Uncommon truths
Will tapering ruin our Covid memories?

The peak-end rule suggests memories of events are dominated by the moment of peak emotion and the end. We use the VIX as a measure of pain during the pandemic and look ahead to tapering.

What will be your memory of the Covid experience? Of course, we have all had very long, personal and sometimes painful experiences but the duration may have less effect on our recollections than you might believe. Indeed, there are good theoretical reasons for believing that how it ends will have an important influence upon our memories (of which more later).

Unfortunately, for the world as a whole, the pandemic is far from over. **Figure 1** shows we are in the middle of a third global wave, with daily infections now higher than at any other point and daily deaths moving higher (it is to be seen if vaccination rollouts will prevent deaths also setting a new record). This was not totally unexpected, as the second and third waves of the Spanish Flu pandemic were also the deadliest (see Virtual clusters favour regions over large cities).

The problem area now appears to be Asia Pacific, with India responsible for most of that surge. Unfortunately, India has so far only vaccinated around 9% of its population (with at least one dose), compared to 50% in the UK, 43% in the US and 20%-30% in many EU countries. Quite apart from the problems caused by variants, this low vaccination rate in India suggests case fatality rates are likely to remain high.

Interestingly, **Figure 1** suggests the latest wave of the pandemic is easing in some other regions. We suspect this is due to a combination of lockdown measures and vaccine rollouts, with lockdowns doing the heavy lifting (as suggested by UK PM Boris Johnson on 13 April). Hence, there is a concern that another wave is possible as countries ease lockdowns (note that cases and deaths have stopped falling in the US where easing has been relatively rapid). However, unless variants render vaccines ineffective, many developed countries can look forward to some (new) kind of economic normality during the second-half of the year.

This raises the question of how we will look back upon this extraordinary episode. We shall turn to the investment legacy later but thought it might be worth looking at how our memories of extreme events are formed. Rather than being an average of our feelings throughout the duration of an episode (either positive or negative), it appears that our memories are formed by a combination of our feelings at the most extreme moment and those at the end.

This is known as the peak-end rule and was developed by psychologist Daniel Kahneman ("*The peak-end rule is a psychological heuristic in which people judge an experience largely based on how they felt at its peak (i.e. its most intense point) and at its end, rather than based on the total sum or average of every moment of the experience.*").

He talks of two kinds of selves: the experiencing self and the narrating self. The experiencing self is our moment to moment awareness and does not remember those moments (each of which lasts three seconds). The narrating self organises those experiences into a story and, given the number of three second moments in our lives, it has to be selective. From an evolutionary perspective, Kahneman suggests that "*For survival you don't need to put a lot of weight on duration of experiences. It is how bad they are and whether they end well, that is really the information you need as an organism*". Hence, our memory of an event may differ from the actual experience of that event.

Figure 1a – Daily Covid cases (7-day MA)

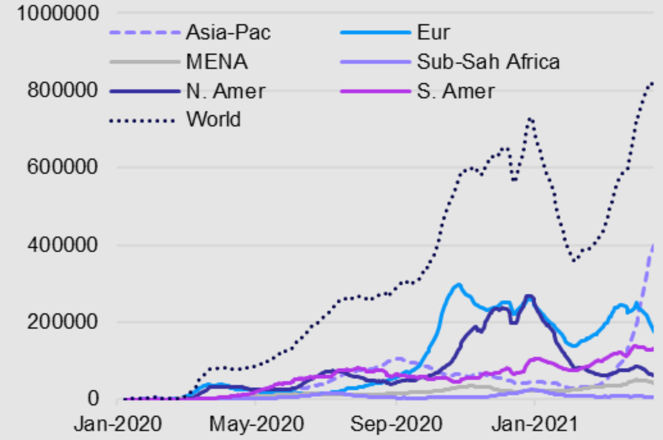
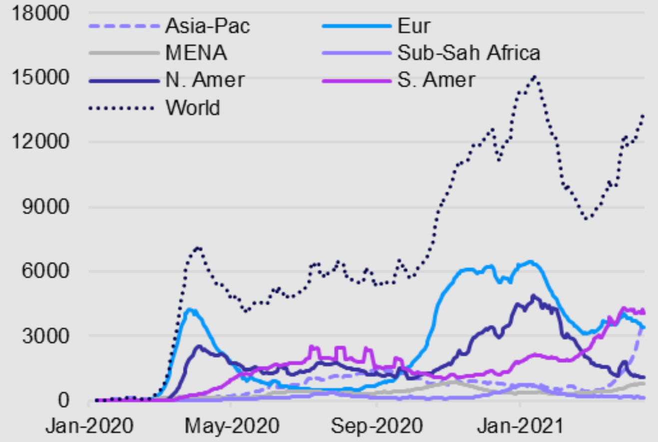


Figure 1b – Daily Covid deaths (7-day MA)



Based on daily data from 16 January 2020 to 28 April 2021. "7-day MA" is seven-day moving average.
Source: Reuters, Refinitiv Datastream and Invesco

Invesco

Kahneman and others have conducted experiments to test this theory, one of the most graphic involving the patient experience of a colonoscopy (a friend of mine suggested that being told such interventions may cause discomfort was like being told you may get a little wet shortly before being hit by a tsunami!). Patients were asked to record their feelings at regular intervals during the procedure and were then asked sometime later for their assessment of the experience.

There were two groups of patients, both of which had the same experience (and recorded similar feelings) during the procedure but for the second group the scope was left inside and immobile for a further 20 seconds (there is more discomfort when the scope is moved). They recorded less stress during those 20 seconds and their overall judgement about the discomfort of the procedure was less extreme than for the other group. So, it would appear the fact that the procedure ended with less discomfort was important in forming their memory of the overall experience. I remember being told that for the same reason dentists fiddle aimlessly in your mouth at the end of dental work but my dentist had never heard of the idea.

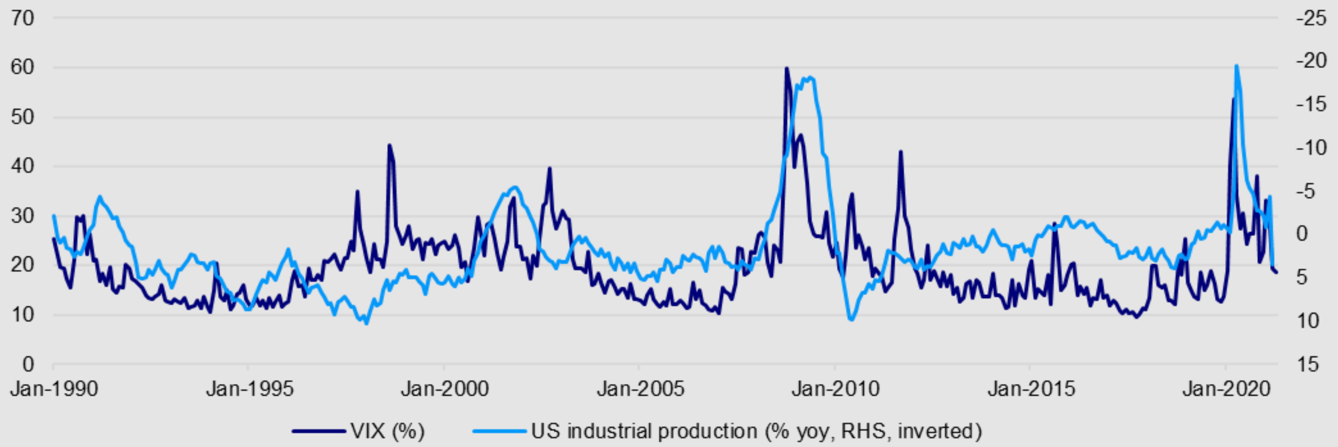
If there is anything to the peak-end rule, our memories of Covid will depend upon what we felt at the most intense moment (perhaps a bereavement, lockdown depression or fear) and how it ends. We will all have our own version of the most intense moment but we will have similar experiences about the conclusion (perhaps a family reunion or a visit to the pub, cinema, theatre or abroad). Those ending experiences are likely to be positive and could dampen the memory of the pain that some have felt during the pandemic, irrespective of the duration of that pain.

When it comes to the investment legacy, after some dramatic weeks in February and March 2020, financial markets have broadly looked forward to happier times. In **Figure 2** we use the VIX index as a measure of financial market stress and it would appear that markets had never been more worried than they were in March 2020 (the 16 March peak of 82.69 was a daily record). From that perspective, the "peak" moment was the epitome of extreme.

However, **Figure 2** also shows the cyclical nature of volatility, with peaks tending to occur when the economy is in recession (industrial production growth is inverted in the chart). Likewise, economic expansion tends to be associated with low volatility (this was even more clear when we use gains in payrolls to gauge the cycle but the unprecedented swings in employment during 2020 cause a problem of scaling). Not surprisingly, as the economy has recovered, volatility has declined. Indeed, the VIX index averaged 17.4 during April 2021, well below the historical average of 19.5 (since 1990), suggesting a happy (relaxed) ending to the period of turmoil.

However, and as we have noted before, volatility is not only cyclical, it also seems to follow a seasonal pattern. So, to judge the level of "comfort" expressed by a VIX average of 17.4 during April, we need an idea of the seasonal pattern. **Figure 3** shows monthly averages of the VIX index since 1990 and would seem to suggest that volatility is on average lowest during the spring and early-summer period. Late-summer typically brings higher volatility with the peak coming in the September-November period. If that pattern holds during 2021, the dampened volatility of recent weeks may continue over the coming months.

Figure 2 – US equity market volatility and the economic cycle



Based on monthly data from January 1990 to April 2021 (as of 30 April 2021). The CBOE Volatility Index (VIX) is an index that represents the market's expectations for volatility of the S&P 500 over the coming 30 days. **Past performance is no guarantee of future results**.
Source: CBOE, Refinitiv Datastream and Invesco

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Indeed, the 2021 data in **Figure 3** confirms that, having started the year above historical norms, the VIX index was below the historical average during April. The decline between March and April would appear to have both seasonal and cyclical aspects (volatility typically declines in April but the decline also seems to be part of the ongoing response to improved economic and profit conditions).

If the pandemic is now past its worst point (in the developed world), and if the VIX index is our measure of financial market stress or pain, then the ending of the pandemic could feel pain free (the equivalent of the dentist fiddling around aimlessly in your mouth at the end of a root canal procedure). Hence, despite the trauma of March 2020, our investment memories of the pandemic episode may be surprisingly positive (and why not given the subsequent performance of stock markets).

But what of the future? What could bring about the typical seasonal pattern whereby volatility picks up as we head into the Autumn? The obvious answer this year would appear to be the possibility of Fed tapering, whether announced by the Fed or anticipated by markets.

The Bank of Canada recently announced a tapering of its own asset purchase programme and suggested an acceleration of its rate hike schedule. Given that the US economy is receiving so much fiscal support (see Is ARP dollar positive?, for example), it is only reasonable to assume the Fed will feel able to remove some of its own policy support in the not too distant future. If anything, we think the risk is that the Fed is too slow to tighten, with the result that inflation rises above what is currently priced-in to markets (around 2.4% per year over 10 years).

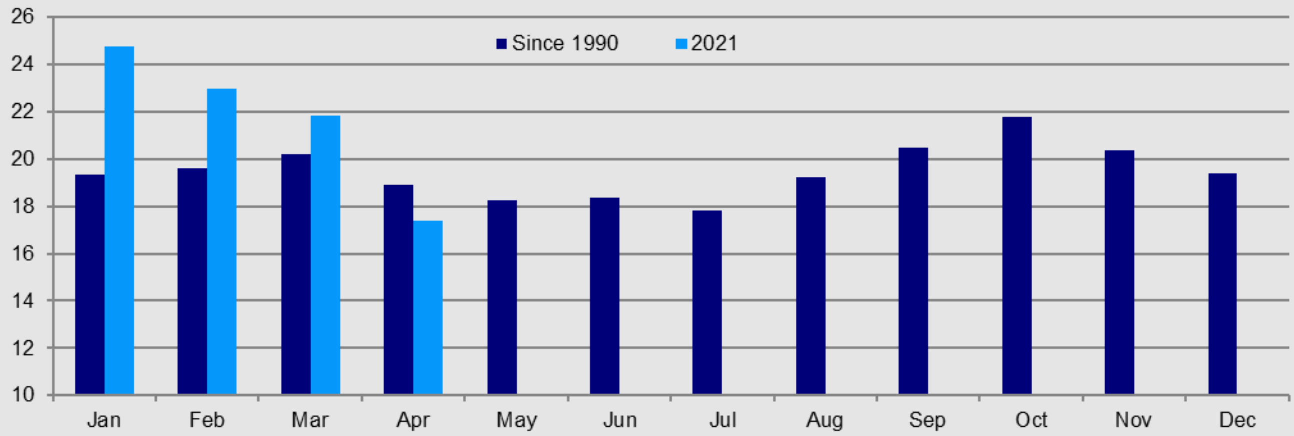
Though the Fed's most recent FOMC meeting gave no hint of imminent changes, Bloomberg's survey of 49 economists revealed that a majority believe a tapering announcement will come this year (14% of respondents chose Q3 and 45% selected Q4). Most (71%) believe that tapering will last for 7-12 months and it is therefore unsurprising that they think the first rate hike will not come until 2023.

We do not fear a tapering process that starts later this year. In fact, we would be more worried if it doesn't come this year (either because it would signal that the economy is too weak or conversely that the Fed is falling a long way behind the curve). Tapering may cause a bit of market volatility (a mild tantrum), in our opinion, but we doubt it would cause anything much beyond the typical seasonal rise (our research suggests Fed tightening cycles are associated with low volatility because the economy is strong). To see something worse than that would take either a sharp slowdown in the economy (due to troublesome variants, say) or a sharp rise in core inflation that spooks markets, in our opinion. Needless to say, when volatility rises, market indices tend to fall.

In peak-end terms, the only way we see this ending badly is if Covid turns nasty or if it turns out that major central banks have already committed a big error. In either case, we suspect it would be too late for financial markets to escape (the equivalent of being tied into the dentist's chair, with no anaesthetic and hearing the whirring sound of the drill). Of course, as individual investors can always take a more defensive stance. However, we suspect the year will end without too much drama and for now we stick to our preference for cyclical assets (see the Model Asset Allocation in **Figure 7**).

Unless stated otherwise, all data as of 30 April 2021

Figure 3 – US equity market volatility (VIX) – monthly averages (%)



Based on daily data from 2 January 1990 to 30 April 2021. The CBOE Volatility Index (VIX) is an index that represents the market's expectations for volatility of the S&P 500 over the coming 30 days. **Past performance is no guarantee of future results**.
Source: CBOE, Refinitiv Datastream and Invesco

Invesco

Figure 4 – Asset class total returns

Data as at 30/04/2021	Index	Current Level/RY	Total Return (USD, %) 1w	1m	QTD	YTD	12m	Total Return (Local Currency, %) 1w	1m	QTD	YTD	12m
Equities												
World	MSCI	702	-0.2	4.4	4.4	9.3	46.4	-0.2	3.8	3.8	10.0	42.7
Emerging Markets	MSCI	1348	-0.4	2.5	2.5	4.9	49.2	-0.6	1.6	1.6	5.7	43.3
China	MSCI	109	-1.8	1.4	1.4	1.0	37.1	-1.7	1.2	1.2	1.0	35.9
US	MSCI	4061	-0.1	5.4	5.4	11.2	48.5	-0.1	5.4	5.4	11.2	48.5
Europe	MSCI	1983	-0.4	4.7	4.7	9.1	43.8	-0.4	2.5	2.5	10.4	31.3
Europe ex-UK	MSCI	2489	-0.6	4.8	4.8	8.6	47.3	-0.6	2.1	2.1	10.7	34.5
UK	MSCI	1127	0.6	4.4	4.4	10.9	32.6	0.6	4.0	4.0	9.4	20.8
Japan	MSCI	3827	-2.0	-1.5	-1.5	0.2	31.0	-0.9	-2.6	-2.6	6.0	33.9
Government Bonds												
World	BofA-ML	0.52	-0.7	1.1	1.1	-4.7	0.3	-0.4	0.1	0.1	-3.0	-2.6
Emerging Markets	BBloom	4.45	-0.2	3.0	3.0	-4.6	17.7	-0.2	3.0	3.0	-4.6	17.7
China	BofA-ML	3.05	0.3	2.0	2.0	2.6	8.0	0.0	0.7	0.7	1.6	-0.9
US (10y)	Datastream	1.63	-0.6	1.6	1.6	-5.2	-6.8	-0.6	1.6	1.6	-5.2	-6.8
Europe	Bofa-ML	0.08	-0.7	1.3	1.3	-4.9	10.7	-0.6	-1.1	-1.1	-3.4	0.7
Europe ex-UK (EMU, 10y)	Datastream	-0.25	-0.6	1.6	1.6	-4.8	6.3	-0.5	-0.8	-0.8	-3.2	-3.3
UK (10y)	Datastream	0.87	-0.8	0.5	0.5	-4.4	4.0	-0.9	0.2	0.2	-5.7	-5.3
Japan (10y)	Datastream	0.08	-1.4	1.2	1.2	-6.0	-2.9	-0.2	0.1	0.1	-0.4	-0.8
IG Corporate Bonds												
Global	BofA-ML	1.76	-0.2	1.5	1.5	-2.9	8.2	-0.2	0.8	0.8	-2.6	4.9
Emerging Markets	BBloom	3.78	0.1	1.4	1.4	-0.5	20.9	0.1	1.4	1.4	-0.5	20.9
China	BofA-ML	3.95	0.3	1.8	1.8	2.6	9.7	0.0	0.5	0.5	1.5	0.6
US	BofA-ML	2.25	-0.3	1.2	1.2	-3.4	5.1	-0.3	1.2	1.2	-3.4	5.1
Europe	BofA-ML	0.46	-0.3	2.4	2.4	-2.3	15.1	-0.2	0.0	0.0	-0.7	4.8
UK	BofA-ML	1.90	-0.4	1.2	1.2	-2.5	14.0	-0.5	0.8	0.8	-3.7	3.9
Japan	BofA-ML	0.40	-1.2	1.2	1.2	-5.3	-1.4	0.0	0.1	0.1	0.2	0.8
HY Corporate Bonds												
Global	BofA-ML	4.67	0.2	1.5	1.5	1.4	22.0	0.2	1.0	1.0	1.7	19.8
US	BofA-ML	4.79	0.2	1.1	1.1	2.0	20.1	0.2	1.1	1.1	2.0	20.1
Europe	BofA-ML	2.94	0.1	3.1	3.1	0.6	27.6	0.2	0.7	0.7	2.2	16.1
Cash (Overnight LIBOR)												
US		0.07	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1
Euro Area		-0.58	-0.7	2.5	2.4	-1.8	9.1	0.0	-0.1	0.0	-0.2	-0.6
UK		0.04	-0.4	0.5	0.2	1.0	9.8	0.0	0.0	0.0	0.0	0.0
Japan		-0.09	-1.2	1.0	1.3	-5.5	-2.0	0.0	0.0	0.0	0.0	-0.1
Real Estate (REITs)												
Global	FTSE	1968	0.6	5.6	5.6	11.9	32.6	0.7	3.1	3.1	13.7	20.6
Emerging Markets	FTSE	2005	-0.8	-2.5	-2.5	2.2	12.4	-0.7	-4.8	-4.8	3.9	2.2
US	FTSE	3304	1.5	8.2	8.2	18.6	39.4	1.5	8.2	8.2	18.6	39.4
Europe ex-UK	FTSE	3713	-0.5	8.1	8.1	0.3	35.3	-0.4	5.6	5.6	2.0	23.1
UK	FTSE	1481	1.2	6.5	6.5	10.9	33.0	1.2	6.1	6.1	9.5	21.2
Japan	FTSE	2819	-0.8	0.7	0.7	8.7	26.8	0.4	-0.4	-0.4	15.1	29.6
Commodities												
All	GSCI	2430	2.4	8.2	8.2	22.9	80.0	-	-	-	-	-
Energy	GSCI	348	2.4	7.1	7.1	30.2	123.1	-	-	-	-	-
Industrial Metals	GSCI	1673	2.7	9.7	9.7	19.6	65.0	-	-	-	-	-
Precious Metals	GSCI	2055	-0.6	3.3	3.3	-6.6	6.1	-	-	-	-	-
Agricultural Goods	GSCI	491	3.3	15.7	15.7	22.7	63.5	-	-	-	-	-
Currencies (vs USD)*												
EUR		1.20	-0.7	2.5	2.5	-1.6	9.7	-	-	-	-	-
JPY		109.29	-1.2	1.3	1.3	-5.5	-1.9	-	-	-	-	-
GBP		1.38	0.0	0.4	0.4	1.3	9.8	-	-	-	-	-
CHF		1.09	0.0	3.3	3.3	-3.1	5.7	-	-	-	-	-
CNY		6.47	0.3	1.2	1.2	0.8	9.1	-	-	-	-	-

Notes: *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: Refinitiv Datastream and Invesco

Figure 5 – World equity sector total returns relative to market (%)

Data as at 30/04/2021	Global				
	1w	1m	QTD	YTD	12m
Energy	**1.3**	**-3.4**	**-3.9**	**0.5**	**-13.8**
Basic Materials	**-0.2**	**2.3**	**2.1**	**4.7**	**16.2**
Basic Resources	-0.3	4.5	3.9	6.9	23.5
Chemicals	0.0	-0.5	-0.3	1.8	7.9
Industrials	**0.0**	**-0.2**	**0.2**	**1.9**	**6.7**
Construction & Materials	0.3	-0.6	-0.2	3.0	8.0
Industrial Goods & Services	0.0	-0.1	0.3	1.7	6.6
Consumer Discretionary	**-0.1**	**0.0**	**0.0**	**-1.6**	**7.0**
Automobiles & Parts	-2.5	-3.1	-4.1	-2.5	41.1
Media	0.1	-2.7	-2.6	-4.9	3.6
Retailers	1.2	1.9	2.0	-2.2	-4.5
Travel & Leisure	1.0	-2.3	-1.8	1.5	3.4
Consumer Products & Services	-0.9	1.5	1.7	-0.6	13.0
Consumer Staples	**-0.4**	**-2.3**	**-1.6**	**-5.9**	**-16.0**
Food, Beverage & Tobacco	-0.5	-1.2	-0.3	-4.4	-14.2
Personal Care, Drug & Grocery Stores	-0.2	-4.4	-4.0	-8.5	-19.4
Healthcare	**-1.3**	**0.4**	**0.1**	**-4.4**	**-15.0**
Financials	**1.7**	**-0.9**	**-0.1**	**5.5**	**3.4**
Banks	2.3	-1.9	-1.0	6.9	3.2
Financial Services	1.3	1.2	1.6	4.6	6.7
Insurance	1.0	-1.0	0.1	3.4	-0.4
Real Estate	**0.3**	**-0.2**	**0.6**	**1.2**	**-11.0**
Technology	**-0.8**	**2.6**	**1.6**	**0.6**	**12.8**
Telecommunications	**0.0**	**-2.2**	**-1.5**	**-2.1**	**-12.1**
Utilities	**-0.4**	**-1.0**	**-1.3**	**-5.2**	**-13.0**

Notes: Returns shown are for Datastream sector indices versus the total market index. Past performance is no guarantee of future results.
Source: Refinitiv Datastream and Invesco

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Figure 6a – US factor index total returns (%)

Data as at 30/04/2021	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	-0.8	6.4	14.8	14.8	66.8	-0.8	0.6	2.6	2.6	14.3
Low volatility	0.1	5.2	9.7	9.7	36.5	0.1	-0.5	-1.9	-1.9	-6.5
Price momentum	0.6	4.7	9.7	9.7	44.7	0.6	-1.0	-1.9	-1.9	-0.9
Quality	-0.7	3.5	17.1	17.1	56.9	-0.7	-2.1	4.7	4.7	7.5
Size	1.2	5.1	28.6	28.6	88.2	1.1	-0.6	15.0	15.0	28.9
Value	1.8	3.7	30.8	30.8	85.6	1.8	-1.9	17.0	17.0	27.2
Market	0.0	5.7	11.8	11.8	46.0					
Market - Equal-Weighted	0.2	4.7	16.8	16.8	57.1					

Notes: All indices are subsets of the S&P 500 index, they are rebalanced monthly, use data in US dollars and are equal-weighted. Growth average return on equity and the retention ratio); Low volatility includes stocks in the bottom quintile based on the standard deviation of their daily returns in the previous three months; Price momentum includes stocks in the top quintile based on their performance in the previous 12 months; Quality includes stocks in the top third based on both their return on invested capital and their EBIT to EV ratio (earnings before interest and taxes to enterprise value); Size includes stocks in the bottom quintile based on their market value in US dollars. Value includes stocks in the bottom quintile based on their price to book value ratios. The market represents the S&P 500 index. Past performance is no guarantee of future results.
Source: Refinitiv Datastream and Invesco

Figure 6b – European factor index total returns relative to market (%)

Data as at 30/04/2021	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	-0.6	6.1	15.8	15.8	58.2	-0.4	3.9	4.5	4.5	19.8
Low volatility	-0.8	1.3	7.3	7.3	24.2	-0.6	-0.8	-3.2	-3.2	-6.0
Price momentum	-1.1	2.6	7.9	7.9	38.1	-0.9	0.5	-2.7	-2.7	4.6
Quality	-0.2	3.0	11.6	11.6	45.4	0.0	0.9	0.6	0.6	10.1
Size	0.0	3.1	13.5	13.5	51.1	0.2	1.0	2.4	2.4	14.4
Value	1.7	0.5	19.3	19.3	60.7	1.9	-1.6	7.6	7.6	21.7
Market	-0.2	2.1	10.9	10.9	32.1					
Market - Equal-Weighted	-0.1	2.5	11.1	11.1	40.7					

Notes: All indices are subsets of the STOXX 600 index, they are rebalanced monthly, use data in euros and are equal-weighted. Growth includes stocks in the top third based on both their 5-year sales per share trend and their internal growth rate (the product of the 5-year average return on equity and the retention ratio); Low volatility includes stocks in the bottom quintile based on the standard deviation of their daily returns in the previous three months; Price momentum includes stocks in the top quintile based on their performance in the previous 12 months; Quality includes stocks in the top third based on both their return on invested capital and their EBIT to EV ratio (earnings before interest and taxes to enterprise value); Size includes stocks in the bottom quintile based on their market value in euros; Value includes stocks in the bottom quintile based on their price to book value ratios. The market represents the STOXX 600 index. Past performance is no guarantee of future results.
Source: Refinitiv Datastream and Invesco

Invesco

Figure 7 – Model asset allocation

	Neutral	Policy Range		Allocation	Position vs Neutral
Cash Equivalents	**5%**	**0-10%**		**10%**	
Cash	2.5%			10%	
Gold	2.5%			0%	
Bonds	**40%**	**10-70%**	↑	**22%**	
Government	25%	10-40%	↑	**17%**	
US	8%		↑	5%	
Europe ex-UK (Eurozone)	7%			4%	
UK	1%		↓	1%	
Japan	7%		↑	4%	
Emerging Markets	2%		↓	3%	
China**	0.2%		↓	0%	
Corporate IG	10%	0-20%		0%	
US Dollar	5%			0%	
Euro	2%			0%	
Sterling	1%			0%	
Japanese Yen	1%			0%	
Emerging Markets	1%			0%	
China**	0.1%			0%	
Corporate HY	5%	0-10%		5%	
US Dollar	4%		↑	5%	
Euro	1%		↓	0%	
Equities	**45%**	**25-65%**		**50%**	
US	25%			18%	
Europe ex-UK	7%			12%	
UK	4%		↑	7%	
Japan	4%		↓	5%	
Emerging Markets	5%			8%	
China**	2%		↓	2%	
Real Estate	**8%**	**0-16%**		**16%**	
US	2%		↑	4%	
Europe ex-UK	2%			4%	
UK	1%		↓	1%	
Japan	2%		↑	4%	
Emerging Markets	1%			3%	
Commodities	**2%**	**0-4%**	↓	**2%**	
Energy	1%		↓	1%	
Industrial Metals	0.3%		↓	0%	
Precious Metals	0.3%			0%	
Agriculture	0.3%			1%	
Total	**100%**			**100%**	

Currency Exposure (including effect of hedging)					
USD	48%		↑	40%	
EUR	20%		↓	22%	
GBP	7%		↓	10%	
JPY	15%		↑	14%	
EM	9%		↓	14%	
Total	**100%**			**100%**	

Notes: This is a theoretical portfolio and is for illustrative purposes only. See the latest The Big Picture document for more details. It does not represent an actual portfolio and is not a recommendation of any investment or trading strategy. Arrows indicate the direction of the most recent changes. Source: Invesco

Figure 8 – Model allocation for global sectors

	Neutral	Invesco		Preferred Region
Energy	**6.1%**	**Underweight**	↓	**US**
Basic Materials	**4.5%**	**Neutral**	↑	**Europe**
Basic Resources	2.5%	Neutral	↑	Europe
Chemicals	2.0%	Neutral		US
Industrials	**12.9%**	**Neutral**		**US**
Construction & Materials	1.6%	Neutral		Europe
Industrial Goods & Services	11.3%	Neutral		US
Consumer Discretionary	**16.2%**	**Overweight**		**US**
Automobiles & Parts	2.8%	Underweight		Japan
Media	1.3%	Overweight		US
Retailers	5.8%	Neutral	↑	US
Travel & Leisure	2.2%	Overweight		US
Consumer Products & Services	4.0%	Overweight		EM
Consumer Staples	**6.3%**	**Overweight**		**Japan**
Food, Beverage & Tobacco	4.1%	Overweight		Japan
Personal Care, Drug & Grocery Stores	2.2%	Underweight		Europe
Healthcare	**9.8%**	**Underweight**		**Europe**
Financials	**14.7%**	**Neutral**		**Japan**
Banks	7.4%	Underweight	↓	Japan
Financial Services	3.8%	Overweight		US
Insurance	3.4%	Neutral		Europe
Real Estate	**3.4%**	**Overweight**		**EM**
Technology	**18.9%**	**Overweight**		**US**
Telecommunications	**4.0%**	**Neutral**		**Europe**
Utilities	**3.2%**	**Neutral**		**Europe**

Notes: These are theoretical allocations which are for illustrative purposes only. They do not represent an actual portfolio and are not a recommendation of any investment or trading strategy. See the latest Strategic Sector Selector for more details.
Source: Refinitiv Datastream and Invesco

Appendix

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.

Definitions of data and benchmarks for Figure 4

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 Barclays Bloomberg emerging markets sovereign US dollar bond index.

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

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

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