Uncommon truths
Is China over-investing?

China is often accused of over-investing and its capital productivity has fallen. However, marginal efficiency of capital is positive and return on equity is in the middle of the developed comparator range.

We recently wrote that China's economy is in reasonable external balance but noted that investment is extremely high when compared to other countries. China's investment spending has represented 40%-50% of GDP throughout most of this century but has been easily financed because savings have been even higher (see China in the balance).

External balance is one thing but what about the effect of high levels of investment on the domestic economy? Just as too little investment can be a bad thing, too much can render projects unprofitable and create economic inefficiencies and losses. China has often been accused of building roads to nowhere or even worse to newly constructed ghost towns. If this were true it could boost employment and income in the short term but would imply a loss of efficiency over the long term as those projects fail to give economic returns.

One way to judge the efficiency of investment is to look at capital productivity (though finding the data for China is a challenge). **Figure 1** shows the simplest of measures: GDP divided by the capital stock. When this measure of average capital productivity is on the rise, it suggests that recent investment has given more GDP returns than was the case in earlier periods (not surprisingly, capital productivity declines during recessions, as predicted for 2020). For example, US capital productivity improved throughout the 1960-2000 period but has since levelled off and declined slightly.

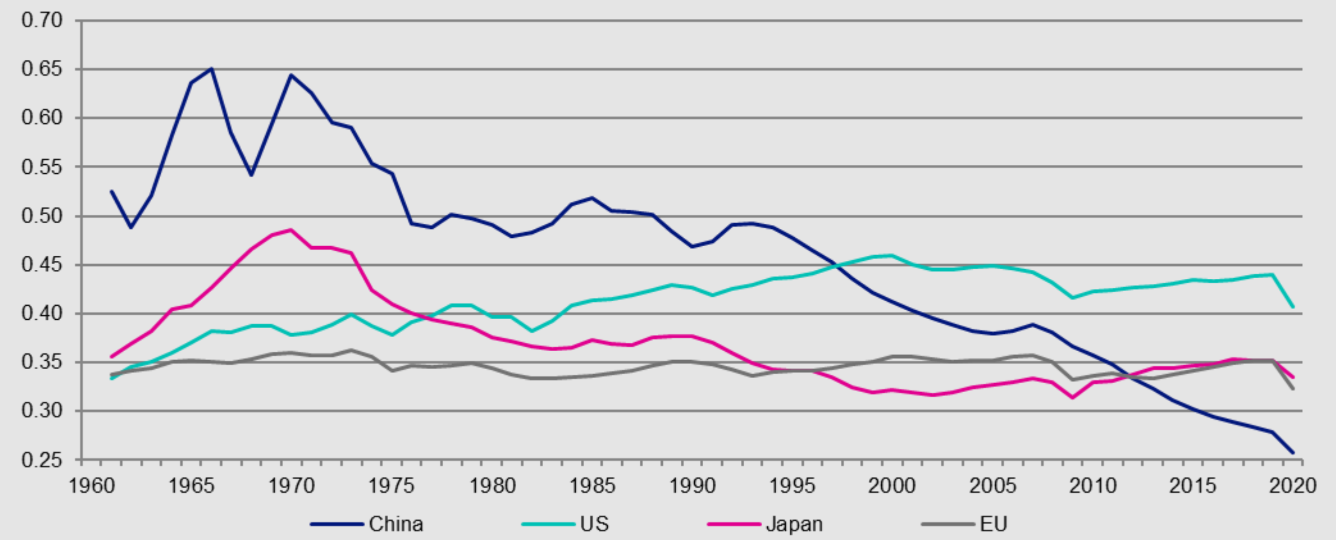
Japan has followed the opposite path, with high post-war capital productivity giving way to decline from 1970 to 2000, perhaps due to over-investment in the 1970s and 1980s. However, since the start of this century, capital productivity in Japan has improved again and is now back in line with that of the European Union (which itself has been relatively stable since 1960).

China appears to have gone through a dramatic transition. During the Mao era, we would guess the country suffered from under-investment (see the high capital productivity in the 1960s and 1970s), making it easy to invest profitably. Though productivity stabilised at a lower level in the post-Mao era (he died in 1976), it remained well above that of the comparator countries until the end of the last century.

It was during Deng era that investment spending became more important, approaching 40% of GDP in the mid-to-late 1980s and finally exceeding that level for a few years in the early 1990s. The cumulative effect of all this investment spending was to lower capital productivity, which started on a new downtrend in the mid-1990s, a downtrend that is ongoing.

That doesn't look good. Not only is China extracting less benefit from its capital stock than at any time since at least 1960, it also appears to be getting less benefit than developed country counterparts (with the US doing better than Japan and the EU).

Figure 1 – Capital productivity (GDP/capital stock)



Note: annual data from 1960 to 2020 (2020 is based on forecasts). China capital stock data is sourced from Bloomberg until 2013 and subsequent years are calculated by applying OECD growth estimates to the Bloomberg 2013 level. China GDP data is sourced from the World Bank. For other countries/regions, capital productivity is sourced from the European Commission AMECO database.
Source: European Commission, OECD, World Bank, Bloomberg, Refinitiv Datastream and Invesco

Invesco

However, the fact that China is suffering diminishing economic returns from its investment does not mean the investment should not have occurred, nor that it should not continue. The important question is whether China is deriving any benefit from its investment spending. One way to judge that is to look at the marginal efficiency of capital (the return on the latest yuan of investment spending).

Figure 2 shows one such measure, as calculated by the European Commission (EC), along with our own calculations for China. Put simply, it shows the GDP gain for each unit of gross fixed capital formation, calculated as the change in GDP in year t divided by the average level of gross fixed capital formation in years t and t-1. It is naturally cyclical, with sharp declines during recessions, as is forecast for 2020, which is why we show a 10-year moving average (which we think reveals more than it hides). Sadly, the different methods of calculation render it hard to make comparisons between average productivity (**Figure 1**) and marginal productivity (**Figure 2**).

Though China's marginal efficiency of capital has recently been less than half what it was in the 1980s and 1990s (and is trending down), it has remained positive and above that of comparator countries (our calculations suggest it will be close to zero in 2020, while EC calculations suggest it will fall into negative territory for our comparators).

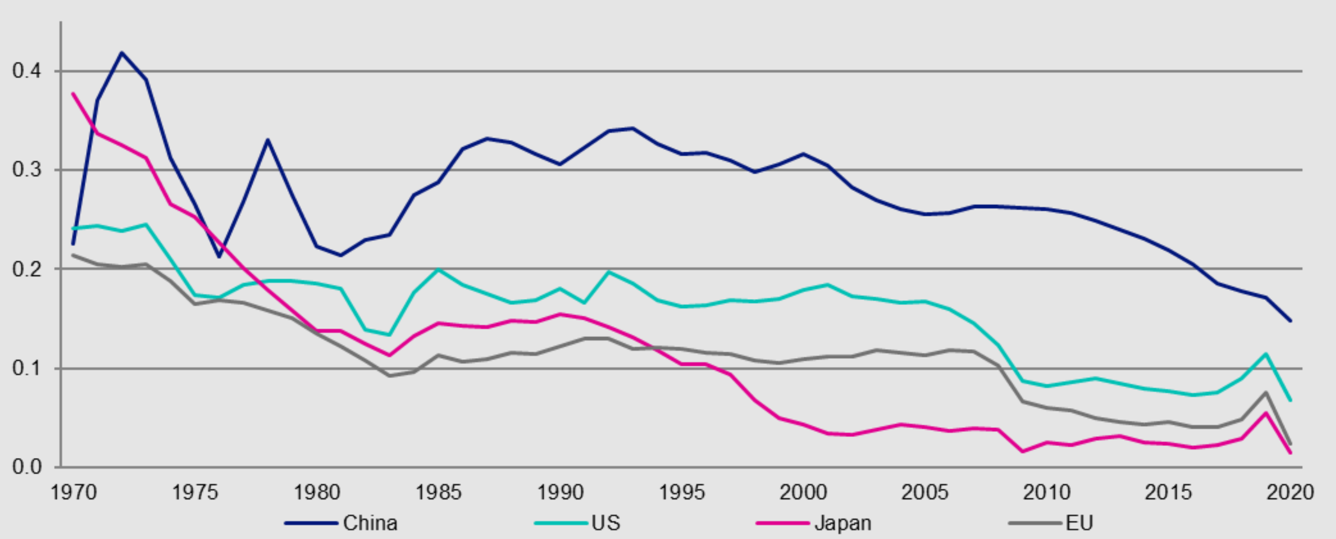
This suggests that, while China's use of capital is less efficient than it used to be, there is still scope to reap economic benefits from further investment (by moving rural populations into urban areas and making them more productive, for example). If our calculations are correct, China is better placed than our comparators to benefit from further investment spending, though the gap has closed.

All the above looks at investment spending from a total economy perspective, including the public sector. From an investor's perspective, return on equity (ROE) is another way to look at it (we use a five-year moving average of ROE derived from Datastream indices). On this basis, US ROE has been between 12% and 16% for most of the last 30 years and has consistently been at the top of the comparator country range. China's ROE approached 20% in the early 1990s but averaged only around 10% in the late 1990s/early 2000s and has since averaged around 12% (and matched that of the US in the aftermath of the GFC). EU and Japanese ROE averaged 6%-10% over the last decade, with that of the EU falling from US levels in the early 2000s (when banks were profitable) and that of Japan gradually rising from the 4% average seen in the early 1990s. We expect ROE to be lower in 2020 in all countries.

Our conclusion is that China's investment is less productive than it was but is still adding economic value. ROE may be lower than in the US but is higher than in the EU and Japan, which suggests to us that valuation ratios should be lower in China than in the US (lower PE for the same PBV, say) but higher than in other developed markets.

Unless stated otherwise, all data as of 28 August 2020

Figure 2 – Marginal efficiency of capital (GDP gain per unit of gross fixed capital formation) – 10-year MA



Note: annual data from 1975 to 2020 (2020 is based on forecasts). Estimates for all countries except China are sourced from the European Commission AMECO database, with marginal efficiency of capital in year t calculated as change in GDP in year t (at constant prices) divided by the average level of gross fixed capital formation in years t and t-1. The same methodology is used to calculate China's marginal efficiency of capital based on data from the World Bank and Oxford Economics (and assuming no change in GDP in US dollars in 2020). The data is presented as a 10-year moving average. Source: European Commission, World Bank, Oxford Economics, Refinitiv Datastream and Invesco

Figure 3 – Asset class total returns

Data as at 28/08/2020	Index	Current Level/RY	Total Return (USD, %) 1w	1m	QTD	YTD	12m	Total Return (Local Currency, %) 1w	1m	QTD	YTD	12m
Equities												
World	MSCI	586	2.7	6.6	12.1	5.4	19.0	2.3	6.2	10.4	4.8	17.3
Emerging Markets	MSCI	1122	2.8	3.8	13.5	2.5	19.3	2.2	3.8	12.5	6.4	20.5
US	MSCI	3386	3.3	9.4	13.9	11.4	25.5	3.3	9.4	13.9	11.4	25.5
Europe	MSCI	1654	2.0	1.7	8.3	-5.2	7.3	0.7	-0.1	1.9	-9.5	-0.8
Europe ex-UK	MSCI	2083	2.2	2.0	9.4	-0.1	12.3	1.1	0.6	3.3	-6.0	4.1
UK	MSCI	931	1.3	0.6	4.5	-19.8	-7.2	-0.7	-2.4	-3.1	-20.3	-14.9
Japan	MSCI	3337	0.7	2.0	5.8	-1.5	11.7	0.1	2.3	3.3	-4.6	11.1
Government Bonds												
World	BofA-ML	0.28	0.0	-0.4	2.6	6.7	4.2	-0.6	-1.0	-0.3	4.1	1.4
Emerging Markets	BBloom	4.91	-0.7	1.0	5.2	2.5	4.9	-0.7	1.0	5.2	2.5	4.9
US (10y)	Datastream	0.73	-1.0	-1.4	-0.6	14.0	10.1	-1.0	-1.4	-0.6	14.0	10.1
Europe	Bofa-ML	0.01	0.2	0.9	6.4	8.7	7.5	-0.8	-0.6	0.4	2.5	0.1
Europe ex-UK (EMU, 10y)	Datastream	-0.44	0.1	0.5	5.3	8.7	4.3	-0.9	-1.0	-0.6	2.5	-2.9
UK (10y)	Datastream	0.27	1.1	1.1	6.6	6.2	11.4	-0.9	-1.8	-1.2	5.6	2.1
Japan (10y)	Datastream	0.06	0.4	-0.7	2.3	2.7	-2.3	-0.2	-0.3	-0.2	-0.5	-2.9
IG Corporate Bonds												
Global	BofA-ML	1.69	-0.3	-0.2	3.5	6.2	6.9	-0.7	-0.8	1.5	4.7	4.6
Emerging Markets	BBloom	4.24	0.2	1.7	4.8	6.2	11.0	0.2	1.7	4.8	6.2	11.0
US	BofA-ML	2.07	-0.8	-1.3	1.5	6.5	6.8	-0.8	-1.3	1.5	6.5	6.8
Europe	BofA-ML	0.63	0.7	1.6	7.7	6.4	6.5	-0.3	0.2	1.7	0.4	-0.8
UK	BofA-ML	1.86	1.4	2.1	8.9	4.7	12.9	-0.5	-0.9	0.9	4.1	3.5
Japan	BofA-ML	0.52	0.6	-0.5	2.5	2.8	-0.5	-0.1	-0.1	0.1	-0.4	-1.1
HY Corporate Bonds												
Global	BofA-ML	5.75	0.9	2.0	6.3	1.8	5.6	0.6	1.7	5.0	0.7	4.1
US	BofA-ML	5.84	0.8	1.7	5.7	0.7	3.9	0.8	1.7	5.7	0.7	3.9
Europe	BofA-ML	4.10	1.3	2.7	9.4	4.0	7.4	0.3	1.2	3.3	-1.9	0.0
Cash (Overnight LIBOR)												
US		0.08	0.0	0.0	0.0	0.3	0.9	0.0	0.0	0.0	0.3	0.9
Euro Area		-0.58	0.9	1.6	5.9	5.8	6.9	0.0	-0.1	-0.1	-0.4	-0.6
UK		0.05	2.0	3.3	7.7	0.8	9.8	0.0	0.0	0.0	0.2	0.4
Japan		-0.09	0.4	-0.3	2.4	3.0	0.6	0.0	0.0	0.0	-0.1	-0.1
Real Estate (REITs)												
Global	FTSE	1656	1.7	4.1	5.9	-16.4	-10.9	0.6	2.6	0.0	-21.1	-17.0
Emerging Markets	FTSE	1950	-0.4	2.0	4.4	-18.8	-2.8	-1.4	0.6	-1.4	-23.3	-9.5
US	FTSE	2639	2.5	3.6	5.4	-16.4	-13.9	2.5	3.6	5.4	-16.4	-13.9
Europe ex-UK	FTSE	3316	0.8	5.2	9.8	-9.7	1.3	-0.2	3.7	3.7	-14.8	-5.7
UK	FTSE	1233	1.5	6.3	11.2	-21.3	3.3	-0.5	3.2	3.0	-21.8	-5.3
Japan	FTSE	2463	1.1	5.2	6.7	-16.2	-14.6	0.4	5.5	4.1	-18.8	-15.1
Commodities												
All	GSCI	1801	1.9	4.6	9.1	-30.5	-24.1	-	-	-	-	-
Energy	GSCI	251	1.8	4.8	9.4	-49.5	-43.8	-	-	-	-	-
Industrial Metals	GSCI	1257	2.4	4.9	12.3	3.2	6.5	-	-	-	-	-
Precious Metals	GSCI	2302	1.7	1.8	11.3	28.7	26.5	-	-	-	-	-
Agricultural Goods	GSCI	322	3.7	6.6	6.6	-7.6	2.0	-	-	-	-	-
Currencies (vs USD)*												
EUR		1.19	0.9	1.6	6.0	6.2	7.5	-	-	-	-	-
JPY		105.36	0.4	-0.3	2.4	3.1	0.7	-	-	-	-	-
GBP		1.33	2.0	3.0	7.9	0.6	9.1	-	-	-	-	-
CHF		1.11	0.8	1.5	4.8	7.1	8.6	-	-	-	-	-
CNY		6.87	0.8	2.0	2.9	1.4	4.4	-	-	-	-	-

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

Invesco

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

Data as at 28/08/2020	Global				
	1w	1m	QTD	YTD	12m
Energy	**-0.8**	**-3.2**	**-6.9**	**-30.6**	**-30.4**
Basic Materials	**-0.4**	**-2.7**	**2.1**	**1.2**	**2.8**
Basic Resources	-0.5	-3.7	3.4	3.1	6.6
Chemicals	-0.2	-1.5	0.6	-0.9	-1.9
Industrials	**0.3**	**1.2**	**0.6**	**-3.5**	**-3.9**
Construction & Materials	-1.2	-0.8	0.3	-5.7	-3.9
Industrial Goods & Services	0.5	1.5	0.7	-3.2	-3.9
Consumer Discretionary	**1.1**	**4.2**	**4.8**	**9.0**	**6.6**
Automobiles & Parts	1.8	8.3	14.3	12.3	15.4
Media	2.0	3.2	3.9	-1.1	-3.1
Retailers	1.0	4.6	5.9	29.2	25.0
Travel & Leisure	2.9	6.8	2.9	-18.5	-21.6
Consumer Products & Services	-0.4	0.2	0.0	4.7	3.5
Consumer Staples	**-1.2**	**-3.9**	**-2.8**	**-2.7**	**-6.8**
Food, Beverage & Tobacco	-0.7	-4.1	-2.8	-5.9	-13.9
Personal Care, Drug & Grocery Stores	-2.2	-3.6	-2.9	3.6	-2.3
Healthcare	**-2.0**	**-4.7**	**-4.9**	**6.7**	**8.8**
Financials	**0.6**	**-1.8**	**-2.5**	**-18.5**	**-16.9**
Banks	0.7	-2.6	-4.9	-25.9	-23.1
Financial Services	0.3	-1.8	-1.4	-9.1	-8.9
Insurance	1.0	-0.5	0.6	-13.7	-13.6
Real Estate	**-1.1**	**-2.0**	**-4.4**	**-13.2**	**-16.4**
Technology	**1.5**	**5.7**	**5.8**	**29.8**	**36.7**
Telecommunications	**-1.7**	**-3.4**	**-3.6**	**-1.5**	**-6.8**
Utilities	**-2.2**	**-6.3**	**-4.6**	**-6.9**	**-11.1**

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

Invesco

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

Data as at 28/08/2020	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	3.6	8.2	45.9	14.5	29.5	0.3	-0.9	6.7	4.1	4.6
Low volatility	1.0	3.7	30.5	9.6	13.6	-2.3	-5.0	-4.6	-0.3	-8.2
Price momentum	0.9	5.7	33.4	9.6	13.3	-2.3	-3.2	-2.4	-0.3	-8.5
Quality	2.4	6.4	34.9	0.6	17.5	-0.9	-2.6	-1.3	-8.5	-5.1
Size	4.6	8.0	46.0	-14.4	2.0	1.3	-1.1	6.7	-22.2	-17.6
Value	5.0	6.3	42.5	-17.5	-1.8	1.7	-2.7	4.2	-24.9	-20.7
Market	3.3	9.2	36.8	10.0	23.9					
Market - Equal-Weighted	2.8	6.1	34.4	-1.5	11.0					

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 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. Past performance is no guarantee of future results.
Source: Refinitiv Datastream and Invesco

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

Data as at 28/08/2020	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	1.2	5.0	33.2	8.1	25.0	0.2	4.5	13.9	19.2	23.0
Low volatility	0.1	1.2	18.4	-3.7	4.3	-0.9	0.7	1.3	6.2	2.7
Price momentum	0.6	2.8	27.5	6.6	17.6	-0.4	2.3	9.0	17.6	15.7
Quality	1.4	3.6	27.3	-8.7	10.6	0.3	3.0	8.9	0.7	8.8
Size	2.3	4.9	30.1	-12.1	6.2	1.3	4.4	11.3	-3.1	4.5
Value	3.0	2.7	20.8	-25.7	-11.2	1.9	2.2	3.3	-18.0	-12.7
Market	1.0	0.5	16.9	-9.3	1.6					
Market - Equal-Weighted	1.5	2.4	22.7	-9.3	4.0					

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 6 – Model asset allocation

	Neutral	Policy Range	Allocation	Position vs Neutral	Hedged	Currency
Cash	**5%**	**0-10%**	↑ **10%**			
Cash	2.5%		↑ 10%			
Gold	2.5%		↓ 0%			
Bonds	**45%**	**10-80%**	↑ **51%**			
Government	30%	10-50%	↑ 25%			
US	10%		↑ 12%			
Europe ex-UK (Eurozone)	8%		0%			
UK	2%		↑ 4%			
Japan	8%		↑ 5%			
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%	↑ 6%			
US Dollar	4%		↑ 6%			
Euro	1%		0%			
Equities	**40%**	**20-60%**	↓ **25%**			
US	24%		14%			
Europe ex-UK	6%		↓ 0%			
UK	3%		↓ 3%			
Japan	3%		↓ 5%			
Emerging Markets	4%		↑ 4%			
Real Estate	**8%**	**0-16%**	↓ **12%**			
US	2%		↓ 2%			
Europe ex-UK	2%		2%			
UK	1%		↓ 0%			
Japan	2%		5%			
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	49%		↑ 51%			
EUR	20%		↓ 4%			
GBP	7%		↓ 12%			
JPY	15%		18%			
EM	8%		↑ 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 7– Model allocations for Global sectors

	Neutral	Invesco	
Energy	**4.2%**	**Neutral**	↓
Basic Materials	**4.2%**	**Neutral**	
Basic Resources	2.3%	Underweight	
Chemicals	2.0%	Overweight	
Industrials	**12.4%**	**Underweight**	
Construction & Materials	1.5%	Underweight	
Industrial Goods & Services	10.9%	Underweight	
Consumer Discretionary	**14.5%**	**Underweight**	
Automobiles & Parts	2.1%	Underweight	↓
Media	1.3%	Underweight	
Retailers	5.4%	Neutral	
Travel & Leisure	1.9%	Underweight	
Consumer Products & Services	3.9%	Neutral	↑
Consumer Staples	**7.4%**	**Overweight**	
Food, Beverage & Tobacco	4.7%	Overweight	
Personal Care, Drug & Grocery Stores	2.7%	Overweight	
Healthcare	**11.0%**	**Neutral**	
Financials	**14.7%**	**Neutral**	
Banks	6.7%	Overweight	
Financial Services	4.4%	Neutral	
Insurance	3.6%	Underweight	
Real Estate	**3.9%**	**Overweight**	
Technology	**19.2%**	**Overweight**	
Telecommunications	**4.9%**	**Neutral**	
Utilities	**3.6%**	**Neutral**	↑

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.

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Definitions of data and benchmarks for Figure 3

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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