

Uncommon truths

The causes and course of inflation

Recent conversations with investors reveal a lot of confusion about what causes inflation and what the future path will be. We take a look at various explanations including a Malthusian view of long-term drivers, shorter-term views of more proximate drivers like commodities and wages (Phillips curve) and wrap it up with a broader monetary approach. All of those prisms suggest that we are witnessing an aggravated cyclical phenomenon and that headline inflation could fall surprisingly quickly.

We all have a view on inflation but recent meetings suggest a lot of confusion about its origins and its future path. What we do here is to explore some basic economic concepts and give our view about whether inflation will rapidly come back down or whether it is now moving to a durably high level, perhaps matching the experience of the 1970s and 1980s.

If inflation is defined as a process of rising prices (of commodities, goods, services, labour and assets) then it would appear to be ever present. I struggle to think of a period during my life (since the early 1960s) when at least some (if not all) prices have not been rising.

Prices adjust to changes in the balance between supply and demand and tend to rise when there is excess demand. If we borrow from Thomas Malthus, in a world where population rises exponentially but the supply of raw materials (and especially food) increases in a linear fashion (due to the nature of productivity gains), there will eventually be a tension between supply and demand that leads to a rise in the price of the relatively scarce resources and/or goods. These “frictions” lead to constant changes in relative prices (some rising and some falling) but constant population

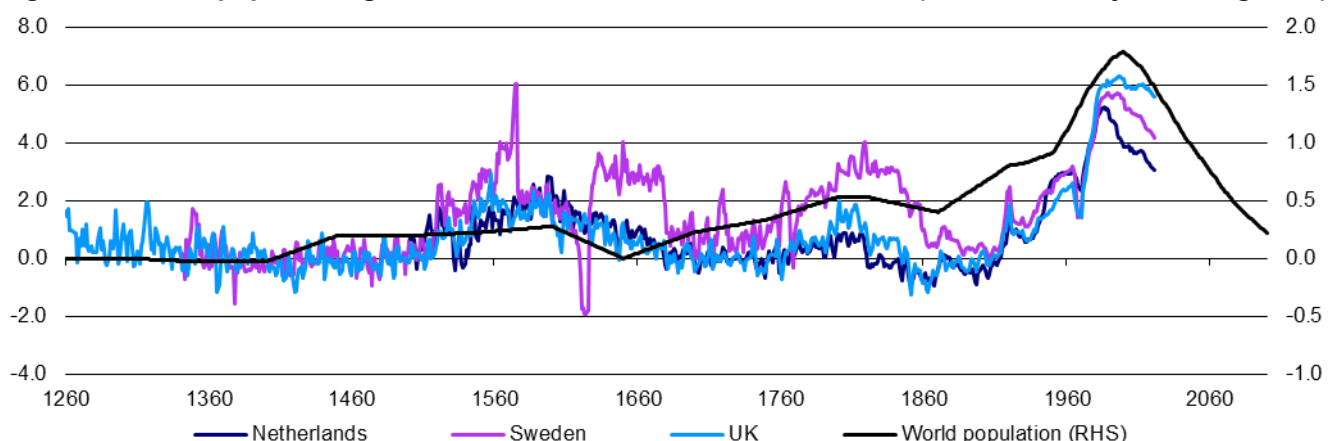
growth lends an upward bias to the general price level. Hence, inflation tends to be positive.

Of course, rising population suggests a continual increase in the supply of labour, which could depress the price of labour (wages). However, labour markets have not been free for some time (due to unionisation, regulation and minimum wages etc.), which has made nominal wages sticky in the downward direction, though real wages can be reduced by inflation. Further, an uptick in population doesn’t impact the supply of labour for around 20 years but does immediately impact demand for goods and services due to the need to feed, clothe and house the expanded number of children.

Hence, population growth in excess of productivity growth will tend to increase prices and inflation long before the additional workers can depress real wages. Indeed, **Figure 1** suggests that the ebb and flow of global population growth over long periods of time is associated with fluctuations in the rate of inflation. The prime example is what happened after WW2 when an unprecedented demographic explosion led to an extended period of high inflation. The OPEC oil embargo of the 1970s may have been the proximate cause of that inflation but we believe it was only made possible by the tightening of commodity markets provoked by extreme population growth.

However, we are now on the other side of that process. Though the world’s population is expected to continue growing, the rate of growth is forecast to move continually lower (and recent low birth rates reinforce that notion). Hence, inflation may face a long-term demographic headwind.

Figure 1 – World population growth and CPI inflation in select countries (annualised 50-year changes, %)



Note: from 1260 to 2100 showing annualised rolling 50-year changes, based on annual data (inflation data is to 2021). For earlier periods, when population data is not annual, the data has been interpolated on a straight-line basis. Population projections are from the United Nations Medium Variant scenario. Source: Global Financial Data and Invesco



Commodities do appear to have been an important factor in the recent rise in inflation (though, we think, unrelated to demographics). Indeed, **Figure 2a** shows that for most commodity groups, the bear market that started in the years after the Global Financial Crisis (GFC) finally ended in the second quarter of 2020. The rapid post-pandemic economic rebound pushed commodity prices toward those post-GFC peaks, with Russia's invasion of Ukraine adding a thin layer of icing to that cake (temporarily in some cases).

However, what is really interesting is that the momentum of commodity prices is waning, even allowing for the most recent war-inspired increase (see **Figure 2b**). Once those prices peak, the year-on-year gains drop to zero (if prices stabilise) and eventually turn negative when the prices come down.

The question then is whether commodities have peaked. Though we can imagine scenarios under which some commodities go significantly higher (especially an abrupt ending of Russian energy supplies to Europe), it is our suspicion that they are in the process of peaking, especially the more cyclical commodities that will now see less demand because high inflation (which they contributed to) is depressing global economic activity. For example, the history of US oil prices (going back to 1870) suggests that oil rarely goes above \$100 per barrel (in today's prices) and that it doesn't stay there for long (in our opinion because supply and demand react in a way that brings the price down again). See the commodity section in [The Big Picture](#) for that analysis.

Figure 2b also shows a good historical correlation between commodity prices and US headline inflation.

Hence, as raw material price gains ease, we would normally expect headline inflation to moderate. However, that chart also shows a recent disconnect between consumer price inflation and commodity price gains. We can think of several possible explanations, including the effect of broader supply chain disruptions (driving up used vehicle prices, for example) or wage inflation, both of which merit examination.

Delving into the 8.6% gain in US consumer prices in the 12 months to March 2022, 2.1 percentage points (ppt) were due to energy (around one-quarter of the gain) and 1.2 ppt were due to food (based on the CPI category weights used in the March 2021 CPI report). Of other categories, the major contributors were shelter (1.7 ppt due to its one-third weighting) and used cars and trucks (1.0 ppt due to the 35% gain in prices). New vehicles made a weighted contribution of 0.5 ppt and transportation services added 0.4 ppt.

Those categories accounted for around four-fifths of the headline inflation in the year to March and, except shelter, could partly be ascribed to either the rise in commodity prices or supply chain problems (we think supply chain problems will eventually ease, though China may cause short-term disruption). When it comes to shelter, the important items (rent and owners' equivalent rent) are showing inflation of around 4.5%, which is above the Fed's 2% inflation target but not egregiously so. That those rent items are rising twice as fast as a year ago may be explained by lax monetary conditions, of which more later. The shelter component that is increasing rapidly is "other lodging away from home including hotels and motels" with a 12m gain of 29% (CPI weight of only 0.8%), perhaps due to the release of pent-up demand for travel.

Figure 2a – S&P GSCI commodity indices (31/12/07 = 100)

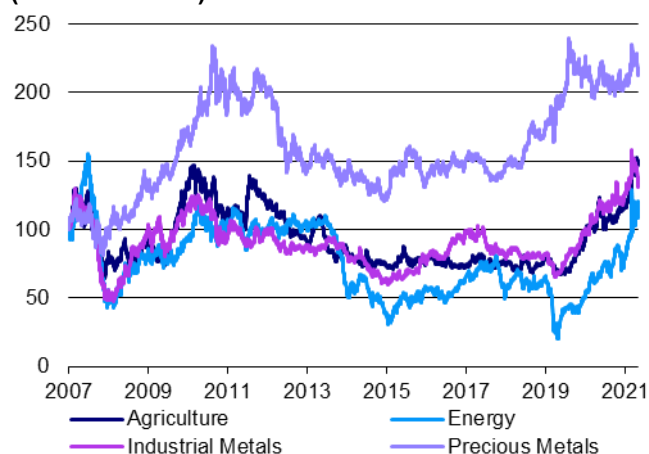
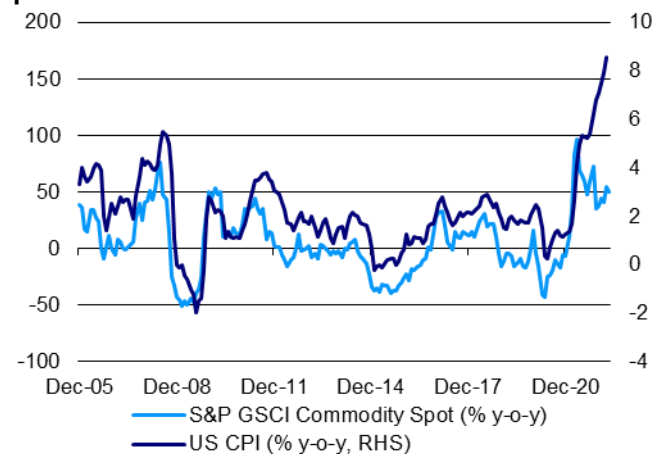


Figure 2b – Commodity prices and US consumer price inflation



Notes: Figure 2a is based on daily data from 31 December 2007 to 4 May 2022. All indices are based on spot prices and are rebased to 100 on 31 December 2007. Figure 2b is based on monthly data from December 2005 to April 2022 (as of 29 April 2022). **Past performance is no guarantee of future results.** Source: S&P GSCI, Refinitiv Datastream and Invesco



To the extent that food and energy have been important drivers of inflation, it is natural to focus more upon core inflation. However, **Figure 2b** suggested there may have been a rise in core inflation and this is confirmed by **Figure 3a** (US core CPI inflation was 6.4% in the 12 months to March 2022, the highest since August 1982). What is also interesting in that chart is that core inflation is correlated to headline inflation. That is no surprise given that core is a component of headline but it would seem that core often follows (rather than leads) headline. It is almost as though headline drags core in its wake.

That suggests inflation could fall rapidly if commodity prices are peaking out (which we think is possible). In that case, food & energy inflation will fall to zero within the next 12 months if commodity prices stabilise, which suggests headline inflation will fall below core. Even better if commodity prices fall from here, the food & energy component will fall into negative year-on-year territory and headline will fall even further below core.

Hence, if the relationship in **Figure 3a** endures, we would expect core inflation itself to be dragged lower. This then requires an understanding of why core may be influenced by headline. One obvious answer is via wages, with higher inflation causing workers/unions to demand higher pay. This is of course the much-dreaded wage/price spiral, though we shouldn't expect a full pass-through of higher wages into prices if productivity growth is positive (of which more later).

The ability of workers to raise wages depends upon a number of factors including profitability (the ability of employers to pay more), the tightness of the labour market (which determines the relative bargaining power of workers and employers) and the extent of

collective bargaining (higher unionisation may increase the bargaining power of workers).

Profits have been surprisingly robust since the pandemic recession, with our calculations suggesting that earnings per share were up more than 60% in the year to April 2022 in the US, Europe and Japan (based on Datastream equity indices). This increases the ability of companies to pay more, though we suspect that higher costs and decelerating economies may reduce that scope over the next year.

On the other hand, unionisation rates have been falling, with OECD data showing a five percentage point decline in OECD country unionisation from 2000 to 2019. Double digit declines were seen in some central and East European countries but also in Australia, Austria and Sweden. This may reflect the changing nature of economies, with sectors that are traditionally not unionised now becoming more important but it confirms that labour markets are on average less subject to collective bargaining, which we suspect weakens the hand of workers.

This then leaves the economic cycle and the tightness of the labour market. The Phillips curve is a simple theory based on the idea that wage growth should increase as unemployment falls (and the labour market tightens). However, it has been much maligned over recent years, the feeling being that it hasn't worked in recent times. Indeed, **Figure 3b suggests** that US wage inflation didn't increase as much as expected in the 2015-20 period, given the extent to which unemployment had declined. Nevertheless, after some pandemic inspired volatility in unemployment and remuneration, wage growth now appears to be reflecting the tightness in the labour market.

Figure 3a – US core inflation lags headline (% yoy)

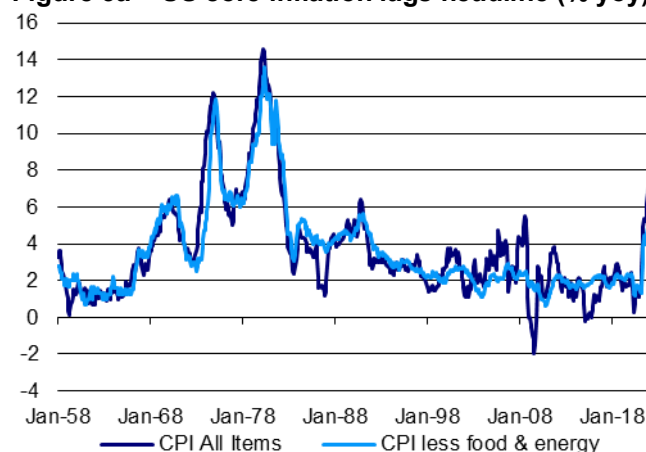
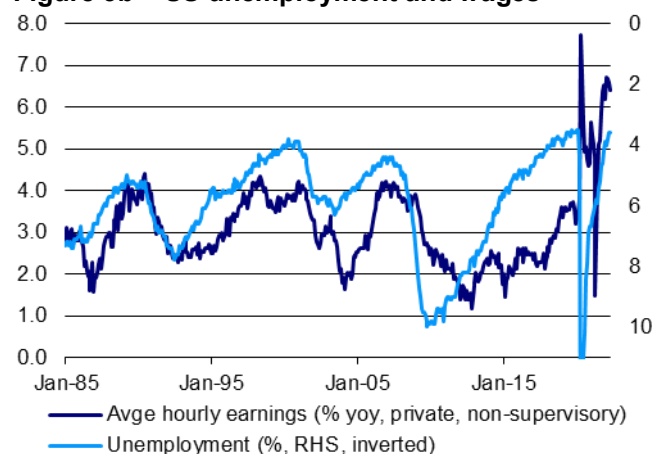


Figure 3b – US unemployment and wages



Notes: Figure 3a is based on monthly data from January 1958 to March 2022. Headline inflation is shown by "CPI All Items", while core inflation is shown by "CPI less food & energy". Figure 3b is based on monthly data from January 1985 to April 2022. Average hourly earnings are for private non-farm, non-supervisory workers. Source: Refinitiv Datastream and Invesco



So, wage growth may now be following price inflation higher, which may be a concern. However, if that is due to strong profits and tight labour markets, it is likely a cyclical phenomenon that will abate once the cycle weakens (as it appears to be doing in many places).

To be really concerned about wage growth, we would need to believe that it is a secular phenomenon, with high wage inflation persisting even when joblessness rises (as in the 1970s). Only time will tell whether that is the case but we remain sceptical and believe that the next recession will see a relapse in wage growth.

Even without that proof, we note that wage inflation does not translate fully into price inflation. What is important for price setting behaviour is unit labour cost growth and that depends upon the combination of wages and productivity (output per head). So long as productivity is growing (which we would expect on average during the cycle), then wage growth will not be passed through entirely to price inflation.

Having started with the influence of demographics, we then considered more direct but partial drivers of inflation (commodities and wages). But there is an alternative and more complete way of looking at the issue, which is the monetary approach. Milton Friedman said, *“Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output”*. On this basis, and given that output growth is relatively stable, large fluctuations in the growth of money supply are likely to be associated with swings in inflation (all else equal).

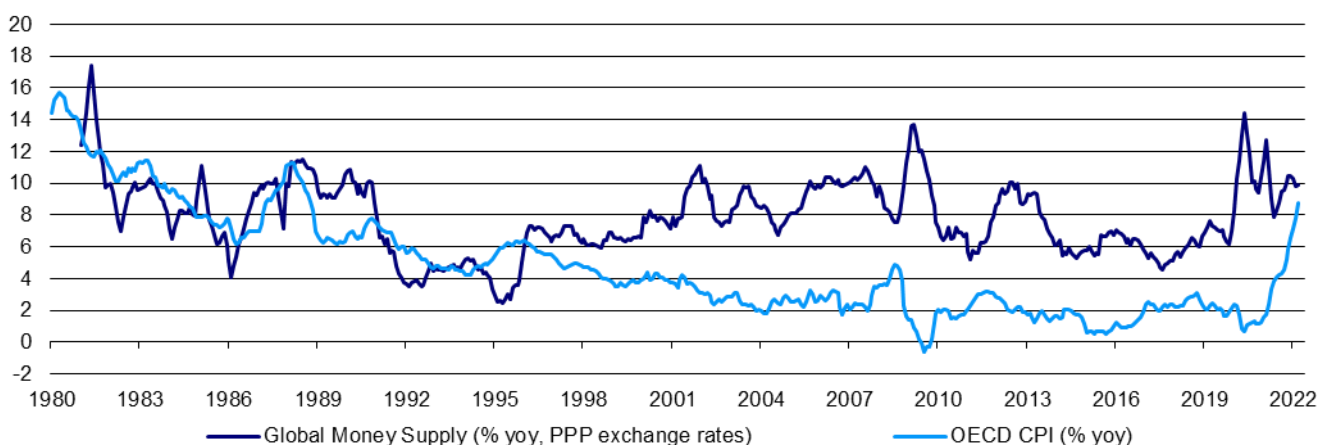
Figure 4 shows the growth in our measure of global

money supply and compares it to OECD inflation. Though there appeared to be some correlation between the two variables in the 1980s and 1990s, the direction of causality wasn't always obvious and the relationship seemed to break down at the start of this century. A number of factors could explain this. For example, the fact that we are comparing world money supply (including China and other emerging countries) with a narrower measure of inflation (restricted to the developed world and excluding assets). However, our analysis of the US suggests a similar loss of explanatory power. Another reason could be that changes in the velocity of circulation of money (especially the reductions after the GFC) have broken the link between money supply and inflation (the lack of demand for credit meant that central banks were pushing on the proverbial piece of string).

However, having majored in monetary economics in the early 1980s, I am always drawn to the idea that rapid monetary growth at least creates the conditions for inflation. The recent data points in **Figure 4** lend some support to this notion: a sharp acceleration in money supply was followed by an uptick in price inflation (having first boosted asset prices). However, if there is anything to this notion, inflation is unlikely to remain at these levels given the more recent deceleration in monetary aggregates (and the ongoing tightening by the Fed and other major central banks). Indeed, asset prices are already suffering.

Whether we look at it from a demographic, monetary or cyclical perspective, we believe this bout of inflation is transitory (as is everything). We expect headline inflation to fall rapidly and to go below core inflation, which itself will then be dragged lower, we think.

Figure 4 – Global money supply growth and inflation (%)



Note: monthly data from January 1980 to March 2022. “Global Money Supply” is based on an aggregation of national money supplies (see appendix for list of countries) using purchasing power parity (PPP) exchange rates to convert to US dollars (PPP exchange rates are those which equalise spending power across countries and are usually more stable than market exchange rates). OECD CPI is the consumer price index for the OECD group of countries. Source: OECD, Oxford Economics, Refinitiv Datastream and Invesco



However, we fear that the decline in core inflation will be relatively slow and that it may take economic slowdown/recession to bring it to or below major central bank targets. Hence, above target core inflation could be with us for a number of years.

Is that such a bad thing? Well, it wasn't long ago that everybody was praying for higher inflation, so why the panic? We don't believe that core inflation in the 2%-4% range would be problematic. Nor do we believe that central banks would need to be overly aggressive in their pursuit of lower inflation, if it were seen to settle in that range during the rest of this economic upswing. They are to a large extent responsible for the current bout of inflation (by remaining too loose for too long) and following up that policy error by another (overly aggressive tightening just as economies are slowing), makes no sense.

However, were core inflation to remain in high single digits and/or not come back down to central bank targets during the next recession, then they may have to take sterner action. The problem for central banks is that they will not know for some time if our (and their) analysis is correct. While waiting for inflation to cool, they may run out of patience, thus increasing the risk of a policy error that provokes the next recession.

Where does this leave financial markets? Confused is perhaps the best description based on price developments during last week (bond yields went higher and growth stocks underperformed, suggesting

confidence in the cycle, while broad equity indices and industrial metals fell, suggesting the opposite – see **Figures 5, 6 and 7**).

If core inflation remains in the 2%-4% range for the next few years, we suspect that long bond yields will still go higher (remember that US inflation-indexed 10-year yields have only just turned positive and a nominal US 10-year yield of 3.13% is still low if nominal GDP growth is in the 4%-6% range). However, we admit that yields have moved a long way and the risk of another policy error means that we cannot ignore the possibility that yields could move lower over the next 12 months. The direction of long yields is now more finely balanced than for some time, even if short yields move higher with Fed rates.

As for equity markets, they have also lost a lot ground this year, despite the fact that profits have continued to expand. We always felt that the US market was at risk, given stretched valuations in the growth segment that is a large part of those indices. However, other regions have done just as badly when expressed in US dollars (except the UK), the result of a deteriorating global economy. We returned to an Overweight equity allocation when we last updated our Model Asset Allocation on 20 March 2022 (see **Figure 8**). That may have been premature but we are not minded to reduce the allocation after the recent price weakness.

All data as of 6 May 2022, unless stated otherwise..

Figure 5 – Asset class total returns (%)

Data as at 06/05/2022		Current Level/Ry	Total Return (USD, %)					Total Return (Local Currency, %)				
Index	1w		1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m	
Equities												
World	MSCI	644	-1.5	-8.2	-9.3	-14.1	-6.8	-1.2	-6.9	-7.7	-11.9	-3.0
Emerging Markets	MSCI	1032	-4.1	-9.5	-9.4	-15.7	-21.1	-3.6	-7.2	-7.0	-12.6	-16.7
China	MSCI	64	-6.9	-11.9	-10.7	-23.4	-39.6	-6.7	-11.1	-9.7	-22.3	-38.7
US	MSCI	3924	-0.4	-8.4	-9.5	-14.2	-2.1	-0.4	-8.4	-9.5	-14.2	-2.1
Europe	MSCI	1734	-3.8	-7.6	-9.2	-15.7	-10.8	-3.2	-3.5	-3.8	-8.9	0.8
Europe ex-UK	MSCI	2107	-3.9	-7.6	-9.8	-18.7	-13.6	-3.7	-4.0	-4.7	-12.4	-2.3
UK	MSCI	1094	-3.5	-7.6	-7.1	-5.3	-0.9	-1.9	-2.1	-0.9	3.8	11.5
Japan	MSCI	3257	0.2	-5.5	-8.6	-14.5	-14.4	0.9	-0.5	-1.8	-3.1	2.3
Government Bonds												
World	BofA-ML	1.96	-1.4	-5.0	-7.1	-13.1	-15.4	-1.2	-2.6	-3.8	-8.4	-7.9
Emerging Markets	BBloom	7.11	-2.2	-8.6	-10.2	-21.5	-20.7	-2.2	-8.6	-10.2	-21.5	-20.7
China	BofA-ML	2.70	-1.4	-4.6	-4.7	-3.6	2.0	0.1	0.2	0.4	1.1	5.3
US (10y)	Datastream	3.13	-2.4	-5.3	-7.5	-14.0	-12.1	-2.4	-5.3	-7.5	-14.0	-12.1
Europe	BofA-ML	1.49	-1.3	-6.9	-10.0	-16.6	-21.5	-1.6	-3.9	-5.4	-10.4	-10.6
Europe ex-UK (EMU, 10y)	Datastream	1.14	-1.6	-7.3	-9.9	-17.4	-22.4	-1.9	-4.4	-5.3	-11.3	-11.5
UK (10y)	Datastream	1.98	-2.3	-7.9	-9.3	-16.6	-19.0	-0.7	-2.4	-3.3	-8.5	-8.9
Japan (10y)	Datastream	0.24	-0.8	-5.2	-7.3	-13.0	-17.3	-0.2	-0.1	-0.3	-1.5	-1.1
IG Corporate Bonds												
Global	BofA-ML	3.86	-1.4	-5.5	-7.0	-14.0	-14.5	-1.4	-4.4	-5.4	-11.9	-10.9
Emerging Markets	BBloom	6.96	-1.7	-6.2	-6.3	-20.0	-23.3	-1.7	-6.2	-6.3	-20.0	-23.3
China	BofA-ML	3.50	-1.4	-4.5	-4.7	-3.6	1.3	0.1	0.3	0.5	1.2	4.6
US	BofA-ML	4.46	-1.5	-5.1	-6.4	-13.6	-12.0	-1.5	-5.1	-6.4	-13.6	-12.0
Europe	BofA-ML	2.34	-1.0	-6.5	-8.7	-15.4	-20.6	-1.3	-3.5	-4.0	-9.1	-9.5
UK	BofA-ML	3.60	-2.7	-9.2	-10.2	-18.7	-20.4	-1.1	-3.8	-4.3	-10.9	-10.5
Japan	BofA-ML	0.53	-0.7	-5.1	-7.1	-12.4	-16.7	-0.1	0.0	-0.1	-0.8	-0.4
HY Corporate Bonds												
Global	BofA-ML	7.42	-1.3	-4.7	-5.6	-11.3	-11.5	-1.3	-4.0	-4.5	-9.8	-8.9
US	BofA-ML	7.36	-1.2	-3.9	-4.9	-9.2	-6.3	-1.2	-3.9	-4.9	-9.2	-6.3
Europe	BofA-ML	5.75	-1.4	-7.4	-9.2	-15.5	-19.4	-1.8	-4.4	-4.6	-9.2	-8.2
Cash (Overnight LIBOR)												
US		0.82	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Euro Area		-0.65	0.1	-3.2	-4.7	-7.4	-13.1	0.0	-0.1	-0.1	-0.2	-0.6
UK		0.18	-1.9	-5.6	-6.1	-8.8	-11.1	0.0	0.0	0.0	0.1	0.1
Japan		-0.09	-0.6	-5.2	-6.8	-11.9	-16.5	0.0	0.0	0.0	0.0	-0.1
Real Estate (REITs)												
Global	FTSE	1835	-4.2	-10.1	-9.2	-12.3	-3.0	-4.5	-7.2	-4.6	-5.8	10.6
Emerging Markets	FTSE	1546	-3.4	-9.8	-6.0	-3.9	-19.2	-3.7	-6.9	-1.2	3.2	-7.9
US	FTSE	3376	-4.5	-10.3	-8.8	-12.6	7.0	-4.5	-10.3	-8.8	-12.6	7.0
Europe ex-UK	FTSE	2836	-5.6	-14.7	-17.2	-23.7	-21.2	-5.9	-12.0	-12.9	-18.1	-10.2
UK	FTSE	994	-10.1	-16.2	-16.0	-20.4	-9.2	-8.6	-11.2	-10.4	-12.7	2.1
Japan	FTSE	2345	0.1	-4.8	-6.0	-9.1	-15.2	0.8	0.3	1.0	2.9	1.4
Commodities												
All	GSCI	3955	1.9	8.7	7.1	42.5	58.7	-	-	-	-	-
Energy	GSCI	712	4.2	16.2	13.5	65.8	100.6	-	-	-	-	-
Industrial Metals	GSCI	1866	-5.4	-12.4	-12.6	2.9	8.5	-	-	-	-	-
Precious Metals	GSCI	2129	-1.6	-2.7	-4.3	2.1	0.5	-	-	-	-	-
Agricultural Goods	GSCI	639	-0.8	3.5	5.0	28.1	24.8	-	-	-	-	-
Currencies (vs USD)*												
EUR		1.06	0.1	-3.1	-4.6	-7.2	-12.5	-	-	-	-	-
JPY		130.57	-0.6	-5.2	-6.8	-11.9	-16.5	-	-	-	-	-
GBP		1.24	-1.6	-5.6	-6.2	-8.8	-11.1	-	-	-	-	-
CHF		1.01	-1.5	-5.6	-6.7	-7.7	-8.2	-	-	-	-	-
CNY		6.67	-0.9	-4.6	-4.9	-4.7	-3.0	-	-	-	-	-

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

Data as at 06/05/2022	Global				
	1w	1m	QTD	YTD	12m
Energy	4.8	11.9	13.3	45.5	48.1
Basic Materials	-0.6	-0.5	-0.1	13.6	4.6
Basic Resources	-2.1	-4.4	-3.5	18.8	5.3
Chemicals	1.3	5.1	4.9	7.3	4.0
Industrials	0.0	1.9	0.2	-3.0	-6.2
Construction & Materials	-1.5	2.3	0.5	-6.6	-7.1
Industrial Goods & Services	0.2	1.9	0.1	-2.4	-6.1
Consumer Discretionary	-2.4	-5.0	-6.1	-12.2	-15.4
Automobiles & Parts	0.8	-1.9	-4.5	-9.2	1.2
Media	-1.6	-13.0	-14.3	-23.0	-25.9
Retailers	-2.8	-7.4	-7.0	-11.1	-16.2
Travel & Leisure	-2.2	1.3	-0.6	-1.7	-14.4
Consumer Products & Services	-4.8	-5.1	-6.4	-17.3	-22.0
Consumer Staples	-0.3	5.6	7.8	9.1	5.4
Food, Beverage & Tobacco	-0.4	6.0	8.2	11.1	6.9
Personal Care, Drug & Grocery Stores	-0.1	4.8	7.2	5.5	2.6
Healthcare	-0.4	-1.1	1.6	0.1	2.3
Financials	0.2	0.0	-0.4	4.6	2.0
Banks	1.0	2.2	1.8	8.8	4.0
Financial Services	-0.9	-3.3	-4.0	-3.7	-2.0
Insurance	-0.1	0.0	0.5	9.2	4.3
Real Estate	-2.0	-1.8	0.7	0.3	-0.6
Technology	0.1	-3.4	-5.2	-12.7	-3.6
Telecommunications	1.4	0.9	3.2	6.9	-0.2
Utilities	0.9	3.1	6.5	12.8	13.4

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

Figure 7a – US factor index total returns (%)

Data as at 06/05/2022	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	-1.0	-9.7	-11.3	-22.1	-4.7	-0.8	-1.9	-2.6	-10.4	-4.2
Low volatility	0.4	-3.7	-1.7	-1.3	9.3	0.6	4.6	7.9	13.5	9.8
Price momentum	1.0	-5.9	-6.2	-6.9	2.1	1.2	2.1	2.9	7.1	2.6
Quality	1.5	-0.6	-1.9	-7.7	2.1	1.7	7.9	7.7	6.2	2.6
Size	-1.0	-3.9	-5.7	-4.1	-3.6	-0.8	4.3	3.5	10.3	-3.2
Value	0.7	-3.6	-5.4	0.4	3.5	0.9	4.6	3.8	15.5	4.0
Market	-0.2	-7.9	-8.9	-13.1	-0.5					
Market - Equal-Weighted	-0.1	-5.6	-6.5	-9.1	-0.3					

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 7b – European factor index total returns relative to market (%)

Data as at 06/05/2022	Absolute					Relative to Market				
	1w	1m	QTD	YTD	12m	1w	1m	QTD	YTD	12m
Growth	-8.6	-14.4	-15.1	-28.3	-14.1	-4.6	-10.1	-10.8	-19.9	-14.5
Low volatility	-4.2	-4.1	-2.6	-4.6	7.6	0.1	0.8	2.4	6.5	7.1
Price momentum	-4.9	-8.0	-7.5	-19.8	-12.3	-0.6	-3.3	-2.8	-10.5	-12.7
Quality	-5.2	-6.8	-7.0	-14.1	-4.3	-1.0	-2.1	-2.3	-4.1	-4.7
Size	-6.7	-8.5	-9.0	-19.9	-14.0	-2.6	-3.8	-4.4	-10.6	-14.4
Value	-4.5	-4.8	-6.5	-8.0	2.5	-0.2	0.0	-1.8	2.7	2.1
Market	-4.3	-4.9	-4.8	-10.4	0.4					
Market - Equal-Weighted	-5.1	-6.6	-7.1	-15.6	-7.6					

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

Figure 8 – 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%	↑	32%
Government	25%	10-40%		10%
US	8%			2%
Europe ex-UK (Eurozone)	7%			2%
UK	1%			0%
Japan	7%		↓	2%
Emerging Markets	2%		↑	4%
China**	0.2%		↑	1%
Corporate IG	10%	0-20%	↑	20%
US Dollar	5%		↑	10%
Euro	2%		↑	4%
Sterling	1%		↑	2%
Japanese Yen	1%		↑	2%
Emerging Markets	1%			2%
China**	0.1%		↑	1%
Corporate HY	5%	0-10%	↓	2%
US Dollar	4%		↓	2%
Euro	1%		↓	0%
Equities	45%	25-65%	↑	50%
US	25%		↑	16%
Europe ex-UK	7%			10%
UK	4%			8%
Japan	4%		↑	6%
Emerging Markets	5%			10%
China**	2%		↑	3%
Real Estate	8%	0-16%	↓	8%
US	2%		↓	0%
Europe ex-UK	2%		↓	2%
UK	1%		↓	0%
Japan	2%		↓	2%
Emerging Markets	1%			4%
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%

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

Figure 9 – Model allocations for global sectors

	Neutral	Invesco	Preferred Region
Energy	7.1%	Underweight ↓	US
Basic Materials	4.7%	Overweight	Europe
Basic Resources	2.8%	Overweight	Europe
Chemicals	1.9%	Neutral	US
Industrials	12.4%	Overweight	US
Construction & Materials	1.5%	Neutral	EM
Industrial Goods & Services	10.9%	Overweight	US
Consumer Discretionary	14.9%	Neutral	US
Automobiles & Parts	3.1%	Underweight	Japan
Media	1.1%	Neutral	EM
Retailers	5.1%	Overweight	US
Travel & Leisure	1.9%	Overweight	US
Consumer Products & Services	3.7%	Neutral	Japan
Consumer Staples	6.0%	Neutral	US
Food, Beverage & Tobacco	4.0%	Neutral	US
Personal Care, Drug & Grocery Stores	2.0%	Neutral	US
Healthcare	9.8%	Overweight ↑	US
Financials	15.2%	Underweight	Japan
Banks	7.5%	Underweight	Japan
Financial Services	5.0%	Overweight	Japan
Insurance	2.7%	Underweight	US
Real Estate	3.4%	Neutral ↓	EM
Technology	19.4%	Overweight	US
Telecommunications	3.6%	Underweight	Japan
Utilities	3.3%	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

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 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 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

Countries used in Global Money Supply (Figure 4)

Based on an aggregation of broad money supply aggregates (usually M3) for the following countries: Australia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Eurozone, Hungary, Iceland, India, Indonesia, Israel, Japan, Mexico, New Zealand, Norway, Poland, Russia, South Africa, South Korea, Sweden, Switzerland, Turkey, United Kingdom and United States.

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