

Uncommon truths

The art of being vaguely right

There are good reasons why we seek out too much information and trade manically but improved performance is not one of them. What can be done to improve investment and life outcomes?

Full disclosure: much of this document was first written in 2017 (“All things come to he who waits” – 26 February 2017). Then, personal circumstances caused a rethink of working patterns. Now, the holiday period in the Northern Hemisphere gives the chance to recalibrate and slow things down again.

Much of my life has been spent rushing from pillar to post (usually across borders), scouring data and news flows, scanning emails and Twitter feeds, while constantly checking market levels. Does that sound familiar? Does it improve performance?

Figure 1 suggests we have collectively become more frantic in our investment processes. In the immediate post-war period, the average holding period for stocks was commonly above six years and sometimes as high as ten years (whether we look at the US or Germany).

Is it pure coincidence that average holding periods then steadily declined as the investment industry matured? By the time I had started my career in the mid-1980s, average holding periods had fallen to less than two years in the US and below one year in Germany. Unsurprisingly, the apex of activity in that decade came in 1987, when the average holding period for German stocks was around three months!

We became ever more frantic as the financial crisis approached, with the post-war low in average holding periods coming in 2008 (around six months in the US

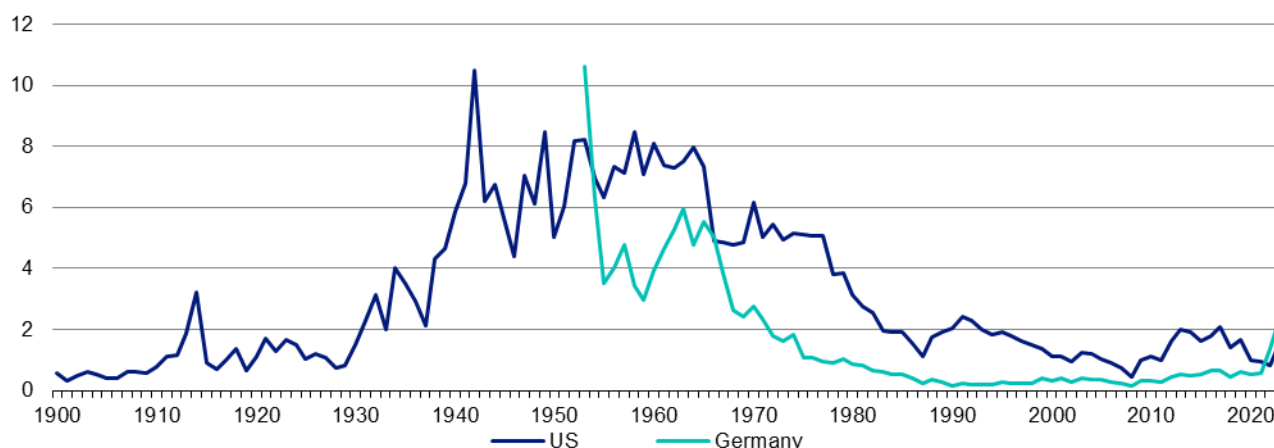
and two months in Germany). Looking at pre-WW2 US data, a similar low (nine months) was reached in 1928 (and we know what happened next). However, the post-1900 low was the 3.76 months achieved in 1901 (stocks gained 32% in the two years to the end of 1901 and surrendered much of that over the next two years, based on index data provided by US academic Robert Shiller, as explained in the appendices).

Average holding periods seem to have increased since the financial crisis. This may be due to the reduction of prop-trading activity within banks but it may also be the normal reaction to a period of stress. There is evidence that a bit of volatility may encourage risk taking behaviour due to an increase in the stress hormone cortisol but that prolonged volatility may lead to a chronic rise in cortisol and depression (see Kusev et al 2017: “Understanding risky behaviour: the influence of cognitive, emotional and hormonal factors on decision-making under risk”).

There were signs of a renewed decline in average holding periods in 2018 (especially in the US), with a further dip in 2020 as Covid struck and lockdowns were enforced. However, holding periods increased in 2022 (in Germany) and so far in 2023 (in the US and Germany). Perhaps the frenetic trading activity of 2021 should have served as a warning that markets would struggle in 2022.

Coming back to personal behaviours, what do we hope to gain by in-depth research activity? Apart from the excuse that more information is now readily available and that we have promised miracles to our clients, there are important psychological factors behind the desire to be seen to be “doing something”.

Figure 1 – Average holding period of equities (years)



Note: Based on annual data from 1900 to 2023 (2023 data is based on annualised trading value data to April for Germany and to May for the US). Holding period is calculated as the inverse of the stock turnover ratio (value of trades divided by market capitalisation). Source: NYSE, World Federation of Exchanges, Global Financial Data and Invesco Global Market Strategy Office



First, we suffer from the “illusion of control”. Fenton-O’Creevy et al tested how much control 107 London traders believed they had over a computer simulated outcome (they had none). The traders believed they had control and those suffering the biggest “illusion” tended to be the worst performers in their day jobs and were the lowest paid (see *Trading on illusions: Unrealistic perceptions of control and trading performance* in Journal of Occupational and Organizational Psychology (2003)).

Second, we nourish this “illusion of control” by gathering as much information as possible, building “better” models and meeting as many companies and analysts as we can. Unfortunately, this does not improve our performance; it simply boosts our confidence. James Montier’s *Behavioural Investing* cites numerous studies to make this point. Also, in an experiment conducted by Huber et al it was found that having more information did not boost trading profits, until the information advantage reached “insider” proportions (see *Is more information always better? Experimental financial markets with cumulative information* in Journal of Economic Behaviour and Organization (2008)). It is better to be vaguely right than exactly wrong (to quote Carveth Read).

Finally, we literally get a high from short term gains and the closer in time we get to those gains the more the emotional “self” dominates the rational “self”. For example, offered a choice between \$10 today and \$11 tomorrow we may take the \$10 now. However, if given the choice between \$10 in one year and \$11 in one year and a day, we will choose the higher delayed payment (see *Brain battles itself over short term rewards, long term goals* which is a 2004 summary

provided by Princeton University of a study conducted by Cohen et al).

We seem hard wired to seek near term gains, which is unfortunate because Figures 2a and 2b suggest short term investing is a mugs game. The range of possible outcomes in a quarter is enormous but narrows considerably as the time horizon extends.

So, how can we live better lives and (hopefully) improve investment performance? First, we should accept the difficulty of outperforming on a regular basis and set expectations accordingly.

Second, it is important to lengthen the investment horizon to something more reasonable. I would suggest something measured in years (preferably five), rather than quarters. Though positions can be adjusted as prices move, I often find the views formed calmly at the start of the year are better than those reworked later in reaction to events. Clients may not like it to start with but performance should also be commented upon less frequently. Regular reporting is just noise, trying to explain noise (I now publish less).

Finally, rather than chasing our tails trying to be the most informed on the street, we should choose a meaningful set of simple decision tools and stick with them. My anchor has always been long term valuations and on that basis I continue to believe that Chinese equities will prove more remunerative than their US counterparts over the next five years (see the cyclically adjusted price-earnings ratios in the latest [Big Picture](#) document).

Unless stated otherwise, all data as of 21 July 2023.

Figure 2a – MSCI World: range of annualised total returns by investment horizon since 1986 (%)

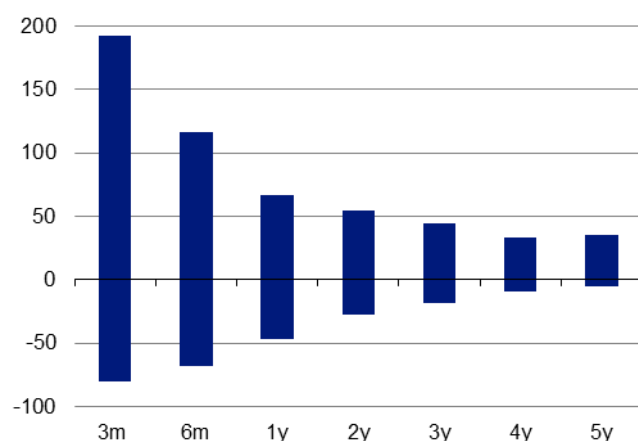
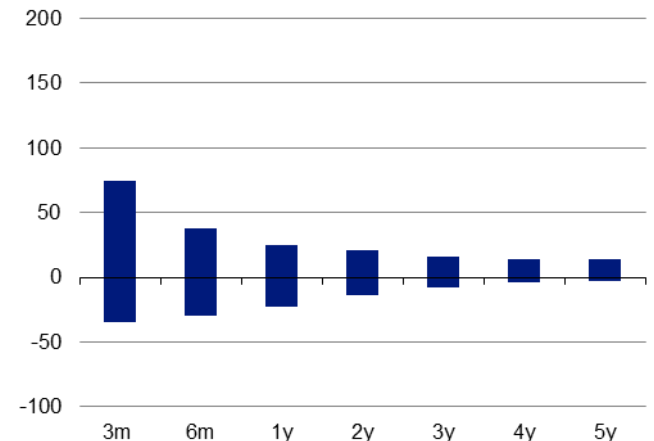


Figure 2b – ICE BofA Global Govt: range of ann. returns by investment horizon since 1986 (%)



Notes: **Past performance is no guarantee of future results.** Based on monthly data from January 1986 to June 2023. “ann. returns” is annualised total returns. Annualised total returns are calculated over successive overlapping horizons (ranging from three months to five years), using the MSCI World index to represent equities and the ICE BofA Global Government Index to represent government bonds. Source: ICE BofA, MSCI, Refinitiv Datastream and Invesco Global Market Strategy.

Figure 3 – Asset class total returns (%)

Data as at 21/07/2023		Current Level/Ry	Total Return (USD, %)					Total Return (Local Currency, %)				
Index	1w		1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m	
Equities												
World	MSCI	697	0.2	3.4	2.2	16.8	15.1	0.6	3.1	1.7	16.3	13.8
Emerging Markets	MSCI	1015	-1.3	1.7	3.0	8.2	5.8	-0.9	1.7	2.2	8.1	5.6
China	MSCI	61	-2.6	1.0	2.6	-2.9	-9.4	-2.5	0.9	2.2	-2.2	-8.8
US	MSCI	4317	0.7	4.2	2.1	19.6	15.2	0.7	4.2	2.1	19.6	15.2
Europe	MSCI	1977	-0.2	3.4	2.6	17.2	23.8	1.1	1.6	0.6	11.8	14.3
Europe ex-UK	MSCI	2450	-0.5	3.6	2.5	18.9	25.9	0.5	1.7	0.2	14.0	15.9
UK	MSCI	1172	1.1	2.4	2.8	11.5	16.7	3.2	1.5	1.8	4.4	8.6
Japan	MSCI	3527	-1.4	-1.3	0.6	13.9	15.8	0.9	-1.5	-1.3	22.4	19.0
Government Bonds												
World	BofA-ML	3.22	-0.7	0.2	0.9	1.4	-1.8	0.2	-0.3	-0.1	1.6	-3.5
Emerging Markets	BBloom	7.85	0.4	2.5	1.8	7.3	12.8	0.4	2.5	1.8	7.3	12.8
China	BofA-ML	2.46	-0.4	1.1	1.8	0.0	-1.6	0.3	0.9	0.6	3.3	4.5
US (10y)	Datastream	3.84	0.0	-0.6	0.0	2.3	-4.1	0.0	-0.6	0.0	2.3	-4.1
Europe	BofA-ML	3.21	-0.7	1.6	1.9	6.3	2.9	0.5	0.1	0.0	2.0	-5.6
Europe ex-UK (EMU, 10y)	Datastream	2.43	-0.7	1.7	1.7	7.2	0.3	0.5	0.2	-0.2	2.9	-8.0
UK (10y)	Datastream	4.27	-0.6	2.4	2.2	4.7	-8.0	1.5	1.5	1.2	-2.0	-14.4
Japan (10y)	Datastream	0.47	-2.3	-0.6	1.4	-4.3	-1.4	0.0	-0.8	-0.6	2.8	1.4
IG Corporate Bonds												
Global	BofA-ML	5.21	-0.2	0.9	1.1	4.6	2.3	0.2	0.4	0.5	3.3	0.0
Emerging Markets	BBloom	7.72	0.1	0.1	0.6	4.8	10.0	0.1	0.1	0.6	4.8	10.0
China	BofA-ML	3.25	-0.4	0.8	1.6	-0.2	-2.9	0.2	0.6	0.5	3.1	3.1
US	BofA-ML	5.54	0.1	0.3	0.4	3.7	0.5	0.1	0.3	0.4	3.7	0.5
Europe	BofA-ML	4.30	-0.8	2.2	2.6	7.0	7.5	0.3	0.7	0.7	2.8	-1.4
UK	BofA-ML	6.21	-0.7	2.8	3.1	7.9	0.5	1.4	1.9	2.1	1.1	-6.5
Japan	BofA-ML	0.74	-2.2	0.0	1.8	-5.5	-2.7	0.1	-0.2	-0.2	1.5	0.1
HY Corporate Bonds												
Global	BofA-ML	8.57	-0.3	1.4	1.3	6.7	8.8	0.0	1.0	0.9	5.6	6.8
US	BofA-ML	8.41	0.0	1.5	1.1	6.6	6.0	0.0	1.5	1.1	6.6	6.0
Europe	BofA-ML	7.44	-1.1	1.7	2.5	9.3	15.6	0.0	0.3	0.6	5.0	6.1
Cash (Overnight LIBOR)												
US		5.06	0.1	0.4	0.3	2.7	4.1	0.1	0.4	0.3	2.7	4.1
Euro Area		3.40	-0.9	1.6	2.2	5.5	10.8	0.1	0.3	0.2	1.5	1.8
UK		4.93	-1.7	1.1	1.5	8.7	10.8	0.1	0.4	0.3	2.3	3.4
Japan		-0.06	-2.2	0.1	1.8	-7.5	-3.2	0.0	0.0	0.0	0.0	0.0
Real Estate (REITs)												
Global	FTSE	1601	0.5	5.0	4.3	5.4	-1.5	1.7	3.5	2.4	1.2	-9.7
Emerging Markets	FTSE	1275	0.1	0.9	1.2	-3.4	0.8	1.2	-0.5	-0.6	-7.2	-7.6
US	FTSE	3032	0.9	6.3	4.1	9.6	0.5	0.9	6.3	4.1	9.6	0.5
Europe ex-UK	FTSE	2177	2.3	12.6	12.1	4.6	-6.4	3.5	10.9	10.1	0.5	-14.1
UK	FTSE	766	3.1	7.6	10.5	7.3	-14.1	5.3	6.6	9.4	0.5	-20.1
Japan	FTSE	2090	-1.6	0.0	2.4	-1.6	-3.2	0.7	-0.2	0.4	5.7	-0.5
Commodities												
All	GSCI	3462	2.3	3.5	7.1	-1.0	-4.3	-	-	-	-	-
Energy	GSCI	590	3.3	7.4	9.3	-3.3	-12.9	-	-	-	-	-
Industrial Metals	GSCI	1561	-2.6	-1.4	1.8	-6.8	3.8	-	-	-	-	-
Precious Metals	GSCI	2229	0.1	2.2	2.8	7.3	16.1	-	-	-	-	-
Agricultural Goods	GSCI	578	3.6	-5.7	6.9	3.3	12.2	-	-	-	-	-
Currencies (vs USD)*												
EUR		1.11	-0.9	1.3	2.0	3.9	8.7	-	-	-	-	-
JPY		141.80	-2.2	0.1	1.8	-7.5	-3.1	-	-	-	-	-
GBP		1.28	-2.1	0.9	1.0	6.8	7.5	-	-	-	-	-
CHF		1.15	-0.5	3.2	3.4	6.8	11.6	-	-	-	-	-
CNY		7.19	-0.6	-0.1	0.9	-4.0	-5.9	-	-	-	-	-

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 Global Market Strategy Office

Figure 4 – Global equity sector total returns relative to market (%)

Data as at 21/07/2023	Global				
	1w	1m	QTD	YTD	12m
Energy	1.8	0.7	1.2	-8.0	-3.5
Basic Materials	-0.7	0.1	1.2	-7.2	4.2
Basic Resources	-1.4	0.2	2.0	-7.7	10.6
Chemicals	0.1	0.0	0.2	-6.4	-3.5
Industrials	-0.1	0.1	0.0	-0.9	3.8
Construction & Materials	-0.1	1.2	0.7	4.9	9.4
Industrial Goods & Services	-0.1	0.0	-0.1	-1.7	3.0
Consumer Discretionary	-1.6	0.1	-0.7	7.6	0.5
Automobiles & Parts	-3.1	-0.6	-1.1	23.4	-6.6
Media	-1.1	-0.5	-1.4	3.3	1.4
Retailers	-1.1	0.7	-0.8	3.6	-6.0
Travel & Leisure	-0.3	0.3	0.2	6.3	14.5
Consumer Products & Services	-2.0	-0.3	-0.6	4.7	8.3
Consumer Staples	0.4	-1.4	-0.4	-9.5	-5.5
Food, Beverage & Tobacco	0.5	-1.4	-0.1	-8.8	-4.6
Personal Care, Drug & Grocery Stores	0.4	-1.3	-0.9	-10.7	-7.2
Healthcare	2.4	-0.8	-0.1	-9.8	-6.9
Financials	1.8	1.5	1.8	-6.1	0.8
Banks	1.8	1.7	2.4	-6.5	-0.2
Financial Services	1.8	1.9	2.2	-3.8	0.3
Insurance	1.7	0.1	0.0	-8.4	4.7
Real Estate	-0.3	0.6	1.0	-9.6	-14.3
Technology	-1.8	-0.4	-1.2	21.9	8.3
Telecommunications	-0.4	-1.1	-1.5	-6.7	-10.2
Utilities	1.1	-0.9	0.2	-9.2	-4.5

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 Global Market Strategy Office

Figure 5a – US factor index total returns (%)

Data as at 21/07/2023	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	0.5	5.7	2.7	22.5	16.7	-0.2	1.7	0.7	2.8	1.2
Low volatility	1.7	3.5	2.3	4.8	11.1	1.0	-0.4	0.3	-12.1	-3.7
Price momentum	-0.5	3.3	0.8	6.4	16.8	-1.2	-0.7	-1.2	-10.7	1.2
Quality	0.6	4.6	2.4	13.6	15.8	-0.1	0.6	0.4	-4.7	0.4
Size	1.9	7.1	4.7	10.6	8.1	1.2	3.0	2.7	-7.2	-6.3
Value	3.4	7.1	5.9	4.1	2.7	2.7	3.0	3.9	-12.7	-11.0
Market	0.7	4.0	2.0	19.2	15.4					
Market - Equal-Weighted	1.4	5.1	3.0	10.2	11.4					

Notes: **Past performance is no guarantee of future results.** All indices are subsets of the S&P 500 index, they are rebalanced monthly, use data in US dollars 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 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.

Source: Refinitiv Datastream and Invesco Global Market Strategy Office

Figure 5b – European factor index total returns relative to market (% annualised)

Data as at 21/07/2023	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	0.7	4.3	2.0	11.9	5.5	-0.3	2.2	1.1	-0.5	-6.9
Low volatility	1.0	1.2	0.1	10.6	8.5	0.0	-0.7	-0.8	-1.6	-4.2
Price momentum	0.0	1.3	0.3	6.2	7.0	-1.0	-0.7	-0.6	-5.5	-5.6
Quality	1.0	4.3	3.2	8.9	6.6	0.0	2.3	2.3	-3.1	-5.9
Size	1.9	4.7	3.9	7.7	4.1	0.9	2.7	3.1	-4.2	-8.1
Value	2.4	6.3	5.4	11.2	14.7	1.4	4.3	4.5	-1.0	1.2
Market	1.0	2.0	0.8	12.4	13.3					
Market - Equal-Weighted	1.4	3.6	2.4	10.9	8.3					

Notes: **Past performance is no guarantee of future results.** 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 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.

Source: Refinitiv Datastream and Invesco Global Market Strategy Office

Figure 6 – Model asset allocation

	Neutral	Policy Range	Allocation	Position vs Neutral	Hedged	Currency
Cash Equivalents	5%	0-10%	10%			
Cash	2.5%		10%			
Gold	2.5%		0%			
Bonds	40%	10-70%	46%			
Government	25%	10-40%	20%			
US	8%		11%			
Europe ex-UK (Eurozone)	7%		2%			
UK	1%		1%			
Japan	7%		2%			
Emerging Markets	2%		4%			
China**	0.2%		0%			
Corporate IG	10%	0-20%	18%			
US Dollar	5%		10%			40% JPY
Euro	2%		3%			
Sterling	1%		2%			
Japanese Yen	1%		0%			
Emerging Markets	1%		3%			
China**	0.1%		0%			
Corporate HY	5%	0-10%	8%			
US Dollar	4%		6%			
Euro	1%		2%			
Equities	45%	25-65%	34%			
US	25%		12%			
Europe ex-UK	7%		6%			
UK	4%		4%			
Japan	4%		4%			
Emerging Markets	5%		8%			
China**	2%		4%			
Real Estate	8%	0-16%	10%			
US	2%		4%			
Europe ex-UK	2%		1%			
UK	1%		2%			
Japan	2%		1%			
Emerging Markets	1%		2%			
Commodities	2%	0-4%	0%			
Energy	1%		0%			
Industrial Metals	0.3%		0%			
Precious Metals	0.3%		0%			
Agriculture	0.3%		0%			
Total	100%		100%			
Currency Exposure (including effect of hedging)						
USD	50%		42%			
EUR	19%		17%			
GBP	7%		12%			
JPY	14%		14%			
EM	9%		17%			
Total	100%		100%			

Notes: **China is included in Emerging Markets allocations. 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 Global Market Strategy Office

Figure 7 – Model allocations for global sectors

	Neutral	Invesco		Preferred Region
Energy	7.3%	Underweight		EM
Basic Materials	4.1%	Neutral	↑	Europe
Basic Resources	2.3%	Neutral	↑	Europe
Chemicals	1.8%	Neutral		US
Industrials	13.0%	Neutral		Europe
Construction & Materials	1.6%	Underweight		US
Industrial Goods & Services	11.4%	Neutral		Europe
Consumer Discretionary	14.9%	Neutral	↓	Europe
Automobiles & Parts	2.9%	Underweight	↓	Japan
Media	1.0%	Underweight	↓	Japan
Retailers	4.8%	Overweight		Europe
Travel & Leisure	2.2%	Underweight		EM
Consumer Products & Services	4.0%	Neutral	↓	Europe
Consumer Staples	6.1%	Overweight		Europe
Food, Beverage & Tobacco	4.0%	Overweight		Europe
Personal Care, Drug & Grocery Stores	2.1%	Overweight		US
Healthcare	9.7%	Overweight		US
Financials	14.7%	Neutral	↑	Europe
Banks	7.1%	Neutral	↑	Europe
Financial Services	4.7%	Underweight		US
Insurance	2.9%	Neutral		Europe
Real Estate	2.9%	Overweight	↑	US
Technology	20.5%	Neutral	↓	US
Telecommunications	3.3%	Overweight	↑	Europe
Utilities	3.4%	Underweight		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 Global Market Strategy Office

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 3

Sources: we source data from Refinitiv 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). From 1st January 2022, we use the Refinitiv overnight deposit rate for the euro, the British pound and the Japanese yen. The global rate is the average of the euro, British pound, US dollar and Japanese yen rates. The series started on 1 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 ICE BofA 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: ICE BofA 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: ICE BofA 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

Methodology, data and sources for long-term US equity index

Long-term US equity returns are 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. 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.

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