

DETERMINANTS AND IMPLICATIONS OF LOW GLOBAL INFLATION RATES

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This article firstly gives an overview of how global inflation has evolved in recent years, during which it has followed a generally downward trend. Inflation has often been low, and even negative, and has fallen short of central banks' targets despite the adoption of unconventional monetary policy measures to achieve the desired stimulus. The decline steepened in mid-2014, coinciding with the collapse in the oil price, although it also extended to core rates. This article explores what domestic and external factors could explain this behaviour, and the possible existence of changes in fundamental relationships between the underlying variables in the main developed economies. It also discusses the possible economic consequences of an extended period of excessively low inflation rates, and the implications for economic policy highlighted in the economic literature.

Introduction

Over the past five years the world has witnessed an almost universal trend towards lower inflation rates, with rates often falling short of central bank targets. The decline steepened in mid-2014 with the oil-price slump, such that inflation rates in the main advanced economies dropped to extremely low – and in some cases negative – levels. This behaviour appears to be at odds with the context of moderate economic recovery and accommodative monetary policy that has prevailed in recent years. It also contrasts with inflation's downward rigidity in the immediate aftermath of the financial crisis, given the depth and duration of the recession (so-called “missing disinflation”).² It is therefore worth asking what factors may be driving this recent behaviour in consumer prices.

One possible explanation is that inflation has been linked to transitory factors, such as the drop in prices of oil and other commodities in the last year and a half. However, the drop in inflation is also apparent in the underlying rates, which ought to be less affected by these factors. Therefore, alternative explanations have been put forward that operate through structural changes in the price formation process. One possibility is that the relationship between inflation and its domestic determinants has changed. This is not new. For example, in many advanced economies, it is well documented that inflation's cyclical sensitivity on a downward trend up until the early nineties, with the growing relative importance of inflation targets, thanks to the credibility central banks had achieved. Global factors may also have become more important in determining domestic prices, due to the closer integration of global product and factor markets, increasing inflation's sensitivity to the degree of slack in the global economy.

Whatever the case, low inflation rates can have harmful effects for economies. For instance they can lead to undesirable tightening of monetary conditions, with higher real interest rates, if monetary policy cannot lower nominal rates sufficiently. Meanwhile, lower inflation has a negative impact on public and private debt dynamics, as it makes

¹ This article is a summary of the following paper: Berganza, Borrallo and del Río (2016), “Determinants and implications of low global inflation”, Documento Ocasional, n.º 2016, Banco de España.

² Ball and Mazumder (2011) indicate that, in the case of the United States, according to historical models, core inflation should have fallen more in the period 2008-2010 (to rates below -3 %, when it only reached 0.6 %). The historical evidence suggests that pronounced and persistent negative output gaps tend to lead to significant disinflation in terms of both prices and wages [see Meier (2010)].

deleveraging more difficult. It also exacerbates the process of internal devaluation in monetary union member countries that need to restore their competitiveness. In extreme cases, there can be a de-anchoring of agents' inflation expectations, with the consequent risk of falling into a deflationary spiral. This also has a negative impact on central banks' credibility.

This article firstly gives an overview of how global inflation has evolved in recent years, distinguishing between different economic areas. The possible factors explaining why prices have behaved in this way are then analysed using the Phillips curve approach. The potential economic consequences of excessively low inflation rates are then explored, along with the associated economic policy implications discussed in the economic literature. Finally, the main conclusions are set out.

Recent global trends in inflation

The global inflation rate has fluctuated widely over the past decade. After climbing to over 5% before the crisis, partly driven by a surge in energy prices, it fell to levels barely above 0% in the wake of the crisis. Nevertheless, as already mentioned, this drop was smaller than predicted by the most widely used models, given the severity and duration of the recession. A gradual recovery began in mid-2009, with inflation reaching 4% in mid-2011, before returning to its downward trend, and dropping to 1% at end-2015. It has since been gradually increasing, and currently stands at 1.6%. The global core rate – which excludes the more volatile energy and unprocessed food prices – dropped from 3.4% to 1.2% during the crisis, and after a partial upturn, it dropped back to 1.3% at the end of 2015, and is currently 2% (see Chart 1).³ It is noteworthy that within core inflation the prices of services and manufactured goods have performed differently. Inflation rates for manufactured goods have tended to be negative over the last two years, whereas those of services have stayed higher.⁴

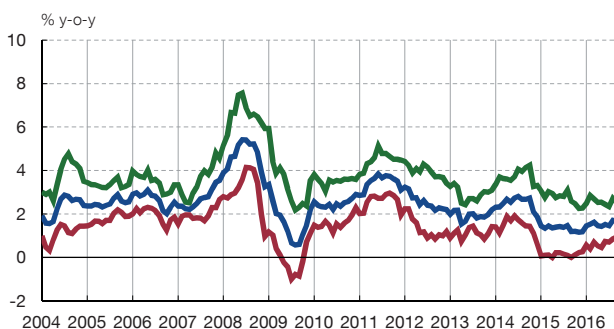
Cross-country analysis shows how inflation rates have been on a downward trend over the past five years in the main advanced economies (see Charts 2.1 and 2.3), often falling short of central bank targets. This has also been the case with core inflation. Indeed, headline inflation in this set of economies was negative in early 2015. In some cases, such as the euro area, inflation has remained at levels close to zero since then, while core inflation rates have remained below 1%. Only in the case of the United States, which is further in to the economic cycle, is the core inflation rate above 2%. In Japan, headline inflation picked up to rates close to 2.5% in mid-2014 due to an increase in the consumption tax rate, but subsequently returned to negative values. Inflation is also rising in the United Kingdom, but this is largely associated with the depreciation of sterling following the result of the referendum on EU membership.

Emerging economies have also experienced a downward trend in inflation, but always at levels exceeding the global average. Moreover, there has been a wider range of variation between countries in the case of the emerging economies than among the advanced economies (see Charts 2.2 and 2.4). While in some cases rates have been very low (particularly in the new EU Member States, and some emerging Asian economies, such as China and Korea), in others such as Brazil, India, Indonesia, Russia and Turkey, inflation rates have remained high, partly as a result of currency depreciation.

³ The global inflation rate has been constructed from a sample of 27 countries, accounting for 80% of global GDP.

⁴ However, in some cases, such as the United States, the moderation of services inflation is surprising when compared to other recoveries. This could be due to trends in health-care prices resulting from recent legislation in the country.

1 HEADLINE INFLATION: MEDIANS

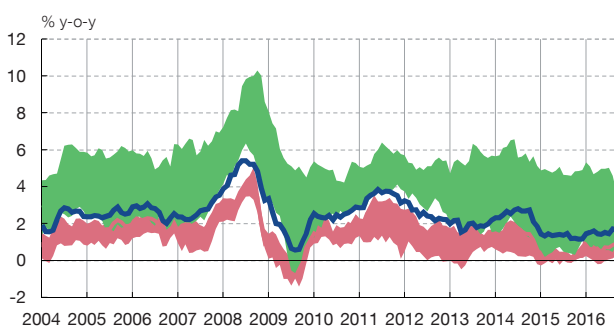


2 CORE INFLATION: MEDIANS (b)

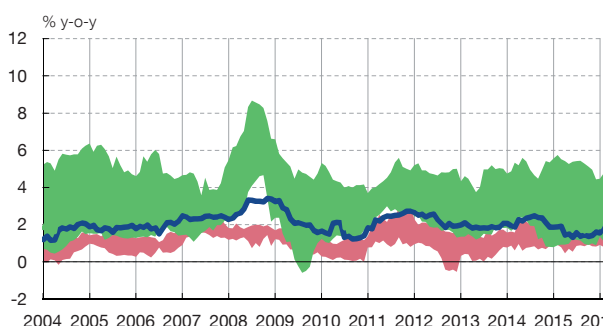


— WORLD — ADVANCED ECONOMIES — EMERGING ECONOMIES

3 HEADLINE INFLATION: RANGES (c)



4 CORE INFLATION: RANGES (b) (c)



— WORLD — ADVANCED ECONOMIES — EMERGING ECONOMIES

SOURCES: Datastreram, national statistics, OECD, and Banco de España.

- a Includes Canada, euro area, Japan, Norway, Sweden, Switzerland, United Kingdom, and United States (advanced economies) and Brazil, Chile, China, Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Singapore, South Africa, Thailand and Turkey (emerging economies).
- b Core inflation excludes food and energy.
- c First and third quartiles.

This article therefore focuses on identifying the underlying reasons for the advanced economies’ low inflation rates in recent years.

Determinants of inflation

The standard framework for modelling inflation is the Phillips curve, according to which inflation (π_t) is basically determined by agents’ expectations. As Ball and Mazumder (2011) suggest, these expectations may have backward-looking π'_t and forward-looking LT_t components. It is also affected by the degree of cyclical slack in the economy ($slack_t$), such that, more idle productive resources would be associated with a lower inflation rate.

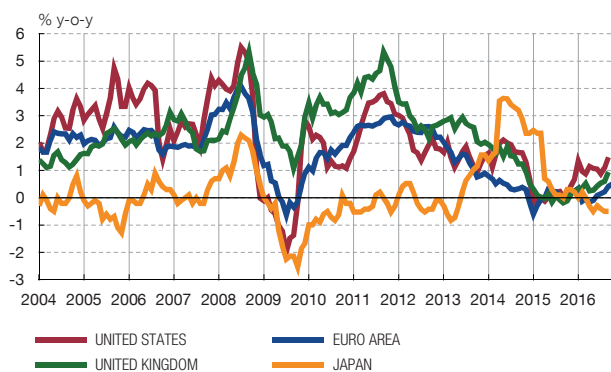
$$\pi_t = \lambda LT_t + (1 - \lambda)\pi'_t + \beta_1 slack_t + \varepsilon_t \quad [1]$$

In this framework, low inflation could be explained by greater relative slack in the economy and/or agents’ lower inflation expectations.

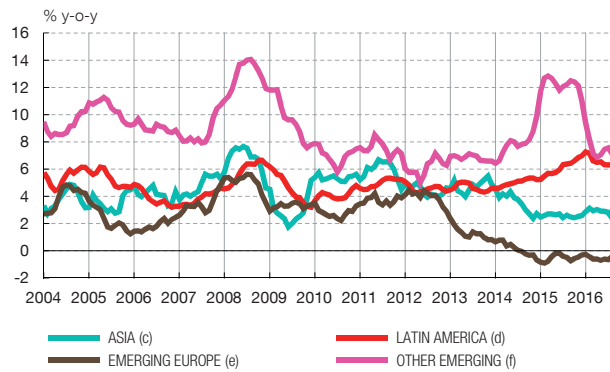
However, the analysis based on the Phillips curve has its limitations and remains controversial among economists.⁵ To start with, the degree of slack in the economy cannot

⁵ See, for example, Constâncio (2015) or Yellen (2015).

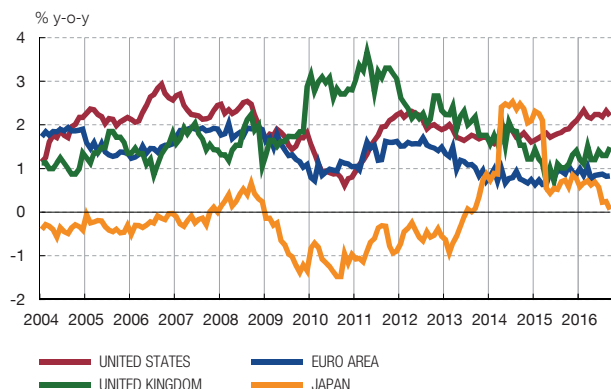
1 INFLATION IN ADVANCED ECONOMIES



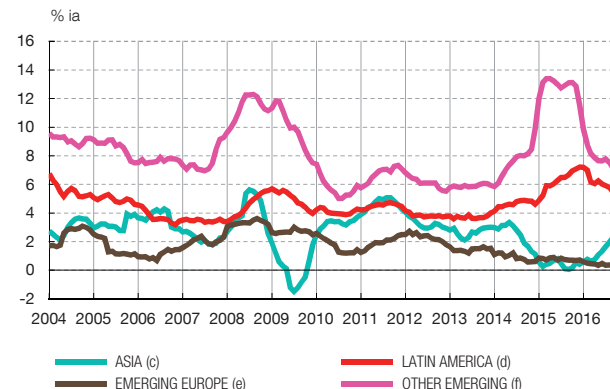
2 INFLATION IN EMERGING ECONOMIES (a)



3 CORE INFLATION IN ADVANCED ECONOMIES (b)



4 CORE INFLATION IN EMERGING ECONOMIES (a) (b)



SOURCES: Datastream, national statistics, OECD and Banco de España.

- a Averages weighted by each countries' GDP in 2005 in PPP terms.
- b Core inflation excludes food and energy.
- c China, Hong Kong SAR, India, Indonesia, Korea, Malasia, the Philippines, Singapore and Thailand.
- d Brazil, Chile, Colombia, Mexico and Peru.
- e Czech Republic, Hungary and Poland.
- f South Africa, Turkey and Russia.

be directly observed but has to be estimated, which is particularly complicated in the wake of the global financial crisis. Secondly, changes have been detected in the model's parameters in the past (both those measuring inflation's sensitivity to the cyclical position and those approximating the contribution of the prospective component relating to inflation expectations), and they could have changed again now. Moreover, this theoretical framework usually has to be backed up with other factors that are relevant to price determination, such as indirect taxes and demographic changes.

In the case of an open economy, the Phillips curve models need to factor in the effects of the exchange rate and prices of imported inputs (including raw materials) and finished goods, which are also a part of agents' consumption basket. This is precisely the approach taken in this study, such that expression [1] has an additional term (imp_t), which captures relative import prices:

$$\pi_t = \lambda LT_t + (1 - \lambda)\pi'_t + \beta_1 slack_t + \beta_2 imp_t \tag{2}$$

Some authors have also highlighted the possibility that, as a result of the globalisation process, inflation depends less at present on each economy's position in the cycle

and more on the degree of global economic slack, this effect being in addition to that of import prices.⁶

These factors are examined in more detail below, starting with those that are, in principle, transitory, followed by those that are more structural. To this end, an extensive literature regarding this matter has been reviewed and an empirical exercise conducted, focusing on estimating equation [2] for the main developed economies, and analysing possible changes in the model's parameters before and after the global financial crisis.

THE EFFECT OF COMMODITY PRICES AND EXCHANGE RATES

It is clear that trends in commodity prices, particularly the oil price, have been among the main factors in the recent drop in inflation around the world (see Charts 3.1 and 3.2). Overall, the energy and foods components have accounted for 85% of the drop in inflation in the United States, 60% in the euro area, and 90% in Japan. The direct effects of softer commodity prices differed between countries, depending on their weight in the CPI basket, changes in exchange rates, the unit tax burden on these goods, and changes in energy taxes and subsidies. For example, the oil price has fallen less in economies whose currencies have depreciated against the dollar over this period. Moreover, the drop in the energy component of the CPI in the EU was smaller than in the United States as a result of the heavier tax burden in European countries.⁷ As regards the possible indirect effects of changes in commodity prices, there is considerable evidence that the degree of pass-through of these changes into core inflation has diminished over the past three decades, as a result of less intensive raw material use and the greater credibility of the monetary authorities.⁸

Exchange rate changes also explain a significant portion of inflation in the various countries, as shown by the negative correlation between inflation rates and changes in the nominal effective exchange rate in recent years (see Chart 3.3). Some economies have experienced substantial depreciation in their exchange rate and an upturn in inflation. These include Japan, following the implementation of the series of economic policy measures referred to as Abenomics, and the United Kingdom, following the global financial crisis and, more recently, in the wake of the referendum on EU membership. Other economies whose currencies have appreciated, such as Switzerland, the United States and, more recently, Japan, have experienced downward pressure on inflation via this channel. Nevertheless, as with commodity prices, there is evidence in the literature that the extent to which exchange rate changes are passed through into inflation has decreased in recent decades.⁹ This decline in pass-through is due to stronger inflation-expectation anchoring and the development of global production chains that enable multinationals to absorb exchange rate shifts better.

In any event, the low levels of inflation witnessed in recent years cannot be explained solely by fluctuations in exchange rates or commodity prices. Other factors, some of which are more permanent, have played a significant role in the price formation process. These possible determinants are discussed in the following sections, always from within the conceptual framework of the Phillips curve.

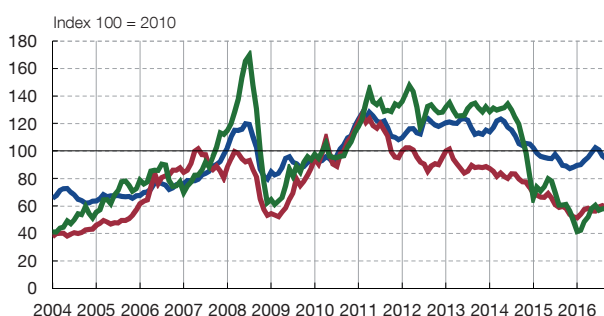
⁶ See BIS (2014).

⁷ In the case of some emerging economies, such as Brazil and Indonesia, subsidy cuts have caused an effective rise in fuel costs.

⁸ See, for example, Blanchard and Galí (2010).

⁹ See, for example, Campa and Goldberg (2005) or BIS (2014). However, Forbes et al. (2015) found pass-through to have increased in the United Kingdom since the crisis and highlight the extent to which pass-through differs according to the source of the exchange rate movement.

1 LEVELS

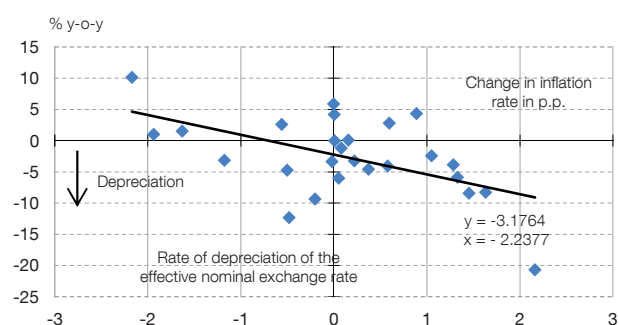


2 YEAR-ON-YEAR RATE

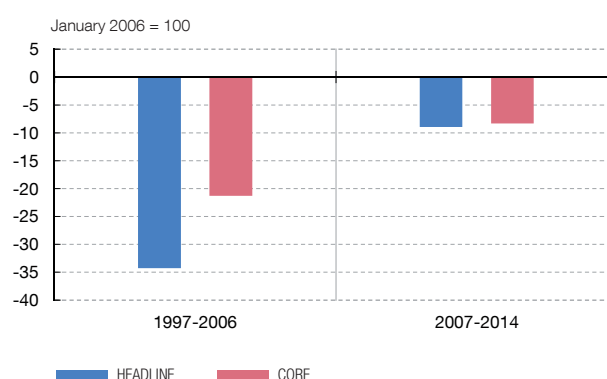


— FOODS — METALS — ENERGY

3 RECENT RELATIONSHIP BETWEEN INFLATION AND THE EXCHANGE RATE (a)



4 CHANGE IN THE INFLUENCE OF THE EXCHANGE RATE ON INFLATION IN RECENT DECADES (b)



SOURCES: Datastream, national statistics and BIS Annual Report 2015.

- a Change between March 2015 and March 2016 in inflation and exchange rates in the following countries: Brazil, Canada, Chile, China, Czech Republic, euro area, Hong Kong, Hungary, India, Indonesia, Korea, Japan, Malaysia, Mexico, Norway, Peru, the Philippines, Poland, Singapore, South Africa, Sweden, Switzerland, Thailand, Turkey, the United Kingdom and the United States.
- b Correlation between headline inflation and second lag of year-on-year change in the nominal effective exchange rate. Simple average of Australia, Brazil, Canada, Chile, Colombia, Czech Republic, Denmark, euro area, Hungary, India, Indonesia, Japan, Korea, Mexico, New Zealand, Norway, Peru, the Philippines, Poland, Singapore, Sweden, Switzerland, Thailand, Turkey, the United Kingdom and the United States.

CHANGES IN THE CYCLICAL SENSITIVITY OF INFLATION

A high degree of slack in the economy is a typical driver of low inflation. The output gap, which is defined as the difference between observed and potential GDP, is usually taken as a proxy for economic slack, although the unemployment gap, which is defined as the difference between the unemployment rate and the non-accelerating-inflation rate of unemployment (NAIRU), may also be used. The output gap and unemployment gap estimates are subject to uncertainty as they include non-observable variables. The statistical relationship that has historically linked changes in these two variables, known as Okun's law, also seems to have changed in some economies. For example, in the United States, in recent years, some of the fundamental labour market variables, such as participation rates, unemployment rates, and long-term unemployment rates, have behaved in ways out of keeping with historical trends. This suggests that structural changes may have taken place in the labour market and/or in the relationships between the various economic variables.¹⁰ In any event, the estimates available from various international organisations suggest that although there is a significant degree of economic slack in the main advanced economies, in most cases it has been shrinking.

¹⁰ For a detailed analysis of recent trends in the U.S. labour market, see Berganza (2014).

This reduction contrasts with the increasing moderation in inflation rates discussed in the previous section.

The fact that inflation rates have not responded as expected to economies' cyclical position in recent years is not entirely new. There is extensive empirical evidence that the Phillips curve flattened between the seventies and the early nineties in the advanced economies,¹¹ as can be seen in Chart 4. However, there is also considerable evidence that this flattening of the Phillips curve has been reversed in some advanced economies since the crisis – such as Spain and Italy¹² – following the implementation of certain structural reforms and labour-market deregulation.

In the case of wages, over the last few years less growth has been seen than in previous recoveries, even bearing in mind the low rates of inflation registered. There may be various reasons for this. Firstly, it could indicate that labour market conditions are weaker than the unemployment rate would suggest. Moreover, the productivity gains seen in recent years have been small and in some countries, such as the United Kingdom, job losses during the crisis and job growth during the recovery have been concentrated in sectors characterised by lower pay and productivity. Another explanation, popularised by the chair of the Board of Governors of the Federal Reserve System at Jackson Hole in 2014 [Yellen (2014)], was the concept of “pent-up wage deflation”.¹³ On this hypothesis, the (supposed) reluctance of workers to accept cuts in nominal wages in recessionary periods or at the start of the expansion¹⁴ would have held real wages above equilibrium levels for a large share of workers. The subsequent drop in unemployment during the expansion would thus have reduced the slack in the labour market without pushing up wages.

Another interesting feature of price determination related to the reduced cyclical sensitivity of inflation is that the relationship between wage growth and inflation seems to have broken down in some advanced economies.¹⁵ As Charts 4.3 and 4.4 show, in the economies of the United States and the United Kingdom this relationship was relatively close in the seventies and eighties, whereas inflation seems to have become less sensitive to changes in wages since the nineties. One possible explanation for this phenomenon would be the countercyclical behaviour of profit margins, which would compensate for changes in wages, thereby reducing inflation's sensitivity to labour market conditions. Thus, increased profit margins in some economies in the wake of the Great Recession may have led to inflation's becoming less responsive to downward wage pressures. The financial crisis could have intensified this pattern, as the countercyclical behaviour of margins is more pronounced in the presence of financial constraints.¹⁶

Other studies attribute inflation's reduced sensitivity to internal cyclical conditions to globalisation, which would have increased the importance of factors such as the global output gap or import prices.¹⁷ By expanding the range of goods and services traded internationally, globalisation has pushed down prices of traded goods, given the lower production costs in economies – such as China's – that have come to play a bigger part in

11 See IMF (2013), BIS (2014) or Blanchard et al. (2015).

12 See, for example, Álvarez and Urtasun (2013), Riggi and Venditti (2014), Banco de España (2015) or IMF (2016).

13 See, for example, Daly and Hobjin (2014).

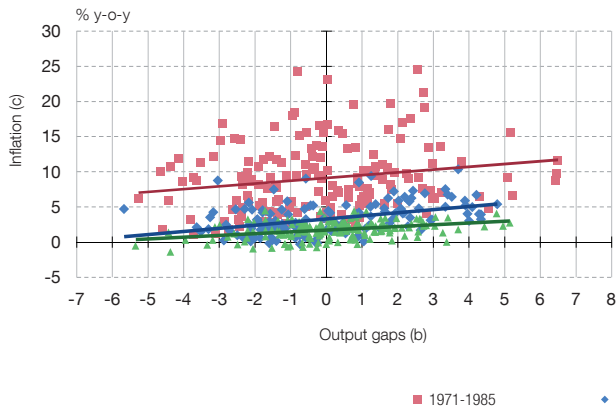
14 There is extensive evidence of these downward rigidities in nominal wages (see, for example, Benigno and Ricci (2011), or Linder et al. (2012)).

15 See, for example, Yellen (2015).

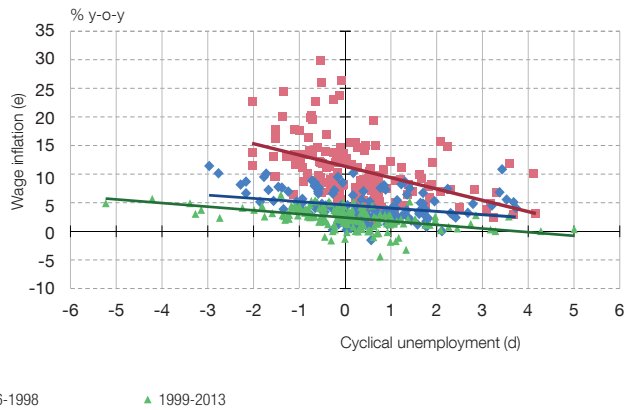
16 As recently proposed by Gilchrist et al. (2015).

17 See, for example, IMF (2013, 2016) or BIS (2014).

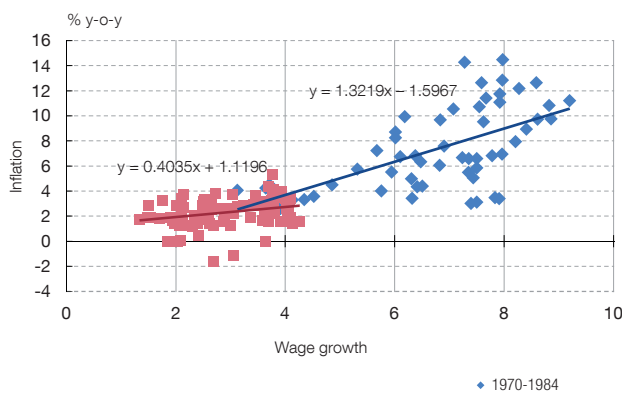
1 INFLATION AND OUTPUT GAPS (a)



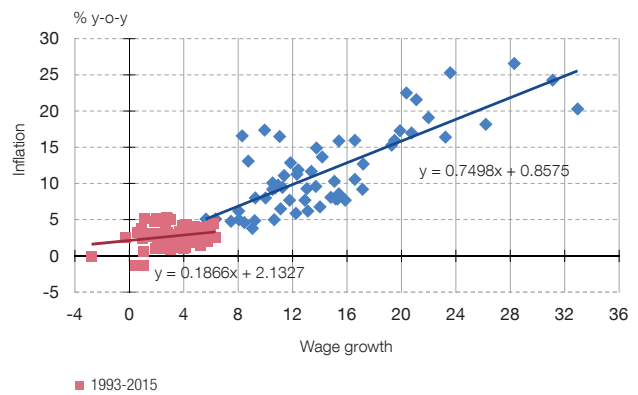
2 WAGES AND CYCLICAL UNEMPLOYMENT (a)



3 UNITED STATES (f)



4 UNITED KINGDOM (f)



SOURCES: BIS Annual Report, 2014 and national statistics.

- a Annual data, regression lines estimated in unbalanced panel regressions with fixed individual effects, controlling for annual changes in commodity prices. The countries included are Australia, Canada, France, Germany, Italy, Japan, Spain, Sweden, Switzerland, the United Kingdom and the United States.
- b Estimated with a Holdrick-Prescott filter.
- c Year-on-year change in the unemployment rate.
- d Unemployment rate less the non-accelerating inflation rate of unemployment.
- e Year-on-year changes in wages.
- f Quarterly data.

world trade. Globalisation has also had an impact on the degree of international competition, affecting workers' bargaining power and businesses' profit margins.

The increased importance of global factors would be consistent with the trend towards greater synchronisation of inflation and wage growth rates in the advanced economies in recent years. However, even if we accept that global factors are playing a bigger role in shaping inflation, there is considerable uncertainty as to how relevant they are in explaining the recent drop in inflation (or low inflation before the global financial crisis).¹⁸ Over the longer term, it is worth discussing the extent to which globalisation will continue to exert downward pressure on inflation, as differences in labour costs between countries tend to narrow.

THE IMPORTANCE OF INFLATION EXPECTATIONS

Another possible explanation given in the literature for inflation's reduced cyclical sensitivity is the firmer anchoring of agents' inflation expectations on central banks' targets and the increased significance of this factor in price and wage setting.¹⁹ If agents remain confident

¹⁸ See, for example Rogoff (2006) or Bernanke (2007).
¹⁹ See, for example, IMF (2013), BIS (2014) or Yellen (2015).

that central banks are committed to price stability, they will attach less importance to transient deviations in inflation and the cyclical pressures on inflation will be more muted. The greater stability of inflation in recent decades, and its resistance to dropping further during the financial crisis, would be consistent with expectation anchoring's playing a bigger role. Studies analysing how the parameters of the Phillips curve have developed over time tend to confirm that the inflation expectation coefficient has increased.²⁰

As short-term expectations tend to be more volatile and more responsive to current trends in inflation, it is particularly important that long term inflation expectations remain anchored. As Yellen (2015) shows, the medium-term effect on inflation of transitory factors (such as energy prices or the degree of economic slack) depends on whether long-term expectations are affected or not. In recent decades, long-term expectations have remained much more stable and have barely been affected by the changes observed in inflation. However, the drop in inflation in the recent recovery does seem to have caused a downward shift in medium- and long-term inflation expectations in developed economies (see Charts 5.1 and 5.2).

Indeed, long-term expectations, particularly when these are measured based on market instruments, have become more closely correlated with observed inflation in the advanced economies since the financial crisis.²¹ A closer correlation has also been seen between inflation expectations and oil prices, particularly in low-growth economies with persistently sub-target inflation and official interest rates close to the lower bound (see Charts 5.3 and 5.4). Along the same lines, a recent IMF study [IMF (2016)] on low inflation rates found that the long-term inflation expectations coefficient had decreased and the role of past expectations, and hence the persistence of past expectations, had increased since the crisis. The same study found the sensitivity of medium- and long-term inflation expectations to inflation and oil price surprises to have risen in those advanced economies with monetary policies constrained by the lower effective bound on official interest rates. These phenomena, which until recently had only been observed in exceptional cases, such as Japan,²² point to a reduced anchoring of inflation expectations and the possibility that transitory factors, such as oil price changes, have second round effects, which is a matter of concern for the monetary authorities.

EMPIRICAL ANALYSIS OF THE DETERMINANTS OF INFLATION

In order to gauge whether inflation's response to the various variables discussed above has changed since the crisis, a series of regressions have been estimated for a group of developed economies. The estimates are based on the standard model of the Phillips curve as specified in equation [2]. In this framework, inflation (π_t) is approximated by its core component, the forward-looking part of inflation expectations (LT_t) by the consensus of analysts' forecasts or the central bank's inflation target; the backward looking part (π'_t) by average core inflation over the last four quarters; the degree of cyclical slack in the economies ($slack_t$) by the difference between NAIRU and the unemployment rate observed (NAIRU gap)²³; and relative import prices (imp_t) by the difference between inflation on

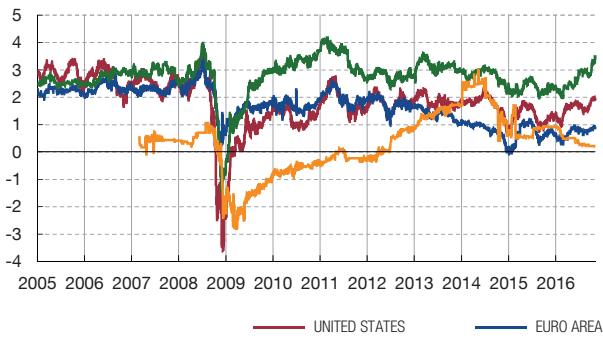
20 See IMF (2013) or Blanchard et al. (2015).

21 The limitations of measures of inflation expectations derived from financial instruments (such as the existence of liquidity premiums) must be borne in mind, while, by contrast, expectations reported in surveys have remained much more stable. In any case, Lyziak and Paloviita (2016) find that following the crisis, long-term inflation expectations in the euro area, as reported by professional analysts and consumer surveys, have also become more sensitive to short-term inflation forecasts and inflation trends.

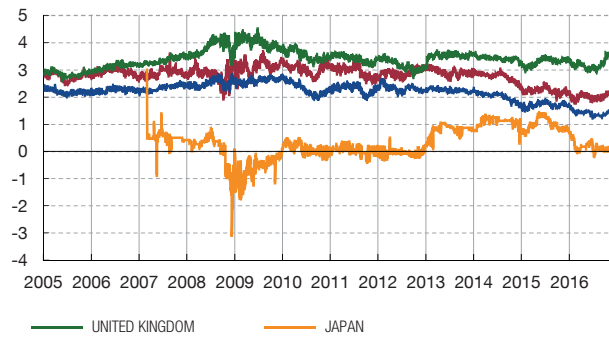
22 In a recent analysis of its monetary policy strategy, the Bank of Japan indicated that one of the main causes of persistently low inflation is the adaptive or backward looking nature of inflation expectations [see Bank of Japan (2016)].

23 This approach means the sign of the (β_1) parameter (the cyclical sensitivity rate) can be expected to be negative.

1 INFLATION COMPENSATION - 2 YEAR HORIZON



2 INFLATION COMPENSATION - 5 YEAR HORIZON



3 COEFFICIENT OF EFFECT OF OIL PRICES ON EXPECTATIONS IN THE EURO AREA (a)



4 COEFFICIENT OF EFFECT OF OIL PRICES ON EXPECTATIONS IN THE UNITED STATES (a)



SOURCES: Barclays, Bloomberg and Banco de España.

a The coefficients are estimated by means of iterative regressions with a moving two-year window. The specification used is: $D_Z^{5y/5y} = a + b * D_{oil} + c * D_Z^{1y/1y}$, where $Z^{5y/5y}$ is inflation expectations 5y/5y, $Z^{1y/1y}$ inflation expectations 1y/1y and oil is the year-on-year change in the oil price in the national currency. The confidence intervals are calculated using residuals robust to heterocedasticity, non-normality, and atypical values by means of the Huber-White estimator.

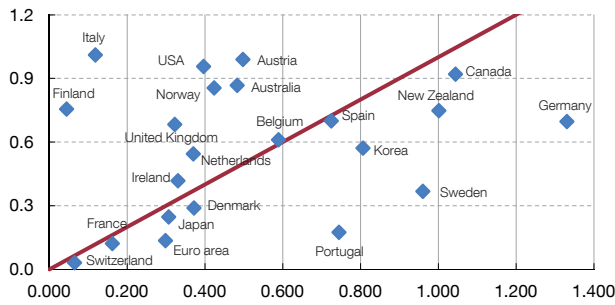
imported goods and core inflation. In all the regressions the sum of the coefficients of both components of inflation expectations (backward and forward looking) is set to unity to ensure that inflation does not affect the real variables over the long term.

As mentioned, the aim of this exercise was to confirm whether the way the various variables respond to inflation has changed following the crisis. Two estimates were made for each country considered: the first for the period between the first quarter of 1997²⁴ and the fourth quarter of 2007, and the second for the period between the first quarter of 2008 and the third quarter of 2015. In a similar way to other recent studies, the results obtained show a high degree of heterogeneity and in some cases, they lack robustness to alternative specifications. As a result, it cannot be concluded that the changes in inflation's sensitivity to any of its determinants has played a general role in the low inflation observed. It may have done so in specific countries, but not overall.

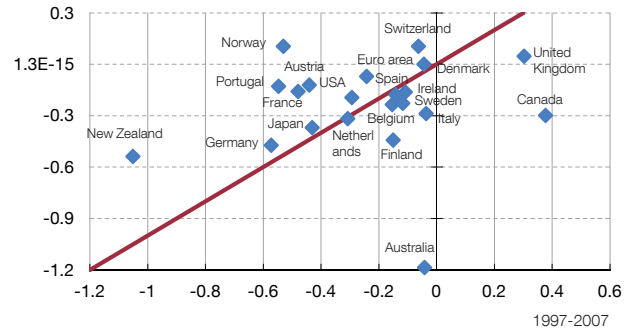
Chart 6.1 shows the coefficients estimated for the forward-looking component of inflation expectations. As can be seen, there is considerable heterogeneity: in some cases (those

24 First quarter of 1999 for the euro area.

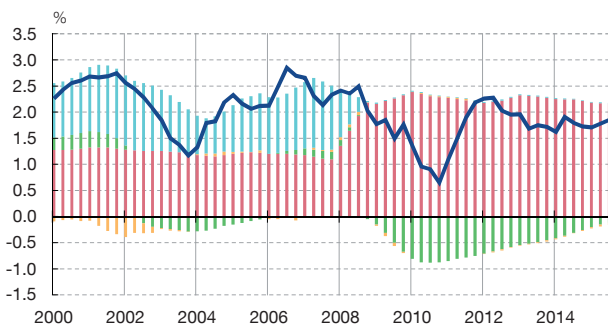
1 ESTIMATED COEFFICIENT FOR THE FORWARD-LOOKING COMPONENT OF INFLATION EXPECTATIONS (λ)



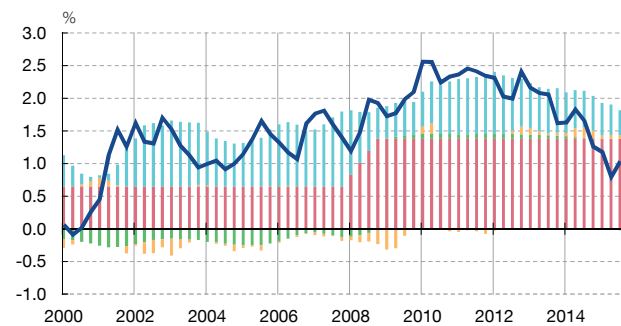
2 ESTIMATED COEFFICIENT FOR THE DEGREE OF CYCLICAL SLACK IN THE ECONOMY (β_1)



3 CONTRIBUTIONS TO INFLATION (UNITED STATES)



4 CONTRIBUTIONS TO INFLATION (UNITED KINGDOM)



— FORWARD-LOOKING — CYCLICAL SLACK — CORE INFLATION ON IMPORTED GOODS — BACKWARD-LOOKING — INFLATION

SOURCES: OECD, Oxford Economics, Consensus, Datastream, national central banks, Banco de España.

lying above the 45° line), the importance of the forward-looking component of expectations increased relative to that of the backward looking component in the second period. In other cases (those below the 45° line), the opposite was observed. Indeed, the coefficients of both periods are only statistically different in in few cases. Chart 6.2 shows the estimated coefficients for the cyclical sensitivity of inflation in the two periods considered. The countries below the 45° line are those for which an increase in the cyclical sensitivity of inflation has been estimated in the most recent period. The countries above the line are those for which sensitivity is estimated to have decreased. A wide degree of variation between countries is again observed. Moreover, the results are not robust to changes in the specification of the backward-looking component of inflation expectations. Lastly, the results obtained for the import price coefficient also present a high degree of heterogeneity and limited robustness.

Given the heterogeneity of the overall results, a more country-specific approach is taken in Charts 6.3 and 6.4, which show the results obtained for the factors determining inflation in the United States and the United Kingdom. In the case of the United States, the greater importance of the forward-looking component of inflation expectations as a factor explaining inflation after 2008 stands out, along with the contribution of cyclical economic slack in reducing core inflation since the onset of the crisis, although with decreasing intensity since end-2010. According to this breakdown, as the cyclical slack reduces, if agents' expectations remain anchored and there are no further significant

drops in import prices,²⁵ core inflation can be expected to converge on the Federal Reserve's inflation target.

In the case of the United Kingdom, the forward-looking component of inflation expectations also became more significant in the post-crisis period, highlighting the importance of keeping inflation expectations anchored to the inflation target. The degree of slack in the economy has not proven to be significant in the various estimates made. Moreover, the estimated sign is the opposite both of that suggested by economic theory and found in the majority of countries. It is worth noting that other studies²⁶ obtained the same results in the specific case of the United Kingdom. The results for the other countries [see Berganza *et al.* (2016)] show that that in some cases the post-crisis drop in inflation may be associated with past inflation having more influence on expectations (such as in the euro area or Japan), although these findings need to be taken with due caution, given the empirical difficulties inherent in these estimates.

The adverse effects of low inflation and its economic policy implications according to the economic literature

A context of excessively low inflation poses various risks. Unless they are accompanied by correspondingly low interest rates, ultra-low inflation rates entail an increase in real interest rates, tightening monetary and financial conditions and weakening demand. Moreover, in the present context of high public and private indebtedness in many countries, lower inflation makes deleveraging more difficult, as past debt remains constant rather than being devalued by current inflation. Indeed, Svensson (2015) shows empirically how an economy such as Sweden's, where inflation expectations are anchored to the target, the unemployment rate would rise in the case of sub-target inflation. This could lead to an increase in the household debt ratio, calculated relative to (reduced) disposable income. Similarly, a generalised drop in inflation could hinder macrofinancial adjustment and make restoring competitiveness more difficult in monetary union countries, which could only adjust by means of internal devaluation. In this case, lower inflation across the area, in the presence of downward price and wage rigidities, would raise the probability of this adjustment having to be made via increased unemployment.²⁷

Deflation, defined as a persistent and widespread decline in price levels, can have even more serious consequences, particularly if it is the result of a negative demand shock²⁸ and is accompanied by a de-anchoring of agents' inflation expectations. As well as causing a drop in spending, particularly in the consumption of durable goods and productive and residential investment, it entails a redistribution of income from debtors to creditors, disincentivises credit intermediation, as a result of the loss value of assets used as collateral, and can lead to a downward spiral in prices, output, profits and employment. Ultimately, an environment of excessively low inflation, or even deflation, may tend to undermine central banks' credibility and make it more difficult for them to implement countercyclical monetary policy.

Central banks in the developed economies have responded to the low growth and low inflation environment with monetary stimulus policies. Official interest rates have remained close to zero in the United States, the United Kingdom, Japan and the euro area for over seven years, and in some cases deposit rates are also below zero (Japan, the euro area, Sweden, Denmark and Sweden). Additionally, central banks have adopted unconventional measures to add extra

²⁵ It should be recalled that only import prices of products in the basket used in core inflation are included.

²⁶ See, for example, Blanchard *et al.* (2015).

²⁷ See, for example, Banco de España (2015).

²⁸ If deflation is the result of a positive supply-side shock (an improvement in productivity, increased competition in product markets or more abundant or cheaper inputs), it will be accompanied by increases in income and output.

stimulus. In particular, this has meant expanding their balance sheets by buying financial assets, and adopting a policy of forward guidance, outlining the future course of monetary policy. Asset purchase programmes result in an expansion of central banks' balance sheets, and therefore an expansion of the monetary base. However, as financial institutions have largely held voluntary reserves with the central bank, very little of the increase in the monetary base has been passed on to monetary aggregates, the money multiplier having reduced markedly.²⁹ However, it is not easy to evaluate the degree of expansion of monetary policy in an environment in which the equilibrium real interest rate has fallen.³⁰

As regards the risks of the current situation, monetary policy-makers in some countries have expressed contrasting positions. Thus, some members of the Federal Reserve think that keeping official interest rates low poses a significant risk to financial stability and increases the risk that the effective lower bound on interest rates could become a constraint on monetary policy and force central banks to resort to unconventional measures if they need to introduce additional stimulus.³¹ Conversely, other members³² consider the risks of premature monetary policy normalisation to outweigh those of waiting, as there is a limited range of tools available to stimulate growth when interest rates are close to the effective lower bound, whereas conventional instruments exist to control inflationary pressures.

The difficulties of conducting monetary policy in this environment have triggered a lively academic debate, with a variety of different proposals. Some authors, such as Blanchard *et al.* (2010), Ball (2014) or Williams (2016), have suggested raising the central bank inflation target to allow more scope for action and to reduce the likelihood of reaching the lower bound for official interest rates in periods of low inflation in the wake of adverse shocks.³³ By contrast, it has been argued that changing the nominal anchor could lead to heightened uncertainty and that it may subsequently prove difficult and expensive to establish the anchor at the new level. Other authors have proposed measures to overcome the lower effective lower bound on official interest rates, such as negative interest rates on physical cash,³⁴ although these proposals raise a number of logistic and behavioural issues. Some academics have suggested the possibility of introducing fiscal stimulus paid for with permanent increases in the money supply (an approach referred to as “helicopter money”) so as to avoid generating expectations of higher future taxation by expanding the public debt [Turner (2015)]. The major risk of this proposal is that agents may assume it will be repeated in the future, leading to a situation of fiscal dominance and loss of central bank independence.

The difficulties of further monetary policy innovation have led to an assessment of the extent to which other policies could contribute to addressing low inflation. However, there are always limits on this support. Some analysts maintain that fiscal policy is the first option, particularly in a context of low government borrowing costs, although the high debt-to-GDP ratios and restricted fiscal space in many economies seem to limit the possibility of recourse to this mechanism. In the area of incomes policy there may be room to accommodate wage increases, given the growth in profits as a share of GDP in recent years. Structural policies are almost always recommended for their usefulness in facilitating

29 See Berganza *et al.* (2014).

30 See, for example, Laubach and Williams (2016).

31 See, for example Yellen (2016) or Reifschneider (2016).

32 See Evans *et al.* (2015).

33 The 2% target prevailing in developed economies is the outcome of weighing the efficiency costs of positive inflation (distortions in adjustments of relative prices and increased uncertainty) against the costs of zero inflation (nominal wage rigidity on the downside and the possibility of reaching the effective lower bound). Biases in inflation measurement also need to be taken into account. See Bernanke (2002).

34 See, for example Haldane (2015) or Rogoff (2016).

the allocation of resources to more productive activities and boosting agents' confidence so as to stimulate demand. However, in the short term they can lead to price reductions, such that it looks necessary to implement them jointly with demand boosting measures in the current context. Finally, some international organisations have highlighted the importance of international coordination.³⁵ In any event, it is essential that the authorities demonstrate their commitment to fighting deflation by taking all the necessary steps, even preventively where necessary [Eggertsson and Woodford (2003)].

Conclusions

The drop in inflation rates witnessed in recent years in the advanced economies, in a context of economic recovery and accommodative monetary policies, partly reflects the impact of transient factors, such as the slump in commodity prices or exchange-rate fluctuations. However, it may also be a response to shifts in the process of setting prices and wages that are more structural in nature, leading to inflation's lower cyclical sensitivity to domestic economic slack in each economy, inflation expectations playing a bigger role, or the greater importance of global factors.

This article presents inflation-model estimates based on the Phillips curve. The empirical results obtained do not make it possible to corroborate the hypothesis that changes in the sensitivity of inflation to some of its determinants can explain this phenomenon overall, although they may be relevant in some countries. The absence of conclusive explanations may be due to an inappropriate specification of the model, as a result of the existence of global factors that are not properly captured, or to issues affecting the measurement of some variables (such as inflation expectations or the degree of slack). In any event, these difficulties have major implications for monetary authorities, in so far as it is more difficult to explain and analyse the behaviour of inflation.

The negative effects of keeping inflation rates low for a prolonged period may be significant, as it can lead to high real interest rates, leading to an excessive tightening of monetary conditions. It can also make public and private deleveraging more difficult, and hamper competitiveness adjustments in a monetary union by making adjustments more costly in output and employment terms. In the most extreme case, if there is a de-anchoring of agents' inflation expectations, there is a risk of falling into a deflationary spiral, with even more serious consequences. Moreover, keeping inflation rates below central banks' targets for a prolonged period may undermine their credibility.

In this context, the monetary authorities have had to resort to unconventional measures to confront the challenges of low inflation, and more recently, some central banks (including the European Central Bank and the Bank of Japan) have cut their official interest rates on banks' reserves to negative levels. This has all intensified the debate on the scope for action and marginal effectiveness of these measures and the risks they entail. In this scenario, many academics consider that it is crucial to support other types of policy, such as fiscal policy and structural reforms in order to stimulate growth and inflation.

21.11.2016.

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³⁵ See Gaspar et al. (2016).

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