-20.6	-13.5	1.3	-11.7	-17.1	-9.7	3.4
US	MSCI	2364	-17.6	-22.9	-9.5	5.7	-17.6	-22.9	-9.5	5.7
Europe	MSCI	1244	-26.1	-29.9	-20.3	-1.9	-25.5	-28.4	-18.9	-1.2
Europe ex-UK	MSCI	1516	-25.0	-28.6	-17.6	-0.8	-25.0	-27.8	-17.1	-1.4
UK	MSCI	780	-29.1	-33.7	-27.3	-4.7	-26.8	-30.0	-24.1	-1.3
Japan	MSCI	2770	-17.2	-19.4	-8.7	1.8	-19.1	-21.6	-13.4	-0.9
Government Bonds										
World	BofA-ML	0.38	2.9	4.0	9.1	3.5	2.8	4.1	8.5	2.9
Emerging Markets (USD)	BBloom	7.44	-7.9	-10.4	-0.4	5.4	-7.9	-10.4	-0.4	5.4
US (10y)	Datastream	0.81	9.4	11.5	20.3	4.7	9.4	11.5	20.3	4.7
Europe	Bofa-ML	0.14	-0.3	0.7	5.7	2.6	0.4	2.0	7.6	1.8
Europe ex-UK (EMU, 10y)	Datastream	-0.74	2.9	4.5	6.6	4.1	3.6	5.8	8.5	3.2
UK (10y)	Datastream	0.27	0.4	-0.2	5.0	1.4	3.6	5.4	9.7	5.0
Japan (10y)	Datastream	-0.06	1.5	3.2	6.0	4.2	-0.8	0.4	0.6	1.4
IG Corporate Bonds										
Global	BofA-ML	2.46	-1.0	-1.6	6.7	3.5	-0.5	-0.8	7.5	3.5
Emerging Markets (USD)	BBloom	5.74	-2.2	-4.3	8.6	8.2	-2.2	-4.3	8.6	8.2
US	BofA-ML	3.12	-0.4	-0.9	9.5	4.1	-0.4	-0.9	9.5	4.1
Europe	BofA-ML	0.90	-2.5	-2.8	0.5	2.6	-1.9	-1.6	2.3	1.7
UK	BofA-ML	2.28	-3.0	-5.2	3.0	1.1	0.1	0.2	7.5	4.6
Japan	BofA-ML	0.32	2.7	3.5	6.6	3.5	0.3	0.6	1.1	0.7
HY Corporate Bonds										
Global	BofA-ML	7.88	-6.8	-9.0	-1.9	3.9	-6.6	-8.6	-1.5	3.9
US	BofA-ML	8.29	-7.3	-9.4	-2.5	3.6	-7.3	-9.4	-2.5	3.6
Europe	BofA-ML	5.54	-8.4	-10.7	-5.2	2.8	-7.7	-9.5	-3.5	2.0
Cash (Overnight LIBOR)										
US		1.08	2.8	0.3	2.0	1.2	2.8	0.3	2.0	1.2
Euro Area		-0.58	-1.8	-0.4	-1.4	0.6	-0.7	-0.1	-0.5	-0.4
UK		0.19	-0.6	-5.1	-3.2	-2.9	0.9	0.1	0.7	0.5
Japan		-0.09	7.8	3.8	6.3	3.0	-0.1	0.0	-0.1	0.0
Real Estate (REITs)										
Global	FTSE	1582	-21.4	-21.9	-13.9	1.6	-20.9	-20.9	-12.4	0.7
Emerging Markets	FTSE	1969	-10.9	-20.4	-7.0	6.2	-10.3	-19.4	-5.4	5.3
US	FTSE	2448	-26.0	-24.0	-17.0	0.6	-26.0	-24.0	-17.0	0.6
Europe ex-UK	FTSE	2920	-19.0	-22.9	-11.6	3.9	-18.5	-21.9	-10.0	3.0
UK	FTSE	983	-21.1	-28.0	-14.1	-4.6	-18.6	-24.0	-10.3	-1.3
Japan	FTSE	2501	-19.2	-16.4	-4.3	1.1	-21.0	-18.7	-9.2	-1.6
Commodities										
All	GSCI	1757	-27.5	-32.2	-29.3	-10.2	-	-	-	-
Energy	GSCI	267	-40.6	-46.2	-42.8	-14.7	-	-	-	-
Industrial Metals	GSCI	1082	-11.1	-11.2	-15.3	-1.7	-	-	-	-
Precious Metals	GSCI	1840	3.0	2.9	19.7	5.3	-	-	-	-
Agricultural Goods	GSCI	315	-5.7	-9.6	-6.1	-8.8	-	-	-	-
Currencies (vs USD)**										
EUR		1.12	0.3	-0.2	-0.9	1.0	-	-	-	-
JPY		104.65	0.5	3.8	6.4	3.0	-	-	-	-
GBP		1.25	-3.1	-5.3	-4.2	-3.4	-	-	-	-
CHF		1.06	4.5	2.5	6.8	1.2	-	-	-	-
CNY		7.03	0.1	-0.9	-4.6	-2.3	-	-	-	-

Notes: *Five-year returns are annualised. **The currency section is organised so that in all cases the numbers show the movement in the mentioned currency versus USD (+ve indicates appreciation, -ve indicates depreciation). Past performance is no guarantee of future results. Please see appendix for definitions, methodology and disclaimers. Source: Datastream and Invesco.

Appendix 3: Invesco 10-year Capital Market Assumptions (USD version)

Asset Class	Index	Expected geometric return %	Expected arithmetic return %	Expected Risk %	Arithmetic return to risk ratio
Fixed income					
US Treasury Short	Barclays US Treasury Short	1.8	1.8	1.6	1.18
US Treasury Intermediate	BBG BARC US Treasury Intermediate	1.9	2.0	4.5	0.44
US Treasury Long	BBG BARC US Treasury Long	1.9	2.5	11.4	0.22
US TIPS	BBG BARC US TIPS	2.2	2.4	5.8	0.42
US Bank Loans	CSFB Leverage Loan Index	4.6	4.9	8.2	0.60
US Aggregate	BBG BARC US Aggregate	2.4	2.5	6.0	0.43
US Inv Grd Corps	BBG BARC US Investment Grade	2.4	2.6	7.5	0.35
US MBS	BBG BARC US MBS	2.8	3.0	6.6	0.45
US Preferred Stocks	BOA ML Fixed Rate Pref Securities	3.7	4.5	12.7	0.35
US High-Yield Corps	BBG BARC US High Yield	4.1	4.6	10.0	0.46
US Intermediate Municipals	BOA ML US Municipal (3Y-15Y)	2.5	2.7	6.0	0.45
US High-Yield Municipals	BBG BARC Municipal Bond High Yield	2.1	2.5	8.9	0.28
Global Aggregate	BBG BARC Global Aggregate	2.4	2.7	6.9	0.39
Global Aggregate-Ex US	BBG BARC Global Aggregate- Ex US	2.4	2.9	10.4	0.28
Global Treasury	BBG BARC Global Treasuries	2.3	2.7	8.6	0.31
Global Sovereign	BBG BARC Global Sovereign	1.9	2.1	6.7	0.32
Global Corporate	BBG BARC Global Corporate	2.5	2.8	7.4	0.37
Global Inv Grd	BBG BARC Global Corporate Inv Grd	2.5	2.8	7.6	0.36
Eurozone Corporate	BBG BARC Euro Aggregate Credit - Corporate	2.5	3.3	13.5	0.25
Eurozone Treasury	BBG BARC Euro Aggregate Government - Treasury	2.5	3.3	12.7	0.26
Asian Dollar Inv Grd	BOA Merrill Lynch ACIG	2.9	3.2	8.7	0.37
Asian Dollar High Yield	BOA Merrill Lynch ACHY	6.4	8.0	18.7	0.43
EM Aggregate	BBG BARC EM Aggregate	3.8	4.7	13.3	0.35
EM Aggregate Sovereign	BBG BARC EM Sovereign	4.5	5.2	12.3	0.42
EM Aggregate Corporate	BBG BARC EM Corporate	3.8	4.8	14.8	0.33
EM Corporate IG	BBG BARC EM USD Aggregate - Corporate -IG	2.6	3.0	8.3	0.36
Equities					
World Equity	MSCI ACWI	6.0	7.3	16.6	0.44
World Ex-US Equity	MSCI ACWI Ex-US	6.7	8.2	18.6	0.44
US Broad	Russell 3000	5.6	6.9	17.1	0.40
US Large Cap	S&P 500	5.5	6.8	16.4	0.41
US Mid Cap	Russell Midcap	6.1	7.8	18.9	0.41
US Small Cap	Russell 2000	6.9	9.1	22.1	0.41
MSCI EAFE	MSCI EAFE	6.2	7.7	18.4	0.42
MSCI Europe	MSCI Europe	6.4	8.0	18.4	0.43
Eurozone	MSCI Euro X UK	6.0	7.7	19.5	0.39
UK Large Cap	FTSE 100	7.3	9.0	19.7	0.46
UK Small Cap	FTSE Small Cap UK	8.4	11.2	25.1	0.44
Canada	S&P TSX	6.1	7.9	19.8	0.40
Japan	MSCI JP	4.9	7.2	22.6	0.32
Emerging Market	MSCI EM	8.0	10.8	25.2	0.43
Asia Pacific Ex JP	MSCI APXJ	7.7	10.6	25.6	0.41
Pacific Ex JP	MSCI Pacific X JP	7.3	10.0	24.8	0.40
Alternatives					
US REITs	FTSE NAREIT Equity	4.4	6.0	18.6	0.32
Global REITs	FTSE EPRA/NAREIT Developed Index	5.0	6.3	17.1	0.37
Global Infrastructure	Dow Jones Brookfield Global Infrastructure Composite	6.7	7.6	14.4	0.53
Hedge Funds	HFRI HF Index	4.3	4.7	8.5	0.55
Commodities	S&P GSCI	5.4	7.7	22.6	0.34
Agriculture	S&P GSCI Agriculture	0.7	2.9	21.5	0.13
Energy	S&P GSCI Energy	7.8	12.8	34.7	0.37
Industrial Metals	S&P GSCI Industrial Metals	4.9	7.5	24.2	0.31
Precious Metals	S&P GSCI Precious Metals	3.1	4.7	18.7	0.25

Notes: Estimates as of 31 December 2020, as published in 2020 Long-Term Capital Market Assumptions – Q1 Update. These estimates reflect the views of Invesco Investment Solutions, the views of other investment teams at Invesco may differ from those presented here. There is no guarantee that these views will come to pass. TIPS = treasury inflation protected securities, MBS = mortgage backed securities. Source: Invesco Investment Solutions

Appendix 4: Scenario asset assumptions

Fixed income assumptions for 1-year projected returns

	US	Eurozone	UK	Japan	EM	China
Central bank rates						
Very Worst Case	0.00	-1.00	0.00	-0.70	-	2.50
Worst Case	0.00	-0.80	0.00	-0.50	-	3.50
Best Case	0.25	-0.70	0.00	-0.30	-	3.75
Very Best Case	0.50	-0.60	0.50	-0.20	-	4.00
Sovereign spreads vs rates						
Very Worst Case	50	100	50	50	-	-
Worst Case	0	75	25	25	-	-
Best Case	-25	60	0	10	-	-
Very Best Case	100	100	25	25	-	-
Corporate IG spreads vs sovereign						
Very Worst Case	600	300	525	100	-	-
Worst Case	300	150	300	100	-	-
Best Case	220	80	200	40	-	-
Very Best Case	135	50	175	35	-	-
Corporate HY spreads vs sovereign						
Very Worst Case	1800	2000	-	-	-	-
Worst Case	1200	1200	-	-	-	-
Best Case	800	625	-	-	-	-
Very Best Case	500	400	-	-	-	-
HY default rates						
Very Worst Case	16%	12%	-	-	-	-
Worst Case	10%	10%	-	-	-	-
Best Case	5%	4%	-	-	-	-
Very Best Case	4%	3%	-	-	-	-
HY recovery rates						
Very Worst Case	25%	25%	-	-	-	-
Worst Case	30%	30%	-	-	-	-
Best Case	40%	40%	-	-	-	-
Very Best Case	43%	50%	-	-	-	-

Notes: See appendices for definitions, methodology and disclaimers. Source: Invesco

Equities and real estate assumptions for 1-year projected returns

	US	Europe ex-UK	UK	Japan	EM	China
Equities dividend growth						
Very Worst Case	-20%	-25%	-20%	-30%	-20%	-25%
Worst Case	-12%	-18%	-15%	-10%	-12%	-15%
Best Case	-2%	-10%	-8%	0%	-5%	-10%
Very Best Case	2%	-5%	0%	5%	0%	-5%
Equities dividend yield						
Very Worst Case	3.5%	6.0%	6.0%	3.5%	5.0%	3.5%
Worst Case	2.8%	4.5%	5.7%	3.0%	4.0%	2.8%
Best Case	2.3%	3.8%	5.0%	2.7%	3.5%	2.5%
Very Best Case	2.1%	3.5%	4.5%	2.3%	3.2%	2.3%
Real estate dividend growth						
Very Worst Case	-25%	-15%	-20%	-15%	-20%	-
Worst Case	-10%	-10%	-8%	-8%	-12%	-
Best Case	-5%	-5%	-5%	0%	-2%	-
Very Best Case	0%	0%	0%	5%	3%	-
Real estate dividend yield						
Very Worst Case	10.0%	8.0%	10.0%	4.5%	5.5%	-
Worst Case	6.5%	5.7%	5.5%	3.8%	5.2%	-
Best Case	4.5%	4.5%	4.3%	3.2%	4.8%	-
Very Best Case	4.2%	4.0%	4.0%	3.0%	4.6%	-

Notes: See appendices for definitions, methodology and disclaimers. Source: Invesco

Appendix 5: Methodology for asset allocation, expected returns and optimal portfolios

Portfolio construction process

The optimal portfolios are theoretical and not real. We use optimisation processes to guide our allocations around "neutral" and within prescribed policy ranges based on our estimations of expected returns and using historical covariance information. This guides the allocation to global asset groups (equities, government bonds etc.), which is the most important level of decision. For the purposes of this document the optimal portfolios are constructed with a one-year horizon.

Which asset classes?

We look for investibility, size and liquidity. We have chosen to include: equities, bonds (government, corporate investment grade and corporate high-yield), REITs to represent real estate, commodities and cash (all across a range of geographies). We use cross-asset correlations to determine which decisions are the most important.

Neutral allocations and policy ranges

We use market capitalisation in USD for major benchmark indices to calculate neutral allocations. For commodities, we use industry estimates for total ETP market cap + assets under management in hedge funds + direct investments. We use an arbitrary 5% for the combination of cash and gold. We impose diversification by using policy ranges for each asset category (the range is usually symmetric around neutral).

Expected/projected returns

The process for estimating expected returns is based upon yield (except commodities, of course). After analysing how yields vary with the economic cycle, and where they are situated within historical ranges, we forecast the direction and amplitude of moves over the next year. Cash returns are calculated assuming a straight-line move in short term rates towards our targets (with, of course, no capital gain or loss). Bond returns assume a straight-line progression in yields, with capital gains/losses predicated upon constant maturity (effectively supposing constant turnover to achieve that). Forecasts of corporate investment-grade and high-yield spreads are based upon our view of the economic cycle (as are forecasts of credit losses). Coupon payments are added to give total returns. Equity and REIT returns are based on dividend growth assumptions. We calculate total returns by applying those growth assumptions and adding the forecast dividend yield. No such metrics exist for commodities; therefore, we base our projections on US CPI-adjusted real prices relative to their long-term averages and views on the economic cycle. All expected returns are first calculated in local currency and then, where necessary, converted into other currency bases using our exchange rate forecasts.

Optimising the portfolio

Using a covariance matrix based on monthly local currency total returns for the last 5 years and we run an optimisation process that maximises the Sharpe Ratio. Another version maximises Return subject to volatility not exceeding that of our Neutral Portfolio. The optimiser is based on the Markowitz model.

Currency hedging

We adopt a cautious approach when it comes to currency hedging as currency movements are notoriously difficult to accurately predict and sometimes hedging can be costly. Also, some of our asset allocation choices are based on currency forecasts. We use an amalgam of central bank rate forecasts, policy expectations and real exchange rates relative to their historical averages to predict the direction and amplitude of currency moves.

Appendix 6: Definitions of data and benchmarks

Sources: we source data from Datastream unless otherwise indicated.

Cash: returns are based on a proprietary index calculated using the Intercontinental Exchange Benchmark Administration overnight LIBOR (London Interbank Offer Rate). The global rate is the average of the euro, British pound, US dollar and Japanese yen rates. The series started on 1st January 2001 with a value of 100.

Gold: London bullion market spot price in USD/troy ounce.

Government bonds: Current values in the market forecast table (figure 34) use Datastream benchmark 10-year yields for the US, Eurozone, Japan and the UK and the Thomson Reuters China benchmark 10-year yield for China. Historical and projected yields and returns (figures 25, 32, 34) are based on Bank of America Merrill Lynch government bond indices with historical ranges starting on 31st December 1985 for the Global, Europe ex-UK, UK and Japanese indices and 30th January 1978 for the US. The emerging markets yields and returns are based on the Barclays Bloomberg emerging markets sovereign US dollar bond index with the historical range starting on 28th February 2003. The same indices are used to construct figure 25 and appendix 2.

Corporate investment grade (IG) bonds: Bank of America Merrill Lynch investment grade corporate bond indices with historical ranges starting on 31st December 1996 for the Global, 31st January 1973 for the US dollar, 1st January 1996 for the euro, 31st December 1996 for the British pound, and 6th September 2001 for the Japanese yen indices. The emerging markets yields and returns are based on the Barclays Bloomberg emerging markets corporate US dollar bond index with the historical range starting on 28th February 2003.

Corporate high yield (HY) bonds: Bank of America Merrill Lynch high yield indices with historical ranges starting on 29th August 1986 for the US dollar, and 31st December 1997 for the Global and euro indices.

Equities: We use MSCI benchmark indices to calculate projected returns and calculate long-term total returns with historical ranges starting on 31st December 1969 for the Global, US, Europe ex-UK, UK and Japanese indices, and 31st December 1987 for the emerging markets index. Equity index valuations (figures 25 and 26 and appendix 2) are based on dividend yields and price-earnings ratios using Datastream benchmark indices with historical ranges starting on 1st January 1973 for the Global, US, Europe ex-UK and Japanese indices, on 31st December 1969 for the UK index and 2nd January 1995 for the Emerging Markets index.

Real estate: We use FTSE EPRA/NAREIT indices with historical ranges starting on 29th December 1989 for the US, Europe ex-UK, UK and Japanese indices, 18th February 2005 for the Global index, and 31st October 2008 for the Emerging Markets index.

Commodities: Goldman Sachs Commodity Index with historical ranges starting on 31st December 1969 for the All Commodities and Agriculture indices, 31st December 1982 for the Energy index, 3rd January 1977 for the Industrial Metals index, and 2nd January 1973 for the Precious Metals index. We refer to oil & gas and industrial metals as industrial commodities.

US Shiller PE and Earnings Per Share (EPS): the Shiller PE is a price to earnings ratio constructed by dividing price by the average earnings per share in the previous 10 years (with both numerator and denominator adjusted for inflation). It is what is commonly known as a cyclically-adjusted PE ratio. It is constructed by US academic Robert Shiller. Data is monthly from 1881 (source Robert Shiller – see here). EPS

US stock/equity index: we have calculated a total return index for broad US stocks based on index and dividend data from US academic Robert Shiller and Datastream. The index prior to 1926 is Robert Shiller's recalculation of data from Common Stock Indexes by Cowles & Associates (see here). From 1926 to 1957, the Shiller data is based on the S&P Composite Index and thereafter is based on the S&P 500 as we know it today.

Definitions of data and benchmarks for Appendix 2

Sources: we source data from Datastream unless otherwise indicated.

Cash: returns are based on a proprietary index calculated using the Intercontinental Exchange Benchmark Administration overnight LIBOR (London Interbank Offer Rate). The global rate is the average of the euro, British pound, US dollar and Japanese yen rates. The series started on 1st January 2001 with a value of 100.

Gold: London bullion market spot price in USD/troy ounce.

Government bonds: Current levels, yields and total returns use Datastream benchmark 10-year yields for the US, Eurozone, Japan and the UK, and the Bank of America Merrill Lynch government bond total return index for the World and Europe. The emerging markets yields and returns are based on the JP Morgan emerging markets global composite government bond index.

Corporate investment grade (IG) bonds: Bank of America Merrill Lynch investment grade corporate bond total return indices and the Barclays Bloomberg emerging markets corporate US dollar bond total return index for emerging markets.

Corporate high yield (HY) bonds: Bank of America Merrill Lynch high yield total return indices

Equities: We use MSCI benchmark gross total return indices for all regions.

Commodities: Goldman Sachs Commodity total return indices

Real estate: FTSE EPRA/NAREIT total return indices

Currencies: Global Trade Information Services spot rates

Important information

Your capital is at risk. You may not get back the amount you invested.
By accepting this document, you consent to communicating with us in English, unless you inform us otherwise.

This document has been prepared only for those persons to whom Invesco has provided it for informational purposes only. This document is not an offering of a financial product and is not intended for and should not be distributed to retail clients who are resident in jurisdiction where its distribution is not authorized or is unlawful.. Circulation, disclosure, or dissemination of all or any part of this document to any person without the consent of Invesco is prohibited.

This document may contain statements that are not purely historical in nature but are "forward-looking statements," which are based on certain assumptions of future events. Forward-looking statements are based on information available on the date hereof, and Invesco does not assume any duty to update any forward-looking statement. Actual events may differ from those assumed. There can be no assurance that forward-looking statements, including any projected returns, will materialize or that actual market conditions and/or performance results will not be materially different or worse than those presented.

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.

You should note that this information:

• may contain references to amounts which are not in local currencies;
• may contain financial information which is not prepared in accordance with the laws or practices of your country of residence;
• may not address risks associated with investment in foreign currency denominated investments; and
• does not address local tax issues.

All material presented is compiled from sources believed to be reliable and current, but accuracy cannot be guaranteed. Investment involves risk. Please review all financial material carefully before investing. The opinions expressed are based on current market conditions and are subject to change without notice. These opinions may differ from those of other Invesco investment professionals.

The distribution and offering of this document in certain jurisdictions may be restricted by law. Persons into whose possession this marketing material may come are required to inform themselves about and to comply with any relevant restrictions. This does not constitute an offer or solicitation by anyone in any jurisdiction in which such an offer is not authorised or to any person to whom it is unlawful to make such an offer or solicitation.

Authors

Paul Jackson
Global Head of Asset Allocation Research,
Global Thought Leadership
Telephone +44(0)20 3370 1172
Email paul.jackson@invesco.com

Andras Vig
Multi-Asset Strategist
Telephone +44(0)20 3370 1152
Email andras.vig@invesco.com

Further information

Telephone +44 (0)20 8538 4900
Email invest@invesco.com
etf.invesco.com

Portman Square House, 43-45 Portman Square, London W1H 6LY

Telephone calls may be recorded.