R&A GROUP
RESEARCH & ASSET MANAGEMENT

# Special topic: Inflation

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# Agenda

- Inflation: A political – not a monetary – phenomenon.
- Forecasting tools for inflation? The real economy in the form of the output gap performs very well. Among monetary indicators, the interest rate level provides some clues, while the relationship between money supply and inflation is questionable.
- Wage-price spiral: Overstretched mechanism.
- Market-based inflation expectations: Not a useful forecast.
- Low and comparatively stable inflation rates as in the last three decades remain the most likely scenario in the medium term. It must be taken into account that inflation forecasts are naturally much less accurate than forecasts of the real economy.

# Executive Summary

In this study we analyse key trends and determinants of inflation. Due to their importance for the global capital markets and the availability of data, the focus is on the USA and, in addition, the euro area.

We look at explanatory factors for inflation, in particular the business cycle, monetary policy indicators and the role of economic policy and its institutional framework (the latter is particularly important in understanding periods of very high inflation). As far as the business cycle is concerned, the output gap (a measure of whether an economy is operating above or below its productive potential at full employment) is a strikingly simple and reliable indicator of the future direction of inflation. Among monetary policy factors, an assessment of the level of interest rates (i.e. their deviation from a level appropriate in a given economic environment) is helpful. Monetary aggregates (such as M1 and M2) are of little use as indicators of inflation. Particularly troubling is that the link between money supply growth and inflation has essentially broken down since the early 1990s. Conceptually, it is unclear whether a change in the amount of money in an economy merely reflects a series of supply and demand factors (with inflation a factor driving demand) or whether changes in the money supply are indeed triggering changes in the price level. We also show that market indicators of expected inflation have little explanatory power with regard to future inflation developments. Finally, we summarise the factors that may have fostered low and comparatively stable inflation since the 1990s.

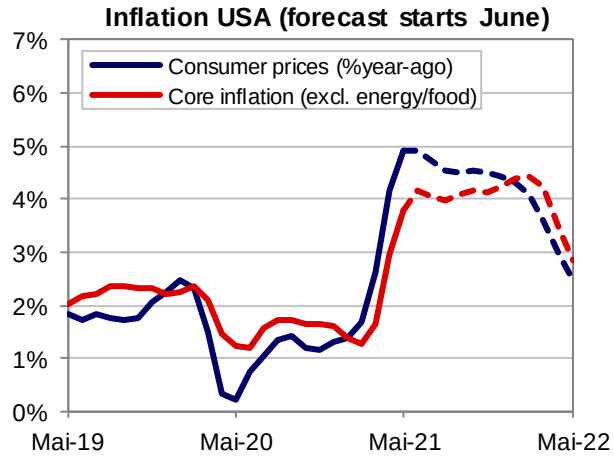
The following analytical building blocks have proven useful in analysing inflation in investment practice: Inflation moves with the output gap, irrespective of whether monetary policy, fiscal programmes or other factors have been the cause of a strong or weak economy. Interest rates systematically below the equilibrium interest rate for a longer period of time would signal medium-term inflation risks (this is currently not the case).

We conclude that low and comparatively stable inflation rates, as in the last three decades, remain the most likely scenario in the medium term, bearing in mind that inflation forecasts are naturally much less precise than forecasts for the real economy.

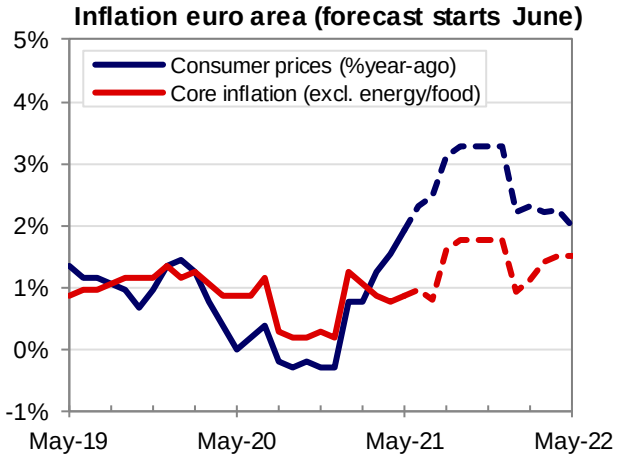
# Inflation: Price pressure largely confined to the US

It became apparent a few months ago that inflation rates would pick up in the second quarter. This is a consequence of economic normalisation, the rise in commodity prices and supply bottlenecks in some goods categories. Consumer prices in the US have indeed been rising more strongly than expected. The core consumer price index (which excludes energy and food) posted a monthly increase of 0.9% in April and 0.7% in May. The comparable figures for the euro area were 0.1% in April and 0.2% May, respectively (using seasonally adjusted ECB data), though surveys of companies in Europe also point to comparatively high price pressure at present. We expect these pressures to ease globally later in the year as supply and demand become more balanced.

In a year-on-year comparison, consumer prices are rising mainly due to base effects, despite higher than normal monthly increases in the US, as prices fell in the lockdowns last year. However, base effects are also leading to temporarily higher inflation rates in the euro area (mostly due to higher energy prices). The forecasts in the charts are based on slightly above-average rates of monthly increases in price levels through August. Thereafter, average monthly increases in recent years have been used.




Source: National statistics, own forecasts



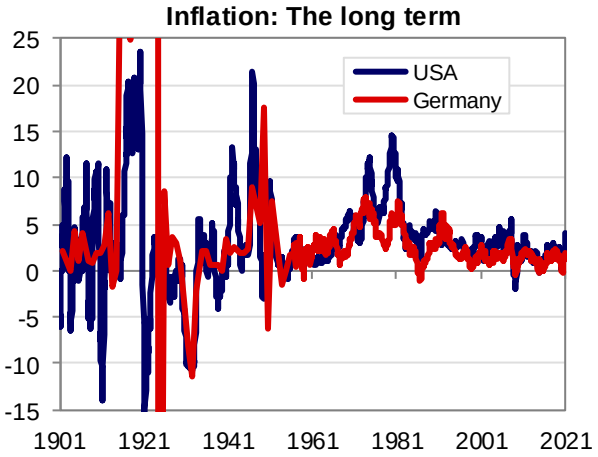

Source: National statistics, own forecasts

# Inflation: Historic trends in Germany and the US

The chart shows inflation rates in the USA and Germany over the past 120 years.

Inflation is usually high (and can end in hyperinflation, as in the Weimar Republic) due to supply-side disruptions and enormous government need for funds during and after wars. The rise in inflation between the mid-1950s and the early 1980s is notable, with the essential causes an activist economic policy that tolerated a rise in inflation (with oil price shocks further fuelling inflation in the 1970s).

Inflation was much more volatile in the first half of the last century than afterwards.



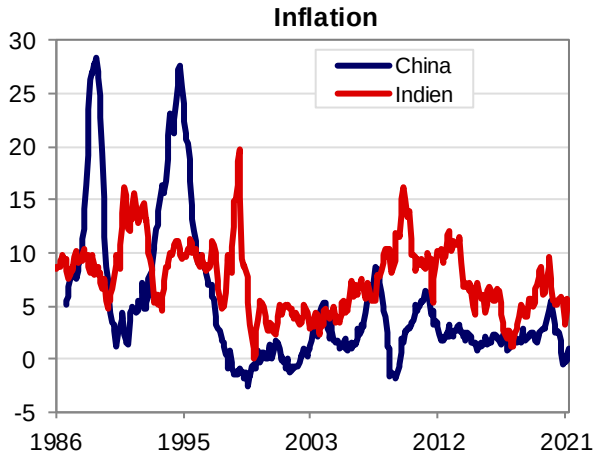

Source: National statistics

**Inflation forecasts much less accurate than those of the real economy**

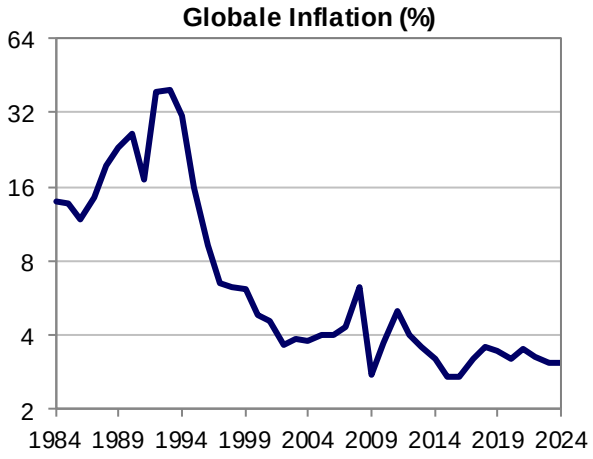
The chart also illustrates that inflation is not a stationary variable in the statistical sense: Inflation (unlike the unemployment rate, for example) does not oscillate over time around a roughly constant mean with a constant variance. This property makes an inflation forecast more difficult for statistical reasons than a forecast of real economic activity as non-stationary variables follow a random walk process without an anchor in the form of an ex-ante steady mean.

# Trends in key emerging economies

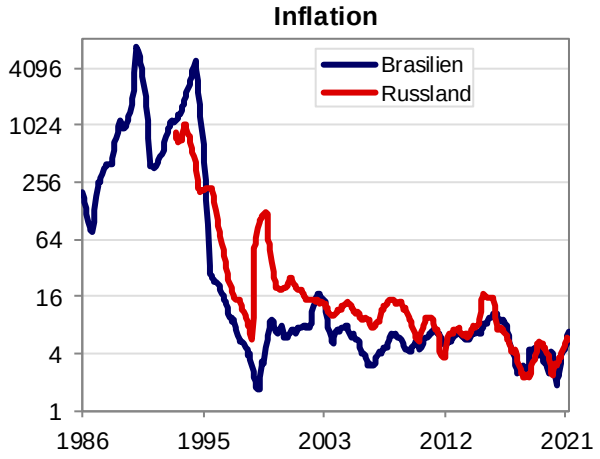
Inflation has been in decline since the 1980s not only in industrialised countries but also in leading emerging countries. While secularly lower inflation is only tentatively discernible in India, a structural break is evident in China in the mid-1990s. In the former hyperinflationary countries Brazil and Russia, the differences in inflation before and after the year 2000 are striking.



Quelle: OECD



Quelle: IWF (inkl. Prognose)



Quelle: OECD

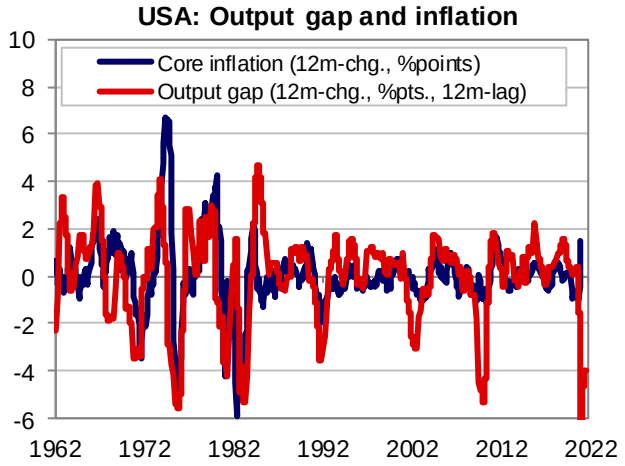
# Output gap: Inflation when capacity is scarce

The chart shows the year-on-year change in inflation (in percentage points) and the output gap (the 12-month change, lagged 12 months).

The output gap measures the difference between current and potential economic output (with the latter defined as the gross domestic product at full employment). A positive output gap means that the economy is operating above its sustainable productive potential and that capacity bottlenecks exist. Companies are more inclined to raise prices in such an operating environment than when demand is low.

That changes in the output gap drive inflation (with a lag of one year) is well visible in the chart, with the correlation stable over the past six decades. The latter is in sharp contrast to the correlation between money supply and inflation, which completely broke down in the early 1990s. The chart also shows that both inflation and the output gap experienced larger swings in the period 1960 to the mid-1980s than in the past thirty years. This provides a hint that the volatility of inflation is correlated with the volatility of real economic output.

We conclude that the business cycle is a good predictor of changes in inflation. At present, given the drop in the output gap a year ago, underlying inflationary pressures are still low. This supports the notion that the latest increase in US inflation is a temporary phenomenon linked to the re-opening of the economy.



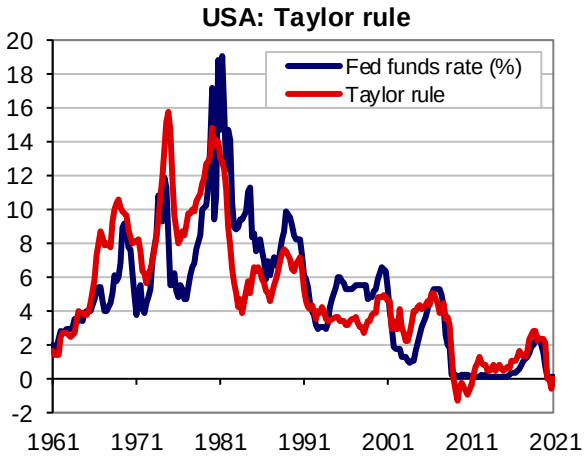
Source: National statistics, own calculations

# Inflation due to cheap money?

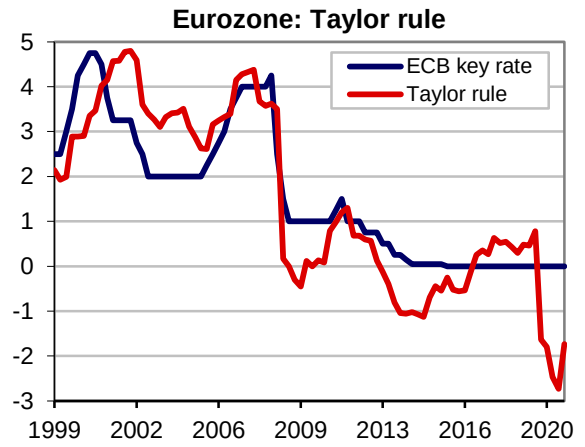
To assess whether a central bank's policy rate is in line with the economic environment, the Taylor rule can be used. The calculation is based on current inflation, the central bank's inflation target, the business cycle (in the form of the output gap, which is defined as the deviation of current economic output from full-employment output) and the neutral real interest rate (which in turn is influenced by demographics and changes in labour productivity).

Indeed, the US example shows that monetary policy was too loose in the 1960s and 1970s. The fed funds rate (the key US interest rate) was lower on average than the level indicated by the Taylor rule in that period. Cheap money in the 1960s and 1970s could thus explain the rise in inflation in that period. Tight monetary policy in the early 1980s (i.e. the fed funds rate significantly above the Taylor rule) laid the foundation for a sustained decline in inflation.

The chart for the euro area shows that since the financial crisis of 2008, the key ECB interest rate has been higher on average than indicated by the Taylor rule. In the US, the policy rate has been almost perfectly in line with the Taylor rule over the past fifteen years. Thus, somewhat surprisingly, even the historically low central bank interest rates prevailing at present do not imply a particularly loose monetary policy.




Source: Fed, CBO, own calculations



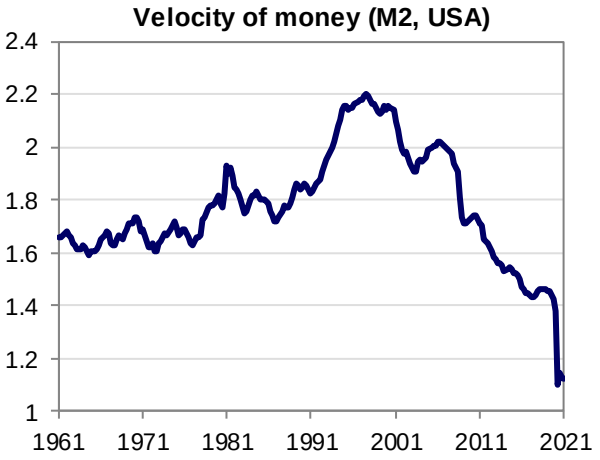

Source: ECB, IMF, own calculations

# Money supply and inflation: Is there a relationship at all?

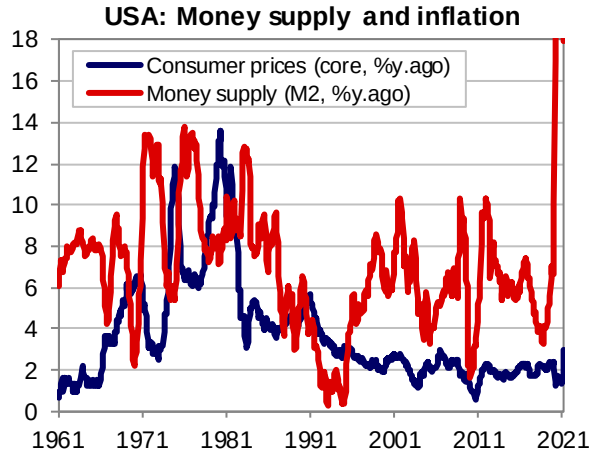
The relationship between the money supply and the price level can be illustrated in a simple way by the quantity equation of money (whose roots date to the sixteenth century). The equation is a mere definition and therefore always true: M*v = P*y. The money supply M multiplied by the velocity of money v corresponds to the value of all transactions, i.e. the price level P multiplied by the transaction volume y (which is usually substituted with real gross domestic product). A relationship between M and P is established when it can be assumed that v is constant (given comparatively little variability in y), which has not been the case since the early 1990s (cf. the top chart). Even if v is constant, the equation says nothing about whether M is caused by P (a rise in the demand for money is caused by an increase in the price level) or vice versa. Based on simple statistical analyses for the US using data from 1880 to 2020, the influence of P on M seems to be somewhat stronger than that of M on P (the latter is usually portrayed as the sole causal relationship).

The bottom chart shows the growth of the money supply M2 and inflation in the US in the past 60 years. There is no stable relationship between the two variables. In the past thirty years, there appears to be no correlation between M2 and inflation at all, a phenomenon known as the "inflation paradox".

Changes in the money supply have not been a reliable predictor of inflation, at least over the last three decades. It goes without saying that s theory that does not provide reasonable forecasts over such a long period of time cannot be considered a good theory. (This is not to say that monetary aggregates and their components may not contain useful information for economists or central banks but that the notion “strong growth in monetary aggregates means higher inflation” is not valid.)




Source: Bloomberg




Source: National statistics, own calculations

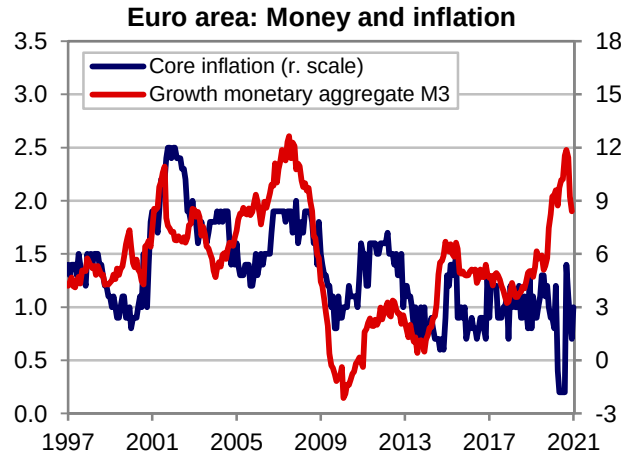
# Euro area: Money supply and inflation

In the euro area, different from the US, data is available for a comparatively short period of time only (longer data series for Germany could be used, but their explanatory power for the euro area as a whole is likely limited).

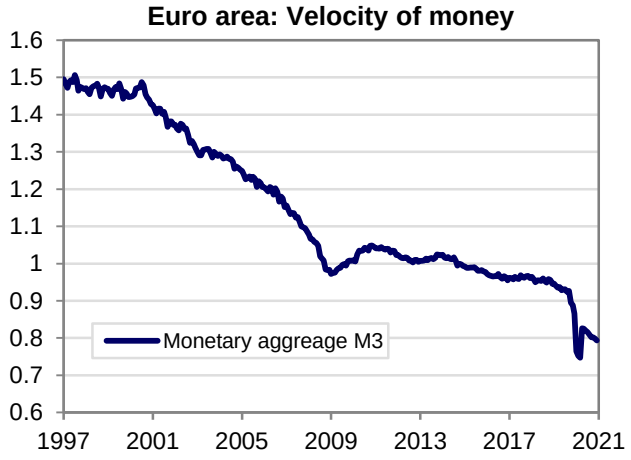
Since 1997, growth in the monetary aggregate M3 in the euro area has been on average much higher than inflation. The mirror image of this phenomenon is the declining velocity of money (see the bottom chart).

Nevertheless, M3 growth in the euro area and inflation tend to move in the same direction (the correlation coefficient is just under 0.4). However, it should be noted – and this is indeed central to the argument – that money supply changes do not systematically lead inflation. At times, money supply growth accelerates or slows only after the inflation rate has started to move higher or lower. It is obvious, therefore, that the money supply cannot be used as a leading indicator of inflation. Since the two variables (money supply and inflation) move – if at all – at roughly the same time, the causality could also be the other way round, i.e. that the money supply is determined by the demand of money, which in turn depends on inflation.

It is easy to conclude for the euro area that an increase or decrease in the money supply cannot be used as signal of future inflation or deflation.




Source: ECB, Eurostat, own calc.

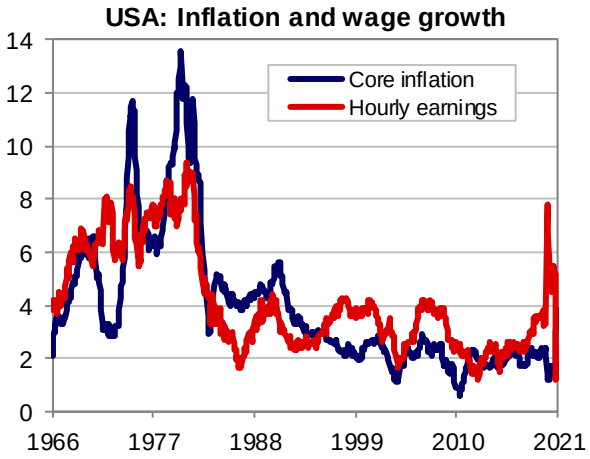



Source: ECB, Eurostat, own calc.

# Wages move with inflation

In connection with inflation, a so-called wage-price spiral often comes into play. The concept suggests that an increase in wages triggers companies to raise sales prices (to pass on higher costs to customers, thereby preserving profit margins), which in turn leads to higher wage demands in response to increased goods prices. The mechanism works when there is full employment and employees have the power to negotiate higher wages and companies enjoy pricing power. In a phase of economic weakness, such as when a central bank slows the economy by raising interest rates, the mechanism works in the opposite direction and inflation falls.

While a wage-price spiral may reinforce inflationary and deflationary tendencies, it is not an independent mechanism driving inflation outside the control of central banks.




Source: National statistics


Source: IMF, OECD

# Economy policy and institutional framework

Episodes of extremely high inflation are often found in a constellation where high government financing needs are matched by insufficient private sector financing. If the central bank is used to finance government spending (which requires the central bank to be controlled by the government), such a process can lead to hyperinflation. This pattern is evident in the hyperinflation episode of the Weimar Republic. Another example is Zimbabwe in the 2000s. Similarly, the inflation in the USA after World War II can be linked to the government interfering with monetary policy. Despite the Federal Reserve's statutory independence since 1913, US monetary policy between 1933 and 1951 was effectively set by Congress and the federal government.

The inflationary phase of the 1960s and 1970s is somewhat different. After the 1958 discovery of the Phillips curve, which shows a negative correlation between wage increases (or inflation) and unemployment, it was soon interpreted, primarily in the US, in a way that the unemployment rate could be lowered (and prosperity increased) by accepting higher inflation. The economic policy experiment of the 1960s based on the Phillips curve ended in a steady rise in inflation. In the 1970s, oil price shocks were an additional factor that drove inflation higher.

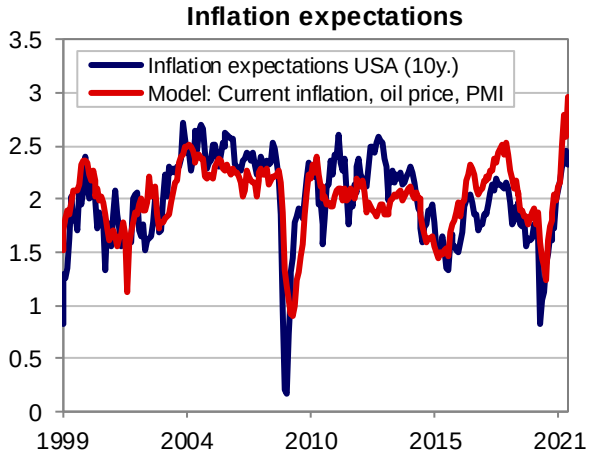
What phases of high inflation have in common is that they ultimately are an unintended or tolerated consequence of specific economic policies. In monetarist Milton Friedman's most famous theorem “inflation is always and everywhere a monetary phenomenon", one is inclined to replace “monetary” with “political” as money describes only the transmission mechanism but not the actual cause of the phenomenon.

The high bond purchases (quantitative easing) by leading central banks in industrialised countries since the financial crisis may at first glance appear to have parallels to historical phases of high inflation, when central banks were exploited by cash-strapped governments. The motivation behind the current bond purchases, however, is quite different. Quantitative easing has been widely used by central banks as a monetary policy tool since the financial crisis. Thus, central banks buy government bonds at their own discretion and not on the instructions of governments that face difficulties in accessing private sector funds.

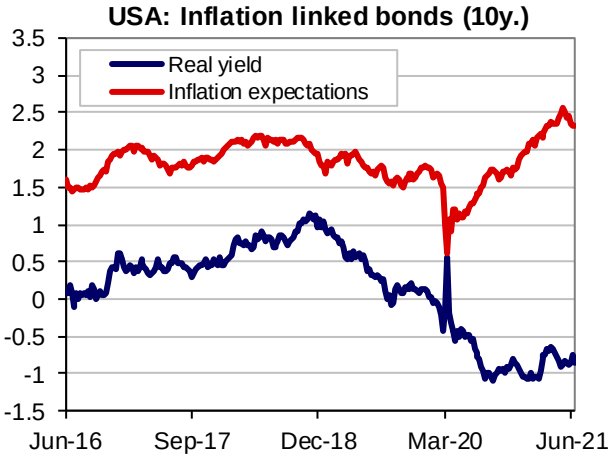
# Inflation expectations: Not a long-term forecast

Inflation expectations can be derived from market prices and surveys. Expectations derived from inflation-linked bonds (see the top chart) reflect current economic data, in particular current inflation, changes in oil prices and economic activity (represented by the PMI, i.e. the industry purchasing managers index).

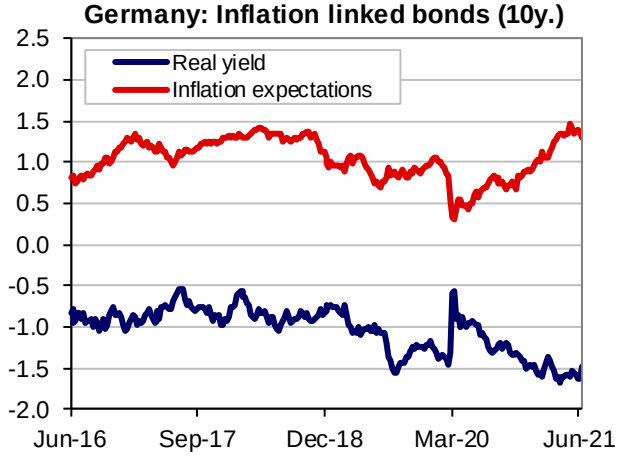
It is doubtful that current economic data are a good predictor of inflation in the next ten years. Inflation expectations are useful in terms of what is priced into the capital markets, but are unlikely to contribute much to an accurate long-term inflation forecast.




Source: Index provider, own calculations




Source: Index provider, own calculations



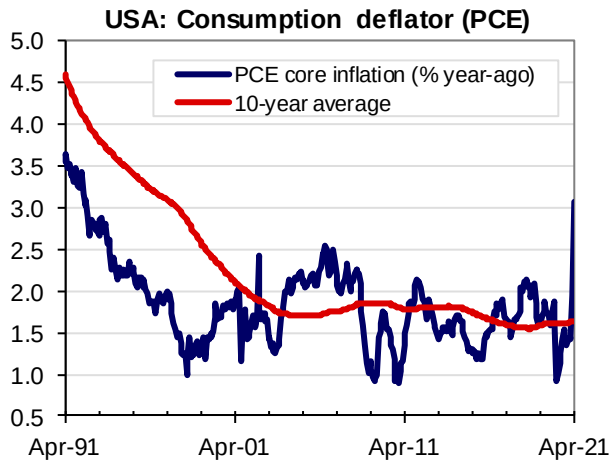

Source: Index provider, own calculations

# The Fed’s experiment

In 2020, the Federal Reserve decided to change monetary policy so that it will refrain from pre-emptive interest rate hikes in the future. The reason is that inflation (measured by the personal consumption deflator PCE) has rarely been above the Fed's target of 2% since the mid-1990s and on average even below that. Inflation is now targeted to average 2% over an economic cycle.

Therefore, monetary policy will no longer be tightened when real economic indicators (such as a very low unemployment rate) point to an advanced economic cycle and inflation risks, but only when these risks are materialising (i.e. when inflation rises).

If pre-emptive rate hikes are abandoned, there is a chance that the unemployment rate could fall far more than previously thought possible before inflation starts to rise. Since inflation generally reacts with a lag to capacity constraints, the risk of the new strategy is that any necessary tightening of monetary policy takes place too late and thus has to go further than under a pre-emptive regime.



Source: Bureau of Labor Statistics

# Factors driving low inflation

The fact that a structural break occurred around 1990 and that inflation has been low and comparatively stable since then is well documented in the literature. Inflation has no longer reacted systematically to changes in the money supply over the past three decades, and the fluctuations in inflation caused by the business cycle have remained comparatively small. Explaining such a structural break is inherently difficult. In the following, we summarise the main factors cited in the literature.

Globalisation is often mentioned as a moderating factor for inflation. China's entry into the World Trade Organisation (WTO) in 2001 is seen as a milestone. As goods and services become more tradable globally, companies lose their local pricing power and therefore do not raise prices even when local wage pressures rise. Moreover, more and more people in emerging economies are moving out of agriculture into the industrial and service sectors, which structurally increases the global labour supply and helps mitigate cyclical bottlenecks. Although this argument is convincing, there seems to be surprisingly little empirical evidence to support it.

Technological progress is another factor that fosters low inflation. Many products (e.g. semiconductors) are becoming more powerful and cost less, which contributes to product price deflation. The sharing economy (e.g. Airbnb, Uber) increases the available capital stock, which reduces the return on capital through declining prices. E-commerce also contributes to increased global price transparency. In recent decades, the industrialisation of the retail sector (e.g. Walmart, Zara, IKEA) has contributed to lower prices for a large number of goods.

Other arguments focus on decreasing wage pressure. For example, the risk of companies relocating production to low-wage countries has increased over time, which may have a moderating effect on wage demands. Moreover, in an ageing society, more and more employees with high wages retire at the end of their working lives, while those entering the labour force have lower wages (the argument is particularly compelling when the productivity gap between older and younger workers is smaller than the wage gap). According to the Fed, this demographic effect has been statistically shown to be at work in the US.

(continued on the next page)

# Factors driving low inflation (cont'd)

Last but not least, central banks likely have made a significant contribution to stable, low inflation rates. The number of independent central banks has increased worldwide, with a higher degree of independence associated with lower inflation rates on average. Moreover, since the late 1980s, more and more central banks have adopted inflation targeting, with targets (at least until a few years ago) pursued asymmetrically (inflation above the target is fought, while inflation below it is tolerated, resulting in below-target inflation over time). Inflation targeting likely also has helped anchor inflation expectations at low levels.

While the influence of the aforementioned factors on inflation cannot yet be comprehensively evaluated quantitatively, there is at least little evidence that these factors will reverse course in the foreseeable future. One minor exception is the US Federal Reserve, which – after inflation had been below the 2% target on average since the mid-1990s – has changed its strategy in 2020 so that the objective is to have 2% through an economic cycle. This change implies a somewhat higher inflation on average but no sustained rise.

# Summary and conclusion

A brief look at history shows that high inflation is usually caused by economic policy mistakes. Phases of hyperinflation go hand in hand with the instrumentalisation of the central bank to finance government budgets. It is worth mentioning that the stepped-up pace of bond purchases by leading central banks since the financial crisis does not fall into this category.

When it comes to forecasting inflation, the real economy is far better suited than monetary variables: Inflation moves with the output gap, irrespective of whether monetary policy, fiscal programmes or other factors have been the cause of a strong or weak economy. Among the monetary variables, the interest rate level provides certain clues: An interest rate level that is systematically too low compared to the equilibrium interest rate for a longer period of time would signal inflation risks in the medium term (which is currently not the case, however). On the other hand, the relationship between money supply and inflation is so unclear, both conceptually and empirically, that monetary aggregates are of little use in judging inflation or deflation risks.

Considering all arguments, low and fairly stable inflation remains more likely than a structural increase in inflation. Unlike in the 1960s, there is currently no evidence of monetary policy being overly loose, despite record low interest rates. In addition, it can be assumed that neither the ECB nor the Fed will tolerate inflation significantly above their 2% targets for an extended period of time. The instruments for fighting inflation (especially raising interest rates to slow the economy) are available and effective (conversely, fighting too low inflation with extremely low interest rates may not work, given the effective lower boundary of zero for interest rates). Overheating of the global economy is also not imminent as economic output has yet to reach its pre-pandemic levels. When assessing inflation, it should be borne in mind that inflation forecasts are by their very nature much fuzzier than forecasts of the real economy.

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