

2

THE DETERMINANTS OF LOW INFLATION IN THE EURO AREA AND IN SPAIN

Summary

Most of the advanced economies' central banks have an institutional mandate to maintain price stability, characterised by a medium-term inflation target. There is broad consensus that accomplishing this mandate contributes to the sustainable development of economies.

Yet during the crisis and, in particular, over the past six years, the euro area inflation rate has long stood below the ECB objective. This is largely due to the prolonged effects of transitory factors, both of a cyclical nature and related to the downward fluctuations of energy prices. Also, the extension over time of this situation may have contributed to its greater persistence, through its impact on economic agents' long-term inflation expectations. The robust monetary policy measures pursued in the past decade have contributed to mitigating the slippage in inflation relative to the ECB objective. The duration of the situation of less dynamic prices may, moreover, have been influenced by several structural factors (population ageing, globalisation and new technologies). And these may be having a bearing on the maintenance of more moderate inflation rates in the advanced economies.

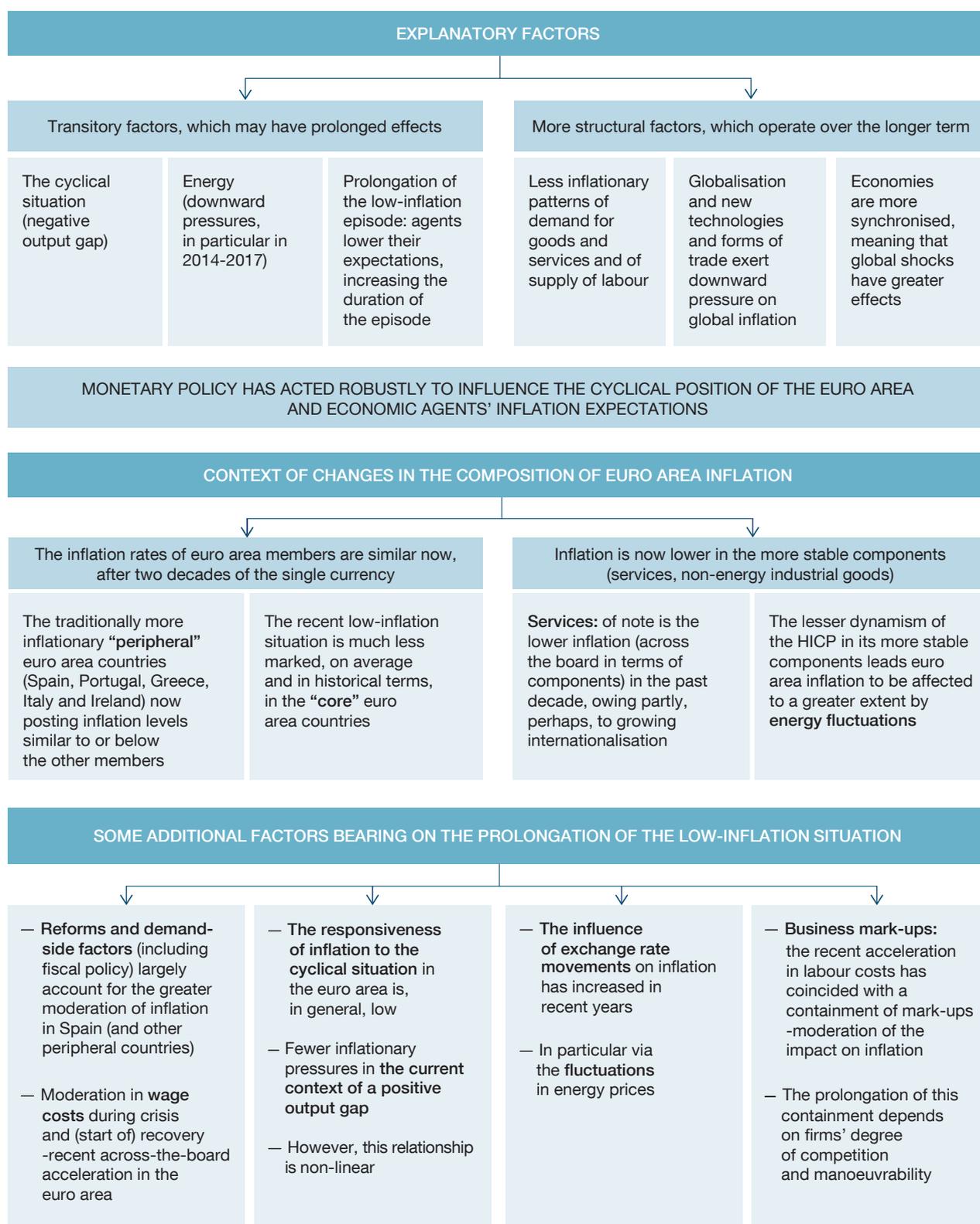
In terms of the euro area countries, the recent "low inflation" phenomenon is chiefly linked to the dynamics of economies such as Spain, Italy, Ireland, Portugal and Greece. It has by contrast been less marked – on average, and in historical terms – in the rest of the countries that formed the euro area in 1999. Moreover, the process has run in parallel with an across-the-board reduction in price changes in the more stable inflation components. This has particularly been the case in services, which might be partly linked to the greater influence of the external openness of this sector. The current lesser dynamism of the more stable components of the HICP has meant that inflation rate fluctuations are now determined to a greater extent by energy, against a background in which the influence of the exchange rate on euro area inflation is estimated to have increased in recent years.

Some further avenues of analysis help add to the explanation of the persistence over time of this situation of lower inflation rates. First, several euro area economies made structural reforms and pursued competitiveness and fiscal processes during the crisis. That is estimated to have contributed to more contained price dynamics, affecting the more labour-intensive sectors, such as services, to a greater extent. And second, the diminished cyclical sensitivity of inflation in the euro area partly explains why the current upturn has not been accompanied by greater inflationary pressures. Also, the low-inflation environment contributed to fewer wage pressures, the recent acceleration in which has been mitigated by the moderation in business mark-ups.

Figure 2.1

DETERMINANTS OF THE LOW INFLATION IN THE EURO AREA AND IN SPAIN

In the past six years, inflation has frequently stood below the 2% objective defining price stability, against a background of lower inflation in recent decades.



SOURCE: Banco de España.

1 Introduction: The importance of price stability and the inflation target

Most of the advanced economies' central banks have an institutional mandate to maintain price stability. This is defined as a situation in which, on average, and in the medium term, consumer price increases are moderate and stable. Currently, there is broad consensus that price stability contributes to raising economic well-being and the economy's growth potential.¹

The ECB price stability objective is set in terms of annual increases in the euro area HICP² close to – but below – 2% in the medium term. The ECB has a strategy and a set of monetary policy instruments to accomplish its mandate.³ Moreover, without prejudice to its main objective, and in keeping with it, the European System of Central Banks (ESCB) supports the EU's economic policies and its objectives. These include, inter alia, the sustainable development of the EU based on balanced economic growth and price stability, and a highly competitive social market economy, aiming at full employment and social progress.⁴

Since 2013, euro area inflation has been persistently lower than the medium-term objective. Specifically, euro area inflation averaged 0.9% from 2013 to 2018, a significantly lower figure than the average for the first decade of its existence⁵, namely 2.1%, more closely in line with the medium-term objective. This recent situation of persistent below-target inflation has come about, moreover, against a background of economic recovery, one due largely to the extraordinarily expansionary ECB monetary policy stance.⁶

Diagnosing the determinants of the current “low inflation” scenario is crucial for monetary policy conduct. A very active debate is currently under way on whether this situation reflects: i) the presence of transitory or cyclical factors, which would gradually be reversed as the cyclical situation improved; or ii) other, more structural factors that would operate over the longer term and push the inflation rate persistently down. This chapter reviews the main arguments in this debate. It also provides empirical evidence for the euro area as a whole – and for the Spanish economy in particular – on inflation determinants in the recent period, aiming to identify the main risks to price stability in the medium term.

1 See ECB (2011) y https://www.bde.es/bde/en/areas/polimone/politica/Los_beneficios_d/Los_beneficios__33560642abac821.html.

2 See Álvarez and Sánchez (2018).

3 See ECB (2011).

4 According to the Treaty on the European Union.

5 1999-2007 period.

6 See Banco de España (2016).

The following section characterises the most recent low-inflation situation. It shows how it can largely be explained by the prolonged effect of transitory (cyclical, energy) factors and how the extension over time of this situation may have contributed to its greater persistence, through its impact on agents' expectations. There is also a review of a set of longer-term (structural) factors, which might be exerting downward pressure on inflation rates globally. Section 3 shows how the “low-inflation” phenomenon, in terms of the euro area economies, is chiefly linked to the so-called “peripheral” countries. Conversely, it is less marked on the whole in the “core” countries. The process has, moreover, run in parallel with an across-the-board reduction in price changes in the more stable inflation components, in particular in services. Section 4 discusses certain elements bearing on these recent inflation dynamics, providing explanatory and analytical factors. Finally, Section 5 offers thoughts on the current inflation outlook, in light partly of the matters discussed in the chapter.

2 Recent inflation developments and inflation expectations

2.1 Inflation is currently at historically low levels

Inflation rates have fallen significantly in recent decades in the main advanced economies.⁷ The 1970s and early 1980s saw marked dynamism in prices, associated largely with the oil crisis. Since then, inflation has fallen continuously in the main euro area economies, and in other advanced economies, to stand in the past decade at a 50-year low (see Chart 2.1). In the specific case of the euro area, the process has been accompanied by the adoption of a price stability-oriented monetary policy regime.

Since the launch of the single currency, inflation has stood at around the ECB objective, though it has shown persistent downward deviations in the most recent period. Specifically, from 1999 to 2007, the average rate of increase of the euro area's overall HICP was 2.1%, down to 1.8% if the energy component is excluded (see Chart 2.2.1). In that period core inflation, i.e. that associated with the most stable components of the HICP (services and non-energy industrial goods), stood at 1.7%.⁸ Taking the full 1999-2018 period, however, the figures are lower: 1.7% and 1.4% for the overall and core HICP, owing mainly to the substantial easing over the past six years (0.9% and 1.0%, respectively).⁹

7 For a broad perspective see, inter alia, Cogley, Morozov and Sargent (2005) and Stock and Watson (2007).

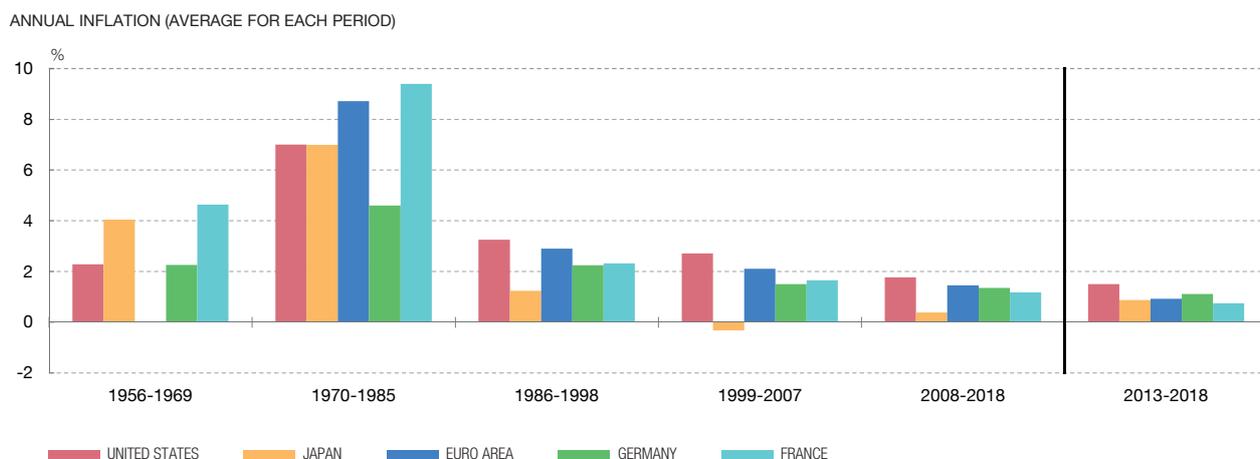
8 HICP, excluding the energy and fresh food components.

9 Álvarez, Gadea and Gómez Loscos (2019a) characterise the 2013-2017 period as one of “low inflation” for the euro area in their study using time series data for a broad set of advanced countries.

Chart 2.1

LONG-TERM INFLATION

Inflation rates have fallen significantly in recent decades in the main advanced economies.



SOURCES: OECD economic indicators, ECB, INE and Banco de España.



Agents' long-term inflation expectations have, since the euro area came into being, stood on average at levels compatible with the ECB objective. That said, since 2013 they have turned down somewhat. An habitually used measure of expectations are the long-term break-even inflation rates obtained from inflation swap prices¹⁰ (Chart 2.2.1). As from the start-up of the monetary union, this indicator stood slightly above 2% expected inflation. This might reflect agents' confidence in the fact that, even with periods of marked slippage from target, inflation would, in the medium term, revert to values compatible with the target. In the 2013-2018 period, long-term inflation expectations measured by this indicator stood persistently at levels below 2% (1.8% on average), marking a low of 1.4% in 2016 Q3.

The credibility of the monetary policy regime influences the formation of agents' inflation expectations.¹¹ If expectations are soundly anchored around the medium-term inflation objective, temporary macroeconomic shocks will tend to have a less durable effect on inflation and, generally, they will require a less energetic response by the monetary authority. Monetary models broadly show that, under

¹⁰ Five-year forward break-even inflation rate five years ahead. This represents the average value of the compensation to cover the risk of inflation with swaps over a given horizon. What is involved is a forward break-even inflation rate with a constant maturity, estimated on the basis of curves of swaps prices at different terms in the euro area. See Gimeno and Ortega (2018).

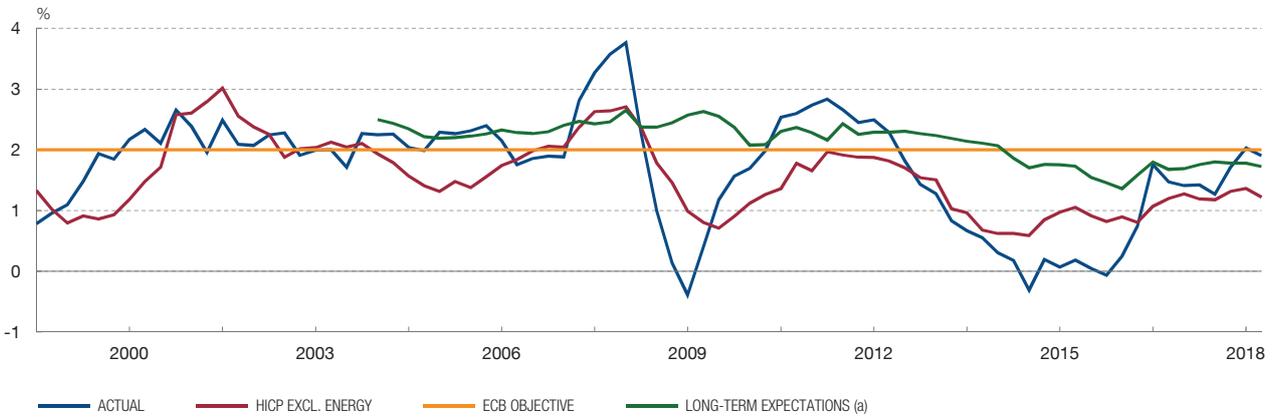
¹¹ See Bems, Caselli, Grigoli, Gruss and Lian (2018) and Mishkin (2007).

Chart 2.2

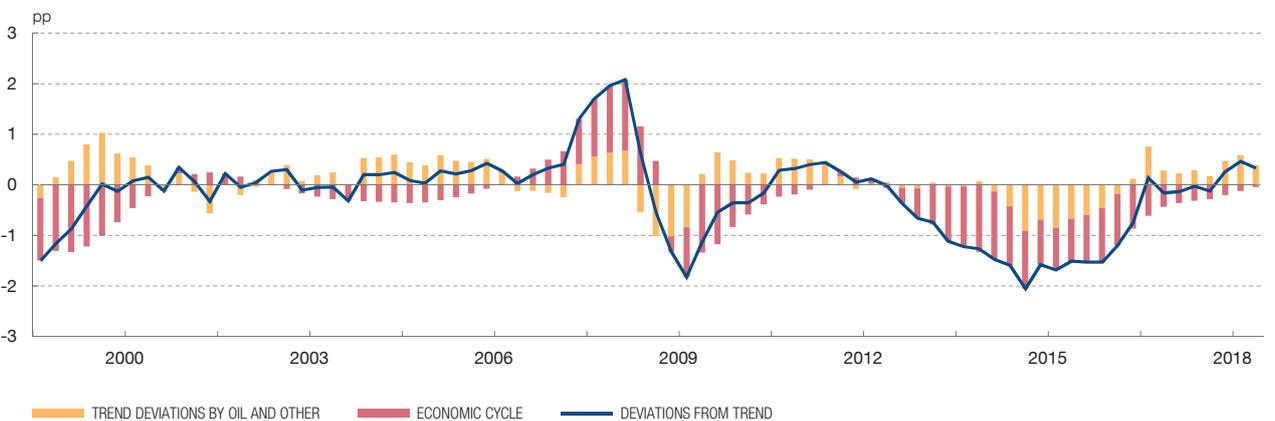
INFLATION IN THE EURO AREA

The credibility of the monetary policy regime influences the formation of agents' inflation expectations. However, deviations by inflation from its long-term value may be persistent.

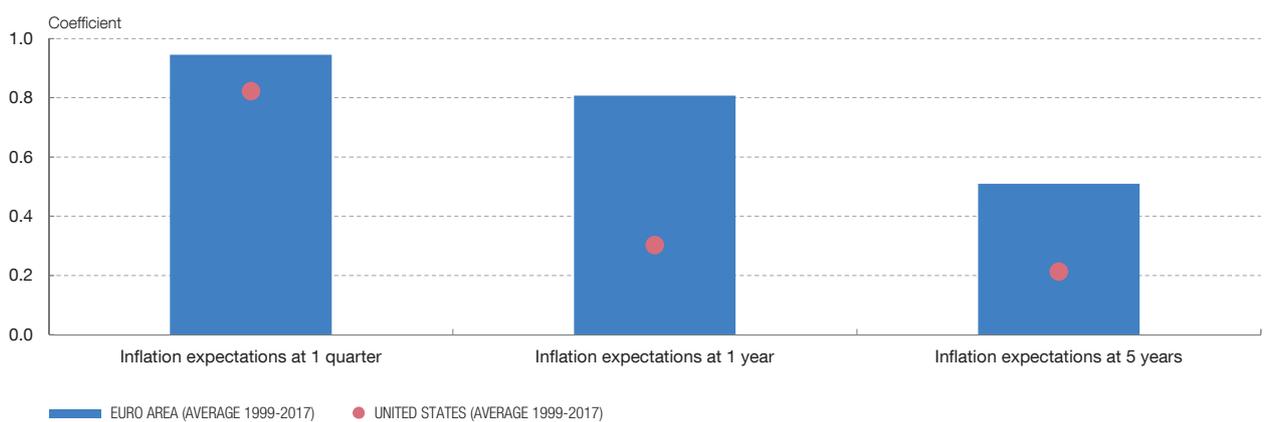
1 INFLATION AND INFLATION EXPECTATIONS



2 DEVIATIONS FROM TREND (b)



3 SENSITIVITY OF INFLATION EXPECTATIONS TO RECENT INFLATION (c)



SOURCES: Eurostat and Area Wide Model Database.

- a Based on Gimeno and Ortega (2018). Five-year forward break-even inflation rate five years ahead.
- b This model includes a set of basic economic relationships (trend-cycle decomposition of growth, Phillips curve, Okun's Law), which are jointly estimated, a set of explicitly modelled parametric instabilities and controls for temporary changes in the volatility of output and of inflation (stochastic volatility). The decomposition is presented by way of illustration.
- c Calculations performed using the Aguilar and Vázquez (2018) model.



regimes in which inflation targets are clearly defined, inflation should in fact be a fundamentally forward-looking variable.¹² This is not incompatible, in any event, with the fact that current inflation may deviate from the medium-term objective, in particular owing to the effect of transitory factors.

2.2 The economic cycle and energy explain the recent slippage by inflation from its long-term reference values

In the past six years, cyclical conditions and the downward impact of short-term oil fluctuations have given rise to a prolonged period of inflation rates recurrently below the medium-term objective. Chart 2.2.2 illustrates this, tracking euro area inflation deviations from an estimated trend path, which proxies agents' long-term expectations.¹³ These transitory deviations reflect two elements. First, the effect that fluctuations in economic activity have on inflation. In the expansionary phase of the economic cycle, there would be inflationary pressures when capacity utilisation were high. Meantime, in the downturn, idle resources and the lack of demand would push prices downwards. Second, this transitory component would be affected by the short-term swings in commodity prices, principally oil.

Thus, deviations by inflation from its long-term value may be persistent and prolonged over time. Three factors helped hold the euro area inflation rate below its trend value for most of the 2013-2018 period: the effect of the double-dip recession in the euro area, in particular in 2012-2013; the persistence of a negative output gap throughout the period; and the downward effect of energy prices, mainly between the second half of 2014 and 2016.¹⁴

2.3 Transitory but persistent deviations by inflation from its objective may ultimately affect long-term expectations

A prolonged low-inflation situation over time may lead to long-term expectations ultimately reflecting the fluctuations in current inflation. Should

12 See Benati (2008). Coibion and Gorodnichenko (2015) argue that recently, and in particular since the Great Recession, the long-term expectations component is the fundamental one for explaining inflation dynamics.

13 See Correa-López, Pacce and Schlepper (2019) for a detailed discussion on the link between trend inflation measures and long-term inflation expectations. The decomposition of the chart is based on the modelling strategy of Leiva-Leon, Pérez, Pérez-Quirós and Urtasun (2019), which includes a set of basic economic relationships (endogenous trend-cycle decomposition of growth, Phillips curve with external prices, Okun's Law) that are jointly estimated, a set of explicitly modelled parametric instabilities and controls for temporary changes in the volatility of output and of inflation (stochastic volatility). The model includes the three usual variables suggested by neo-Keynesian open-economy models, i.e. inflation expectations (proxied by a trend inflation measure), the cyclical position and external prices.

14 Along these lines see, inter alia, Ciccarelli and Obst (2017), for the period to 2016.

this occur, persistently low inflation might prompt a downward revision in agents' expectations, with mutually reinforcing low-inflation expectations and moderate short-term price growth increasing the duration of the low-inflation episode. These dynamics would cause a transitory misalignment or “de-anchoring” of agents' expectations relative to the medium-term target rate.¹⁵

How this transitory de-anchoring of inflation expectations operates can be illustrated using a model in which agents form their expectations on the basis of both forward- and backward-looking elements. Estimating a general equilibrium model of these characteristics¹⁶ for the euro area shows indeed that the weight agents assign to past inflation may be higher than that they attribute to forward-looking elements. Hence after a negative shock that substantially and persistently reduces inflation, the return to target will be slower in those periods in which the backward-looking elements of expectations carry more weight. In the longer term, however, the forward-looking factors would become more preponderant, according to the model. Indeed, on the model's estimates for the euro area (see Chart 2.2.3), the weight agents assign to past inflation falls by somewhat more than 40% when inflation expectations are formulated at five years, compared with when they are set out one quarter ahead. In any event, in the long term and in the absence of fresh shocks, an inflation level similar to that prior to the shock would be attained according to this model.

The speed at which the transitory misalignment of agents' expectations relative to the target is corrected depends on the structure of the economy. In this model, the structure of the economy influences the weight of past inflation in expectations formation. This weight is all the greater the higher the degree of wage inertia and the higher the rigidities in price-setting processes¹⁷, these being the factors that lead low-inflation phases, in particular, to prove more persistent. A euro area/US comparison shows how in America's economy, which shows lower wage inertia and greater price flexibility, inflation expectations rest to a greater extent on trend inflation than on recent inflation (see, once again, Chart 2.2.3).

15 A broad body of work addresses the idea of high persistence as the main explanation for the recent global phenomenon of inflation rates holding lower than central bank targets over prolonged periods [see, *inter alia*, Ciccarelli and Obst (2017) and the authors they cite]. From a more general standpoint, see Orphanides and Williams (2005), Williams (2006), Angeloni, Aucremanne and Ciccarelli (2006) and Altissimo, Bilke, Levin, Matha and Mojon (2006).

16 See Aguilar and Vázquez (2018).

17 According to some recent papers, changes in the sectoral structure of the economy (in particular, the greater weight of the services sector) might entail greater inflation persistence. That is due to the relative higher inertia in price-setting in the services sector [see Bils and Klenow (2004) and Galesi and Rachedi (2019)]. The median duration of prices in the manufacturing sector is three months, while that of prices in the services sector is 10 months.

Monetary policy can affect long-term inflation expectations. In the case of the euro area, monetary policy measures have sought to keep long-term inflation expectations in line with the medium-term reference of 2%. In the recent period, given a negative natural interest rate, as analysed in Chapter 3 of this Report, the ECB has resorted intensely to unconventional monetary policy measures to provide the expansionary stimuli needed to raise actual inflation towards its objective¹⁸ (see Box 2.1).

2.4 Several structural factors exert downward pressure on inflation rates at the global level

The discussion in the previous section should be framed in a setting in which several structural factors might be pushing inflation downwards in the advanced economies. Among these factors, the economic literature particularly highlights the economic dynamics and the structural change wrought by population ageing (see also Chapter 4 of this Report), globalisation (with greater trade openness and exposure to international competition) and the impact of new technologies (digitalisation and new forms of trade). Box 2.2 discusses the channels – direct and indirect alike – through which these factors affect inflation.

Moreover, the advanced countries' inflation rates are increasingly more interconnected and show a high degree of synchronisation. That might amplify the (downward) impact of macrofinancial shocks on price developments.¹⁹ The influence of some of the factors mentioned in the previous paragraph might have contributed to this greater synchronisation (see the discussion in Box 2.3). For one thing, the prices of many commodities are determined on global markets. As a result, their fluctuations may feed through to many countries' consumer prices simultaneously. Furthermore, the considerable external openness of economies reinforces the interconnectedness of inflation rates, largely through the greater global synchrony of economic and financial cycles. Finally, it is worth mentioning that the degree of interdependence of inflation rates may also be affected by the similarity of monetary policy strategic frameworks across countries.

In the specific case of the euro area, movements in inflation common to the member countries are higher, and have tended to increase over time. Generally, moreover, the empirical measures of interdependence are higher between countries' overall inflation rates than between more stable measures that exclude energy and food. This is in light of the overall effect exerted by shocks relating to the prices of oil and other commodities.

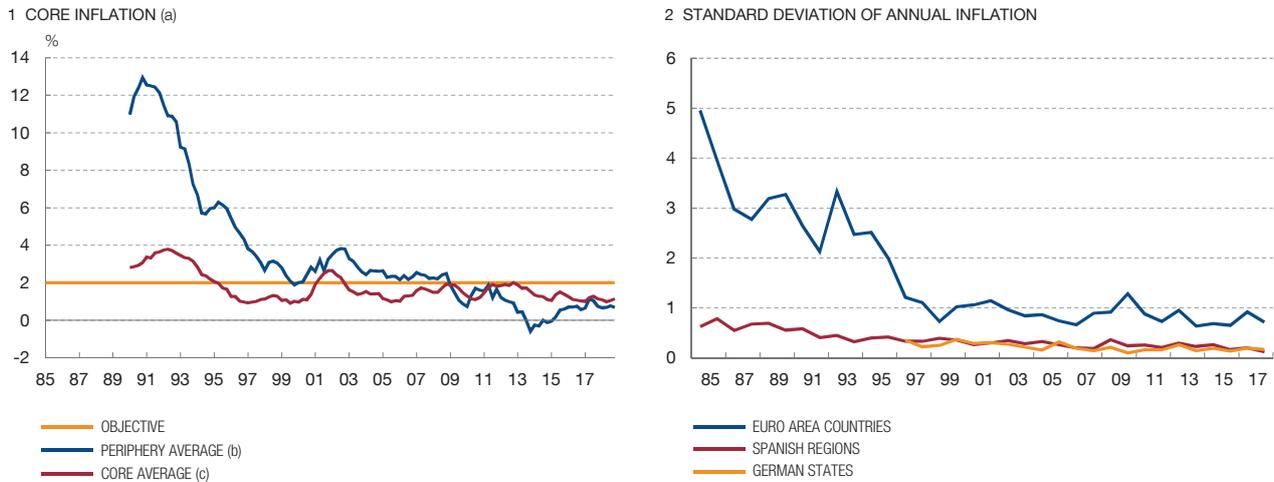
¹⁸ See Banco de España (2016).

¹⁹ See Álvarez, Gadea and Gómez Loscos (2019b) and Carney (2015).

Chart 2.3

INFLATION DISPERSION

The peripheral countries have converged in recent decades towards average levels of inflation in line with the core euro area members.



SOURCES: INE and Eurostat.

- a HICP excluding energy and food.
- b Spain, Italy, Greece and Portugal.
- c Germany, France, Netherlands, Belgium, Austria, Finland and Luxembourg.



3 Changes in the composition of inflation in the euro area, by country and sector

3.1 The traditionally more inflationary peripheral euro area countries have recently been posting lower average inflation levels than the other members

The recent situation of lower inflation has been particularly acute in the euro area countries that had traditionally posted higher rates. In the past two decades, the inflation rates of the peripheral euro area countries have switched to levels more in line with the core members, even standing below these. Chart 2.3.1 depicts this trend in the average core rates of Spain, Italy, Portugal and Greece compared with the other countries that formed the euro area in 1999.²⁰ In these latter nations inflation is, in fact, only slightly lower at present than during the decade following the launch of the euro. Specifically, the average core inflation rate of this group of countries was 1.5% in 1999-2007 and 1.4% in 2008-2018, and, in this latter period, 1.3% in the last six years (2013-2018). Conversely, in the peripheral countries,

²⁰ Excluding Ireland.

the related rates in these periods were 2.6%, 0.9% and 0.4%, respectively. Taking individual countries in each of the two groups, Germany's rates were 0.9%, 1.2% and 1.3%, respectively, while Spain's stood at 2.7%, 1.0% and 0.7% in the same periods.

The more recent low-inflation situation is, therefore, much less marked on average, and in historical terms, for the core euro area countries²¹. The lower inflation environment, on the contrary, is especially marked in Spain, Italy, Portugal and Greece, particularly in the services prices component, as will be discussed in the following section. Further ahead (in Section 4.1) some explanatory evidence for this fact, centred on Spain, will be shown.

The process of convergence²² of the euro area countries' inflation rates has been manifest in a reduction in the dispersion of these rates. However, the degree of dispersion in price increases across the euro area countries continues to be greater than that observed for the regions of two countries – namely Spain and Germany – with highly decentralised territorial arrangements (see Chart 2.3.2).

In the euro area there will not only have been convergence by inflation rates, but also some alignment in cross-country price levels. Specifically, a bigger reduction in price dispersion was recorded from 1995, accelerating as from 1999, among the countries that adopted the single currency, when compared with the EU countries not forming part of the Eurosystem.²³ The reduction in dispersion, in general, depends on the extent to which the good is tradable. Apart from progress in the creation of the single market in the EU, the reduction in transaction costs and the disappearance of exchange rate risk would help explain this process of (partial) convergence in price levels. Convergence in prices, in turn, would limit the divergences among euro area countries' inflation rates derived from catching-up processes in price levels.²⁴

21 Comprising the following countries: Germany, France, Netherlands, Belgium, Austria and Finland.

22 There is evidence in the literature on ongoing convergence in inflation rates among the countries in the euro area, and in the EU in general. In particular, convergence made headway in the run-up to the Maastricht Treaty, prior to 1999, and this continued in the period following the launch of EMU; it quickened from the onset of the financial crisis and it saw no changes in the period of unconventional monetary policy. See, inter alia, López and Papell (2012) and Brož and Kočenda (2018).

23 Allington, Kattuman and Waldman (2005).

24 On this matter see Estrada, Galí and López-Salido (2013). International comparisons of price levels, however, show a high degree of complexity associated with the limitations of the databases available. To surmount these difficulties, some studies focus on specific markets on which detailed and comparable information is available. For example, Dvir and Strasser (2018), for the automobile market, document a convergence process in price levels among the EU countries that extended to 2003, but which, however, was interrupted thereafter. Meanwhile, Fisher (2012) focuses on the washing machine market and finds no evidence of convergence.

3.2 The current, lower-inflation situation can be seen in all the components of core inflation

The overall trend towards lower inflation has been across the board in terms of products, but has proven particularly acute in services. The change in the dynamics of this sector has played a notable role in reducing inflation since 2009, particularly in Spain and Italy among the larger euro area economies, more intensely so over the last six years (see Chart 2.4.1). The easing in services prices has been across the board in terms of product types (see Chart 2.4.3). The other component of core inflation – that of non-energy industrial goods – also eased recently.

This effect is of particular significance in countries which, like Spain, posted a marked positive differential relative to the rest of the area, owing largely to services inflation. The buoyancy of services prices in Spain in the pre-crisis period, along with their high weight in the household consumption basket, explains why they were responsible for almost 40% of the inflation differential with the euro area as a whole during the first decade following the launch of the euro. In that period the difference stood, on average, at 1.1 pp (see Chart 2.5.1). Non-energy industrial goods, exposed to a greater extent to international competition, showed more moderate inflation than in services, and contributed to the tune of around 20% (0.2 pp), on average, to the total differential with the euro area. Finally, the rest of the differential from 1999 to 2007 was due to the contribution of food (0.5 pp), while that of energy, on average, was zero.

In the past decade this situation has been reversed. From 2008 to 2018, inflation in Spain was, on average, lower than that of the euro area as a whole. As a result, the average differential during this period stood at -0.14 pp, with a negative contribution of services in most of the years (see Chart 5.2). The sharp adjustment in the relative prices of services, which is a particularly labour-intensive sector, might be related to the reduction in unit labour costs in that period. In those years, then, whereas in the euro area the average growth of unit labour costs in market services was slightly higher than 1.5%, in Spain it scarcely exceeded 0.5%.

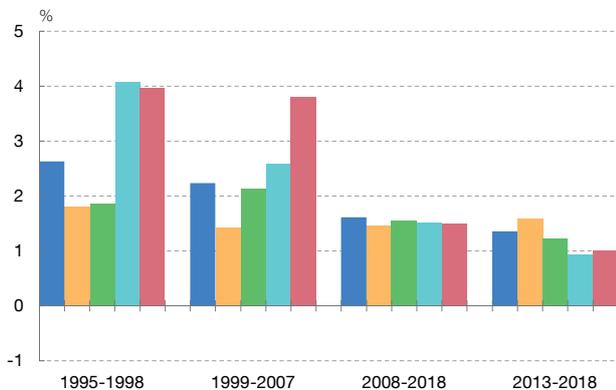
In services, the disinflationary process in terms of components was across the board. Chart 2.6 depicts the percentage of components (weighted by their share in households' total consumer spending) of non-energy industrial goods and services, based on the year-on-year rate of inflation in each of these categories for the euro area and for Spain. The chart illustrates the recent ongoing reduction in inflation rates in services. Specifically, it can be seen in Spain that, in the pre-crisis years, the prices of most services components rose at a pace in excess of 2% per annum, and practically none of them became cheaper. Conversely, in the case of non-energy industrial goods, the respective proportions of articles showing high rises (of over 2%) in prices and those undergoing declines or moderate rises (of less than 1%) were more balanced. Yet in the past decade, the weight of expenditure on

Chart 2.4

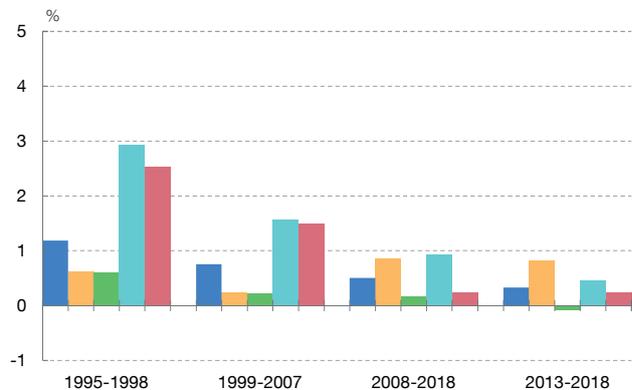
EURO AREA NON-ENERGY GOODS AND SERVICES INFLATION

The overall trend in inflation towards lower values has been across the board in terms of products, but particularly so in services.

1 SERVICES INFLATION: AVERAGE RATE

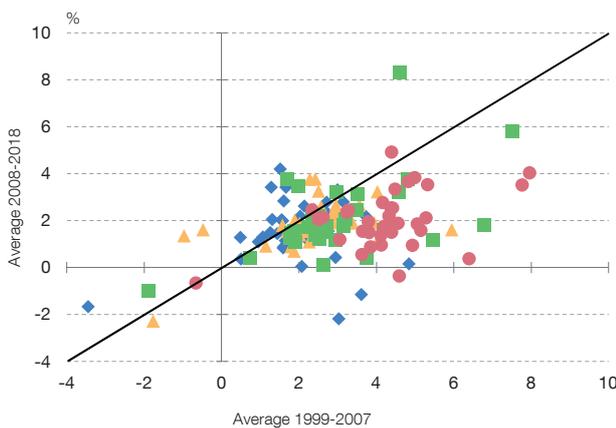


2 NON-ENERGY INDUSTRIAL GOODS INFLATION: AVERAGE RATE



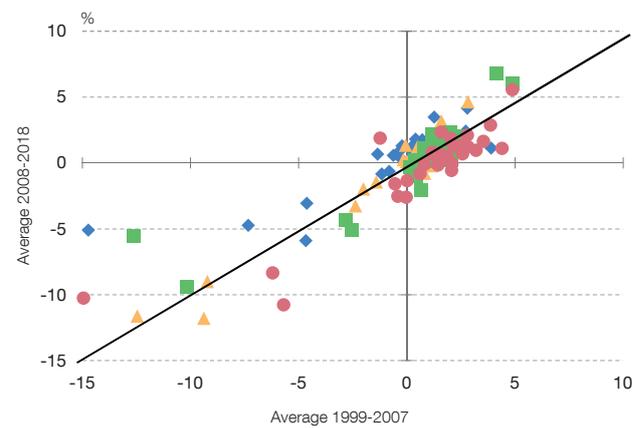
EURO AREA GERMANY FRANCE ITALY SPAIN

3 SERVICES INFLATION BY COMPONENT



GERMANY FRANCE ITALY SPAIN

4 NON-ENERGY INDUSTRIAL GOODS INFLATION BY COMPONENT



SOURCES: Eurostat and Banco de España.



services items showing high price increases has fallen considerably, both in Spain and in the euro area as a whole.

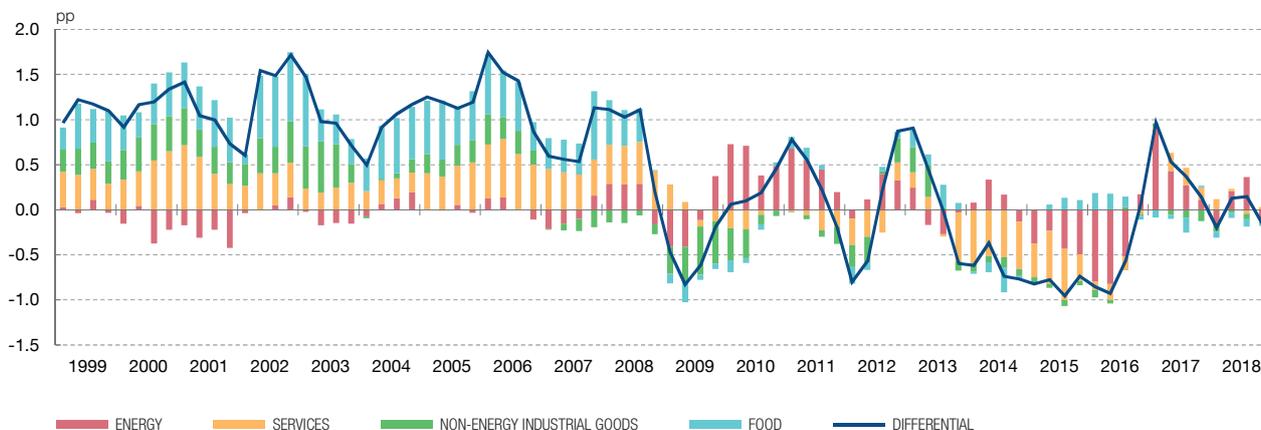
The ongoing internationalisation of a substantial portion of services might have contributed to easing inflation in this sector. From a global standpoint, the weight of services in total goods and services exports more than doubled from 1970 to 2014, rising to 20% in this latter year. The weight of services in global value chains has also increased. These developments have made for an increase in this sector’s degree of exposure to global competition-related factors, and they have added

Chart 2.5

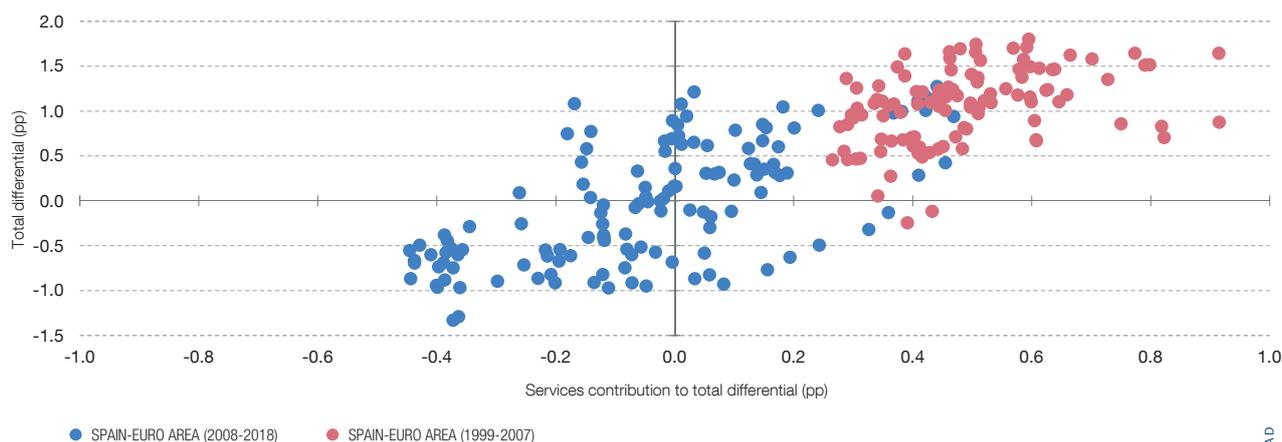
SERVICES INFLATION IN SPAIN

The reduction in services inflation is of particular significance in countries, like Spain, which posted a positive differential with the rest of the euro area, largely on account of services.

1 CONTRIBUTIONS TO THE SPAIN/EURO AREA INFLATION DIFFERENTIAL



2 CONTRIBUTION OF THE SERVICES COMPONENT TO THE SPAIN / EURO AREA INFLATION DIFFERENTIAL (a)



SOURCES: Eurostat and Banco de España.

a Monthly data.



downward pressure to the rate of increase of prices not only in the services sector itself, but also in the economy as a whole.²⁵

The Spanish economy has been no exception as far as the internationalisation of the services sector is concerned. The weight of services sector value added in total exports stood at slightly over 55% in 2015²⁶, marginally up on 2005, in line with

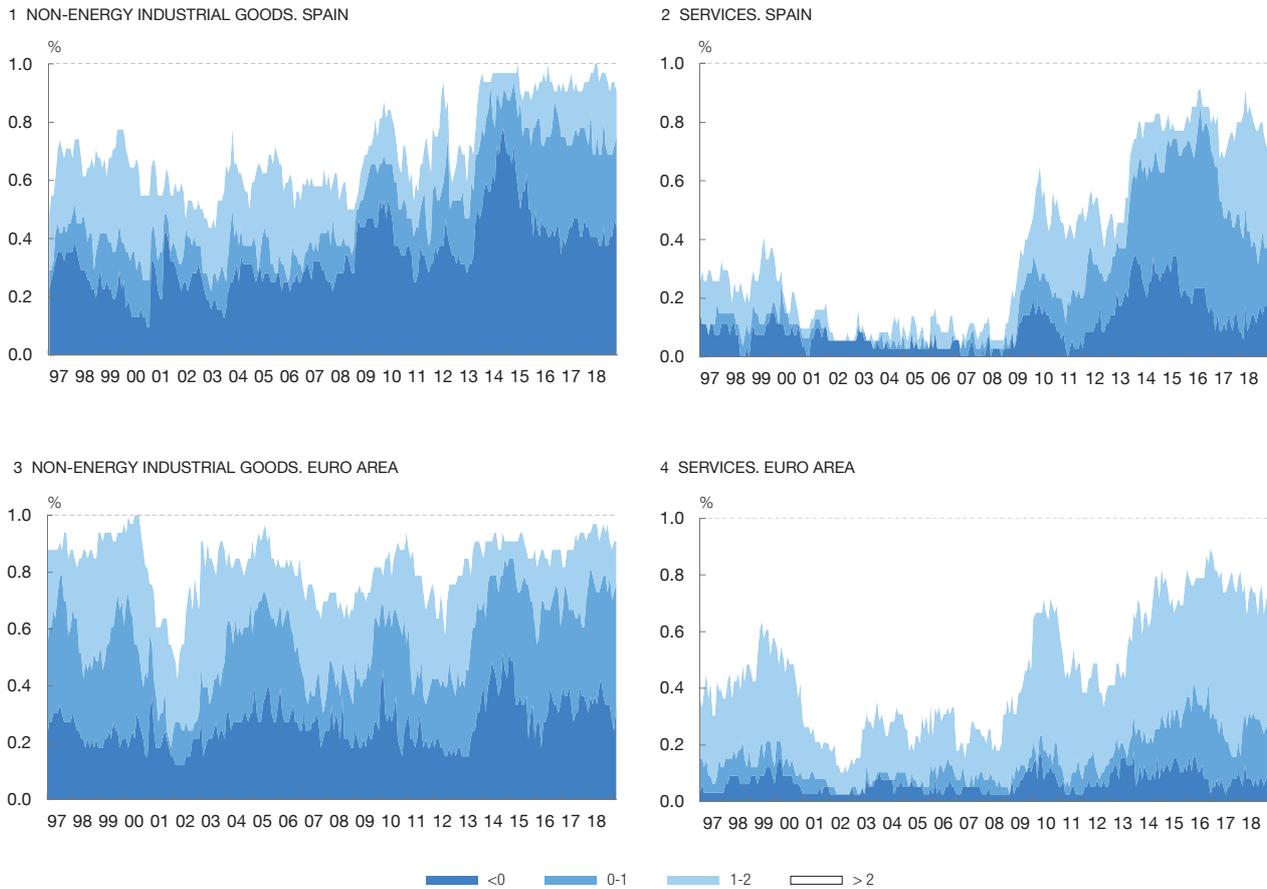
25 See Loungani, Mishta, Papageourgiu and Wang (2017).

26 Drawing on the information in the OECD's Trade in Value Added (TiVA) database, published in December 2018.

Chart 2.6

NON-ENERGY INDUSTRIAL GOODS AND SERVICES COMPONENTS

Under services, disinflation by component was across the board.



SOURCES: INE, Eurostat and Banco de España.



the trend observed in the euro area as a whole (see Chart 2.7.1). Further, manufacturing exports include around 35% of services in their production, and there has been some increase in the value added of services of domestic origin, which may be indicative of improved competitiveness in this sector. Regarding the import facet (Chart 2.7.2), the data also point to a growing internationalisation of the services sector, which is responsible for 30% of the intermediate goods imports of the economy in total. These imported inputs are part both of the services earmarked for the Spanish market and of those provided abroad. This latter component is gaining significantly in importance.

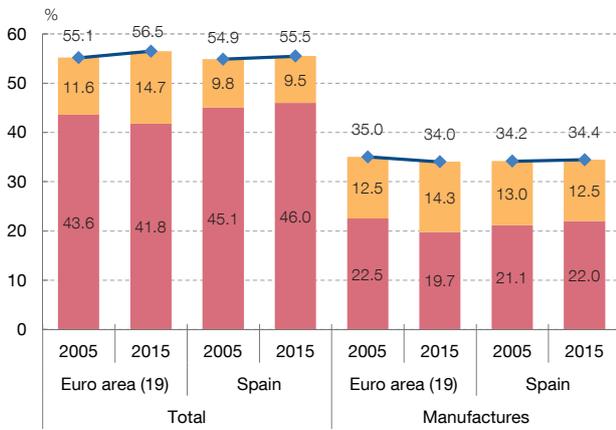
Against this background, the composition effects in the consumption basket take on importance, given the progressive increase in the weight of services. Both in Spain and in the euro area as a whole, services and energy have gained

Chart 2.7

THE ROLE OF SERVICES IN EXPORTS AND IMPORTS

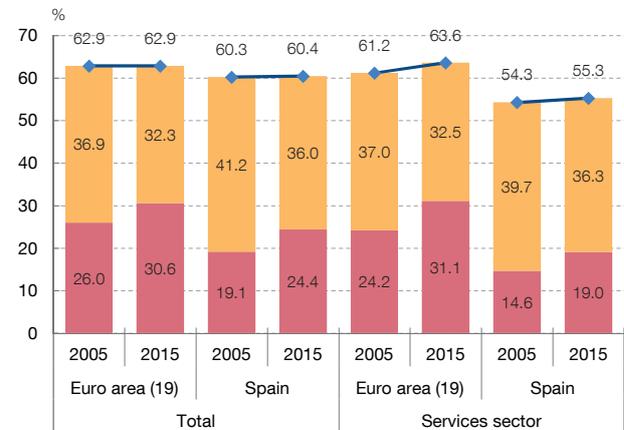
The ongoing internationalisation of a major portion of services might have contributed to alleviating inflationary processes in this sector.

1 WEIGHT OF VALUE ADDED OF SERVICES IN EXPORTS



■ FOREIGN VALUE ADDED OF THE SERVICES SECTOR IN GROSS EXPORTS
■ DOMESTIC VALUE ADDED OF THE SERVICES SECTOR IN GROSS EXPORTS
—◆— VALUE ADDED OF SERVICES IN EXPORTS

2 THE ROLE OF SERVICES IN INTERMEDIATE GOODS IMPORTS



■ INTERMEDIATE GOODS AND SERVICES ABSORBED IN DESTINATION
■ INTERMEDIATE GOODS AND SERVICES RE-EXPORTED TO A THIRD COUNTRY
—◆— WEIGHT OF INTERMEDIATE GOODS IMPORTS

SOURCE: OECD, [Trade in Value Added (TiVA), December 2018].



weight in the consumption basket in recent decades, at the expense of other goods (see Chart 2.8.1). Services have risen from accounting in 1999 for 31% and 36% of total spending in Spain and in the euro area, respectively, to 43% and 45% in January 2019. The increase has been more marked in Spain than in the rest of the large euro area economies (see Chart 2.A.3). Accordingly, less inflationary pressure in services would lead through this composition effect to less aggregate dynamism in prices. Energy, for its part, has gained weight in the past two decades, particularly in Spain: it rose from 7% to 12% between 1999 and 2019, while in the euro area as a whole its increase was more limited (from 9% to 10% over the same period).

3.3 The fluctuations in the inflation rate are now determined to a greater extent by energy

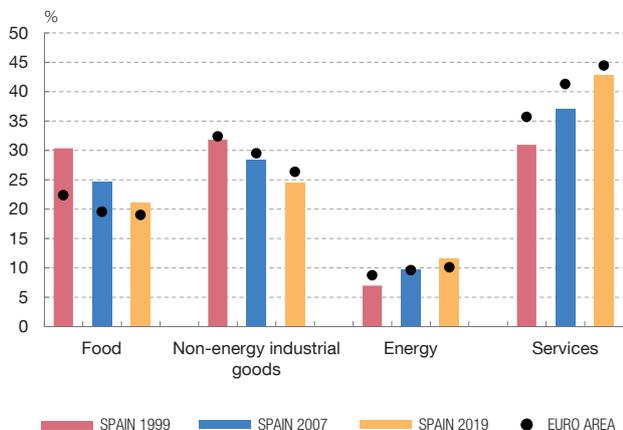
The lesser dynamism of core HIPC at present means that euro area inflation is affected to a greater extent by oscillations in energy prices. As Charts 2.9.1 and 2.9.2 show, the influence of this component on aggregate inflation dynamics in the euro area has increased significantly. In the case of the Spanish economy, the volatility of the contribution of energy to the inflation differential with the euro area

Chart 2.8

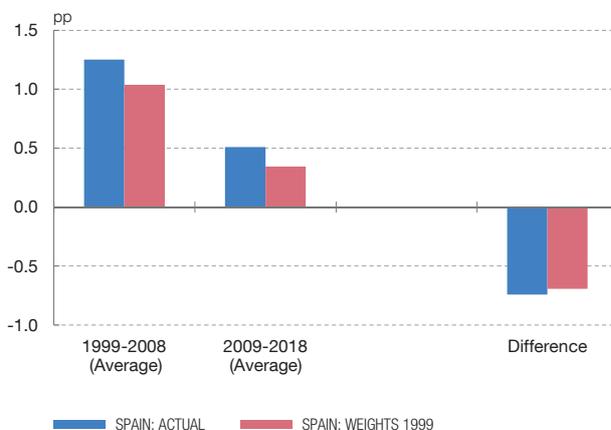
CHANGES IN THE WEIGHTS OF THE DIFFERENT COMPONENTS

The composition effects in the consumption basket have taken on greater importance, given the progressively greater weight of services.

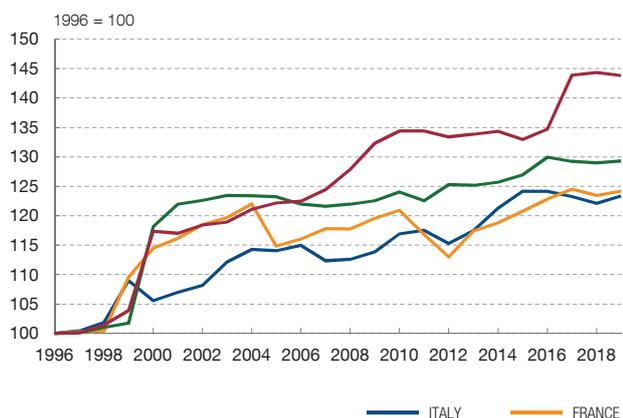
1 WEIGHT OF HICP SPECIAL GROUPS IN SPAIN AND THE EURO AREA



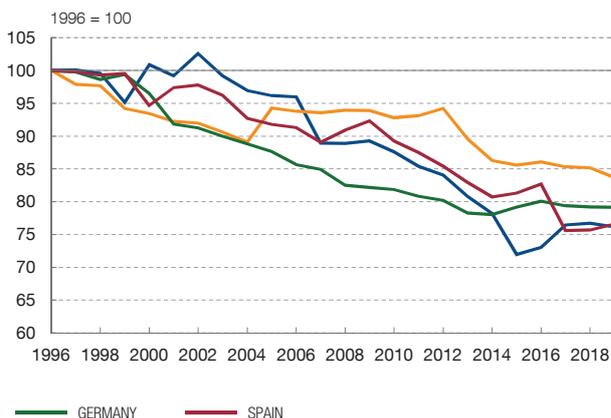
2 EFFECT OF THE CHANGE IN WEIGHTS: CONTRIBUTION OF SERVICES TO OVERALL INFLATION



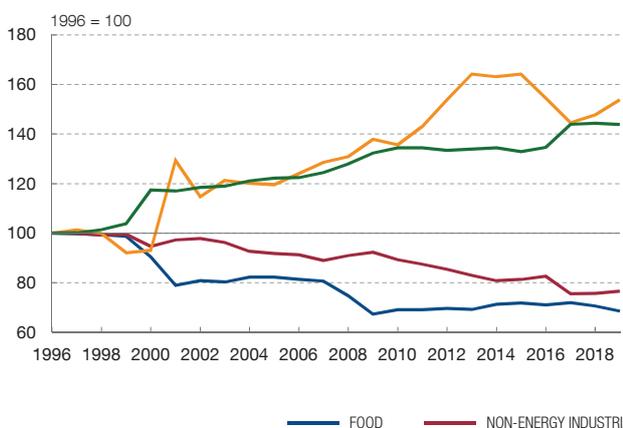
3 WEIGHT OF SERVICES IN THE OVERALL INDEX



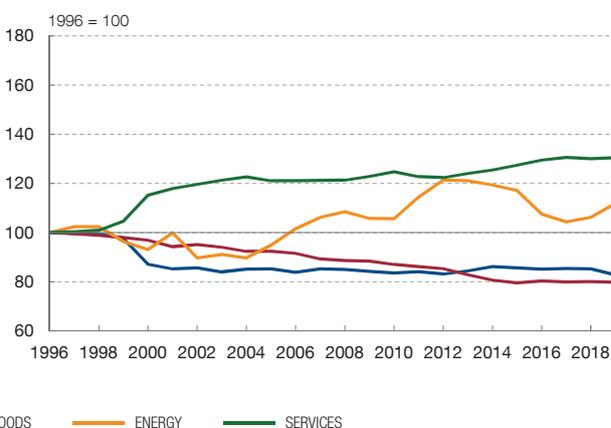
4 WEIGHT OF NON-ENERGY INDUSTRIAL GOODS IN THE OVERALL INDEX



5 WEIGHT OF DIFFERENT COMPONENTS IN THE OVERALL INDEX. SPAIN



6 WEIGHT OF DIFFERENT COMPONENTS IN THE OVERALL INDEX. EURO AREA



SOURCES: INE, Eurostat and Banco de España.

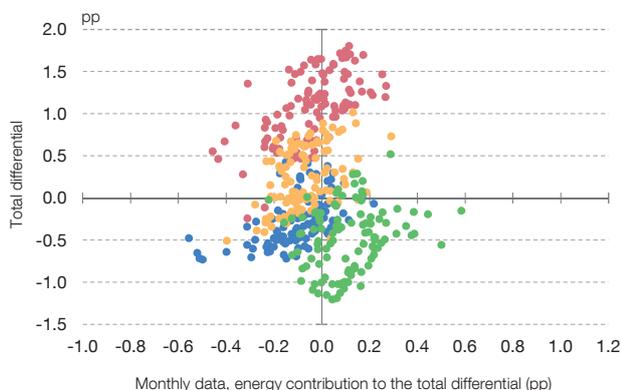


Chart 2.9

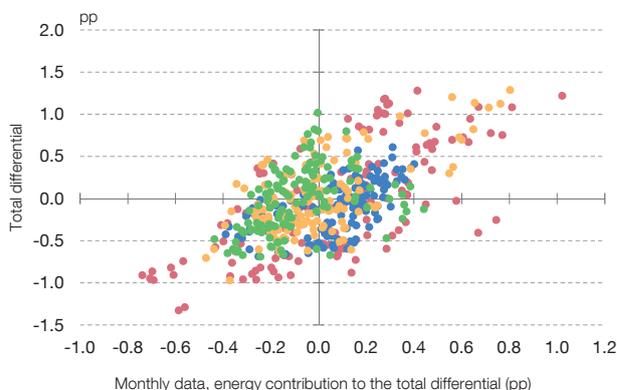
THE ROLE OF ENERGY IN INFLATION DYNAMICS

The euro area HICP is now determined to a greater extent by energy fluctuations.

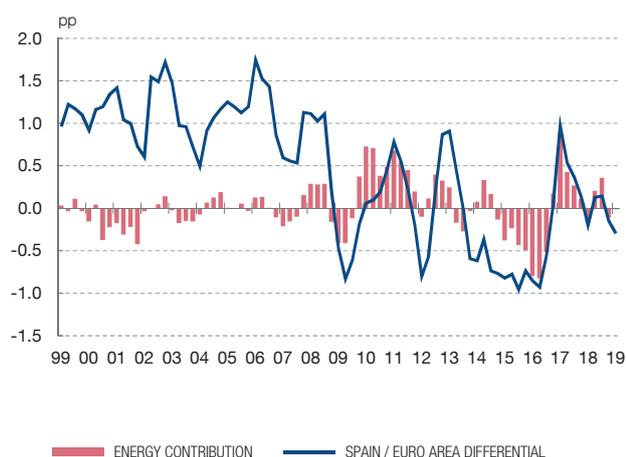
1 CONTRIBUTIONS OF THE ENERGY COMPONENT TO THE INFLATION DIFFERENTIAL WITH THE EURO AREA (1999-2007)



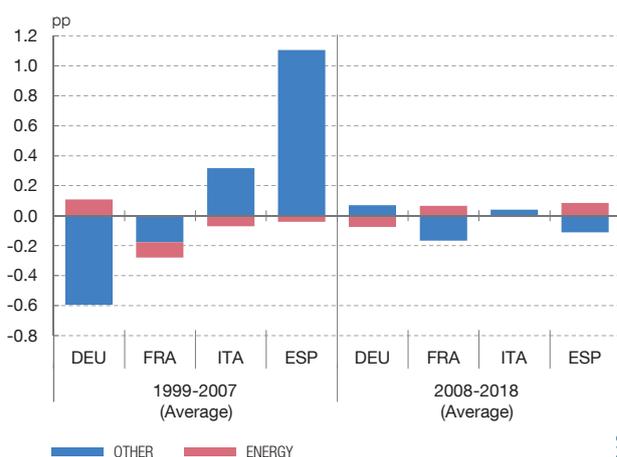
2 CONTRIBUTIONS OF THE ENERGY COMPONENT TO THE INFLATION DIFFERENTIAL WITH THE EURO AREA (2008-2018)



3 CONTRIBUTIONS TO THE SPAIN / EURO AREA INFLATION DIFFERENTIAL



4 COUNTRY-BY-COUNTRY CONTRIBUTIONS TO THE INFLATION DIFFERENTIAL WITH THE EURO AREA



SOURCES: Eurostat and Banco de España.



has increased 2.4 times in the past decade compared with the previous one (see Chart 2.9.3), a slightly higher multiple than that of Italy (2.3), and higher than Germany and France (1.4 and 1.3, respectively).²⁷

²⁷ There have been changes in recent years in the international energy market that have limited the rise in oil prices, particularly those related to the greater presence of renewable energies and the introduction of fracking extraction techniques.

In Spain's case, in addition to the greater weight of energy in the aggregate, there are idiosyncratic reasons that lead the volatility of this component to feed through more acutely to the overall index. The tax rates of vehicle fuel excise duties are lower in Spain than those in force in most euro area countries. That means that the responses to changes in oil prices are greater in the Spanish economy. Moreover, following the introduction of auctions for the setting of wholesale electricity prices in 2007, these prices have shown much greater volatility. This, too, affects fluctuations in the inflation differential vis-à-vis the euro area.

4 Some conditioning factors of recent inflation dynamics

4.1 Reforms and demand-side factors (including fiscal policy) account for the greater easing in inflation in Spain (and other peripheral countries)

During the crisis several euro area economies introduced structural reforms and undertook competitive adjustment processes, which are expected to have contributed to more contained price dynamics. Specifically, the countries that showed a higher level of macrofinancial vulnerability during the first half of the current decade, such as Portugal, Greece, Ireland and Spain, posted average inflation from 2013 to 2018 of 0.4%, compared with 0.9% for the euro area as a whole. And that despite the more frequent and higher increases in indirect taxation in those countries during that period. Within this group of countries, taking Spain as a reference, the macroeconomic model known as JoSE (Joint Spain-Euro area model)²⁸ can be used to analyse the relative contribution of inflation determinants in relation to the euro area. This model decomposes the deviations in inflation in the 2008-2018 period in respect of their long-term value in Spain and in the euro area, in terms of the contribution of a set of structural and transitory shocks (see Chart 2.10).

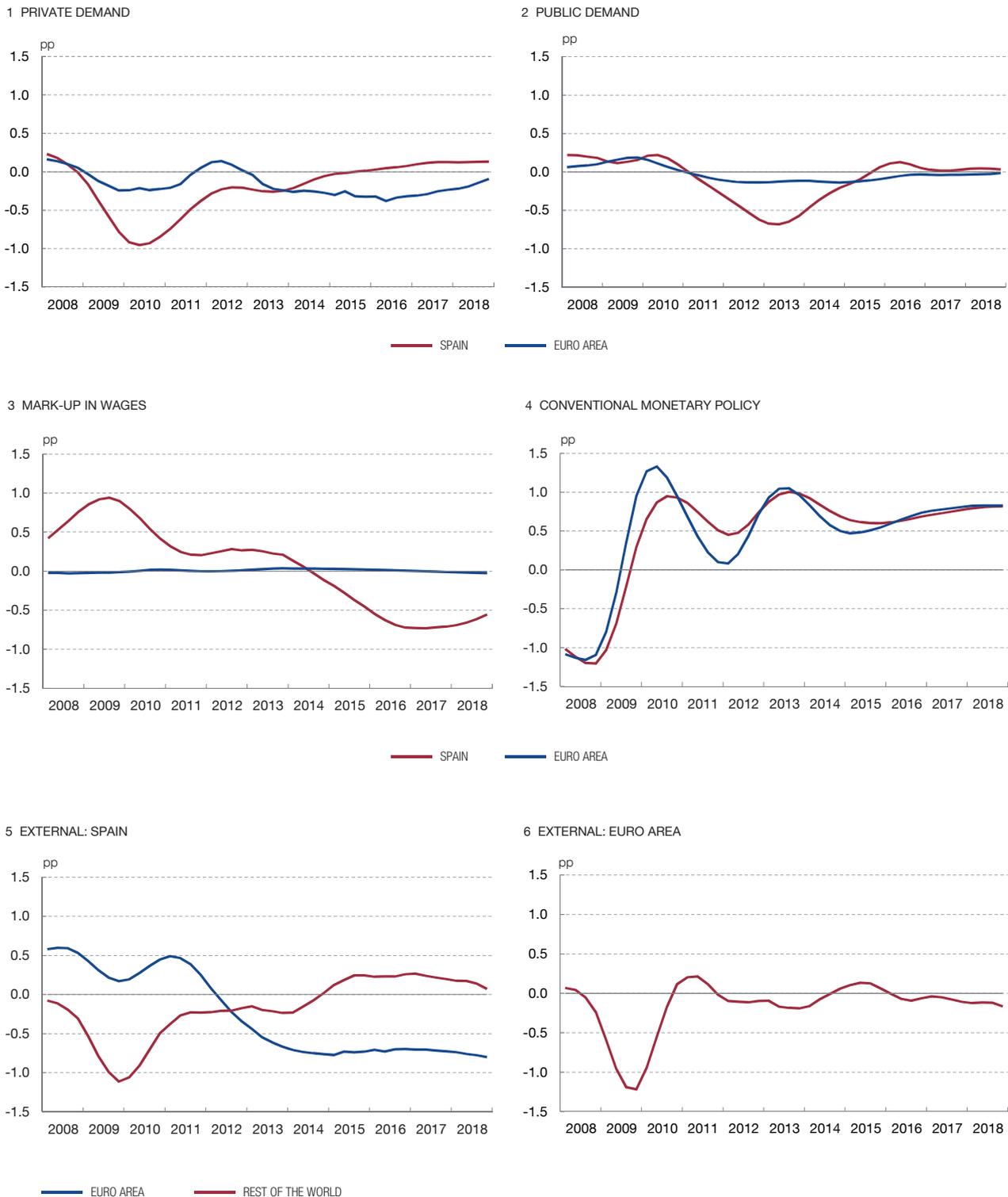
Wage containment dynamics have played a significant role in explaining lower inflation in Spain compared with the euro area in the most recent period. Wages made a clearly inflationary contribution in the first phase of the financial crisis (2008-2009), with a persistent impact, given the high inertia in price-setting processes. There was a turnaround in this trend as from 2010-2013 (see Chart 10.3), whereafter negative wage shocks became central to explaining the downward deviations in inflation in relation to its average. This wage moderation came about against the background of the competitive adjustment in the economy. Contributing to this were the labour market reforms that came into force over that period, and the

28 See Almeida, Hurtado and Rachedi (2019).

Chart 2.10

STRUCTURAL BREAKDOWN OF INFLATION IN SPAIN AND IN THE EURO AREA (a)

Inflation in Spain eased more than in the euro area owing to the greater influence of labour costs and of demand (including fiscal)



SOURCE: Banco de España.

a Inflation, excluding energy and foods. The contributions of the inflation determinants in Spain and in the euro area are presented using the JoSE model.



fiscal consolidation measures that adversely affected civil servants' wages. Both factors explain a considerable portion of the reduction in the average differential between Spain and the euro area in recent years, since wage moderation in the area as a whole was much less during this phase.

In the economies most acutely affected by the sovereign debt crisis, fiscal policy played a more contractionary role, which contributed to lower inflation.

This is the case for Spain, in particular, as Chart 2.10.2 shows. The need to control public finances imbalances against a background of government debt market instability led contractionary budgetary policies to be implemented at recessive cyclical junctures (i.e. procyclical policies), which partly explains the lower growth of activity and prices in the 2011-2014 period. In the euro area as a whole, the effects of the fiscal measures adopted in that period were comparatively smaller.

Monetary policy contributed positively to the rise in inflation and in output, during the crisis and the current upturn.

Its contribution has been positive both in Spain and in the euro area as a whole, practically since the onset of the recession (see Chart 2.10.4). The ECB's monetary policy has provided a notable stimulus in recent years. It has kept policy interest rates at historically low levels, and has applied unconventional measures, including quantitative easing (asset purchase programme and long-term refinancing operations) and forward guidance. All these measures have helped ease financial conditions. They have become one of the underpinnings of the economic recovery in the euro area, thus contributing to checking deflationary trends.²⁹

Private domestic demand shocks are another relevant factor.

In the initial phase of the crisis these shocks, potentially reflecting negative confidence effects, contributed notably to easing inflation, especially in Spain. Indeed, compared with the rest of the euro area as a whole, the crisis had a more lasting and acute effect on Spain. From 2014 onwards, the Spanish economy began to pick up sharply. That saw the negative contribution progressively peter out, to the point of contributing positively to the rise in prices in the more recent period.

Finally, the dynamics of the shocks originating abroad prompted negative deviations in Spain's inflation relative to its trend throughout the crisis and the recovery.

Chart 2.10.5 shows how, during the initial phase of the crisis, these external deflationary shocks stemmed principally from the rest of the world and were linked to an across-the-board decline in aggregate demand. As from 2012, by contrast, the shocks were primarily from the other euro area countries. In the case of the euro area, external flows have exerted limited influence on inflationary dynamics in the economic upturn. Hence, the influence of shocks originating in the rest of the euro

²⁹ See Banco de España (2016) for estimates of the impact of monetary policy on economic growth and inflation, throughout the crisis and the recovery, in Spain and in the euro area.

area are estimated to have contributed to narrowing the inflation differential between Spain and the euro area as a whole.

4.2 The cyclical sensitivity of inflation in the euro area is generally low

The responsiveness of inflation to cyclical conditions depends on the structure of each economy and may vary over time.³⁰ As discussed in the first section, a portion of the inflation deviations relative to the long-term trend is on account of economic fluctuations. Their responsiveness, or cyclical sensitivity, will be greater in situations in which firms more frequently change prices (a lesser degree of “nominal stickiness”). That, in turn, will depend on the degree of market competition (related, in part, to the degree of economic openness), and on wage-formation processes (see Box 2.4). Furthermore, the information available from surveys points to the presence of asymmetries in the response by inflation to activity. These arise, for instance, from differing behaviour by firms in the face of changes in their demand, depending on the cyclical position of the economy.³¹

The empirical studies available show high heterogeneity in the estimates of the cyclical sensitivity of inflation. However, there is at the same time consensus as to this sensitivity having diminished in the advanced economies in the past two decades, and being particularly low at present.³² Some papers highlight the growing importance of foreign economic cycles to explain this lower value, given that an economy’s inflation depends on the national and global cyclical positions alike (see, once more, Box 2.3³³). It is also often pointed out that, in low-inflation situations, agents do not consider inflation as a first-order factor in their decision-making.³⁴

The low level of cyclical sensitivity may also be due to the presence of non-linear factors in the relationship between inflation and economic activity. Sensitivity may, in particular, depend on the state of the economy (e.g. if it is in recession or expanding)³⁵ and on the specific characteristics of this state (e.g. the depth of the recession). Some papers argue that the relationship between capacity utilisation and the inflationary process only operates when the level of inflation

30 On the possible asymmetries in the response of inflation to the cycle, see Álvarez, Gómez Loscos and Urtasun (2015) and Cicarelli and Obstat (2017).

31 For example, Álvarez and Hernando (2007) find that Spanish firms respond to a greater extent to the declines in demand proper to recessions than they do to increases in upturns.

32 See, inter alia, Gilchrist and Zakrajšek (2019), Jordà, Martí, Nechio and Tallman (2019) and Luengo-Prado et al. (2018).

33 See also Gilchrist and Zakrajšek (2019) and Berganza, Del Río and Borralló (2016).

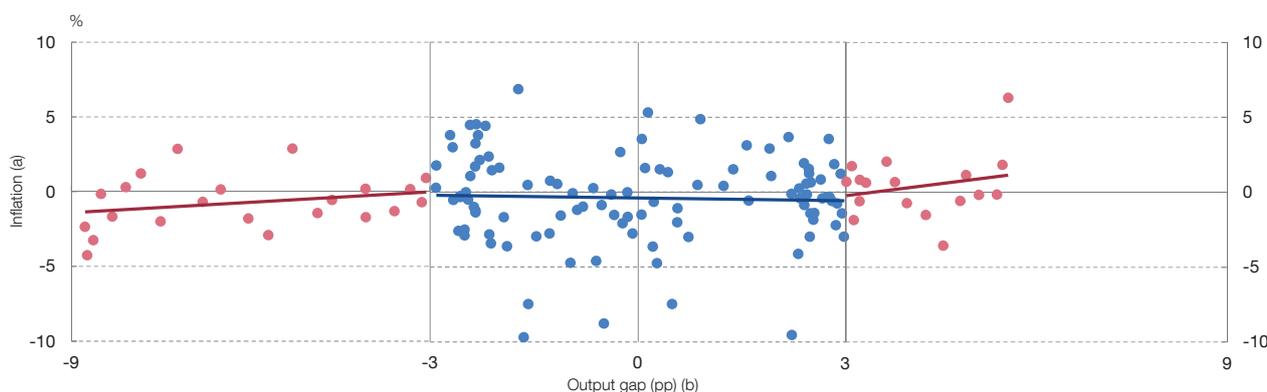
34 See Blanchard (2018).

35 See, in this respect, the evidence for Spain provided by Álvarez, Gómez Loscos and Urtasun (2015), and the references in Cicarelli and Obstat (2017).

Chart 2.11

NON-LINEAR RELATIONSHIP BETWEEN INFLATION AND OUTPUT GAP

The relationship between the output gap and the inflationary process only operates when the output gap exceeds certain thresholds.



SOURCES: INE and Banco de España [Cuadrado and Moral-Benito (2016)].

a Year-on-year change in the inflation rate.

b Percentage difference between actual and potential GDP level, in relation to potential GDP.

DOWNLOAD



exceeds certain thresholds. This is especially so in the case of expansionary phases, in which the output gap reaches very high figures (see Chart 2.11, for the case of Spain). According to the empirical evidence supporting this hypothesis, the progressive closing of the output gap seen in the current upturn would be compatible with the absence of inflationary pressures, insofar as this gap is still some distance off the estimated thresholds for the positive relationship with inflation to be significant.³⁶

Some studies for the euro area have tested the possibility that there is time variability in the cyclical sensitivity of inflation. According to these papers³⁷, at the height of the financial crisis there would have been an increase in this sensitivity, which might be compatible with a reduction in the nominal rigidities potentially linked to the depth of the recession³⁸ (see Chart 2.12). However, the sensitivity of domestic cyclical conditions would have subsequently lessened³⁹, to rise again to values consistent with its historical average in the most recent period.⁴⁰ This latter

³⁶ See Cuadrado and Moral-Benito (2016) for the Spanish case, and the references cited therein for further examples.

³⁷ See Leiva-Leon, Pérez, Pérez-Quirós and Urtasun (2019).

³⁸ See also Álvarez, Gómez Loscos and Urtasun (2015).

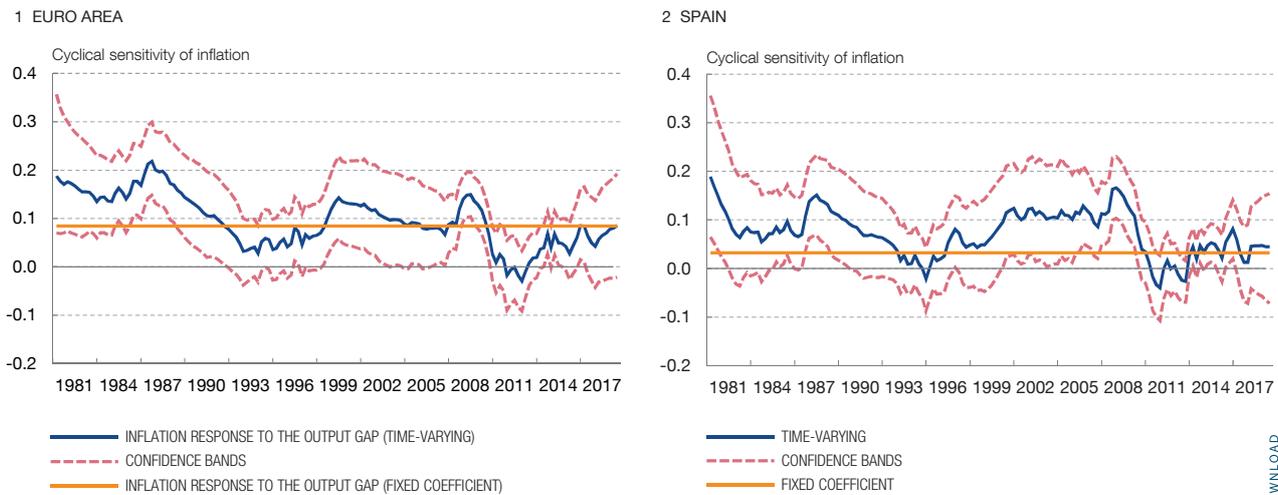
³⁹ Luengo-Prado et al. (2018) document the existence of a structural break in the slope of the Phillips curve around 2009-2010. According to the evidence based on CPI sectoral data for the United States, these authors show how the co-movement between inflation rates and the degree of labour market slack, by sector, weakened substantially and turned to practically zero, in general, in the years immediately following this structural break.

⁴⁰ The results presented for the case of the euro area are practically identical to those provided by Stevens and Wauters (2018).

Chart 2.12

INFLATION RESPONSE TO THE OUTPUT GAP

The cyclical sensitivity of inflation in the euro area is lower at present, although estimating it is subject to much uncertainty.



SOURCES: ECB and Banco de España, Leiva-León, Pérez, Pérez-Quirós and Urtasun (2019).



observation might be related to the effects of reforms in some euro area countries – in particular in the labour market – that may have affected the economy’s degree of nominal rigidity.⁴¹ Finally, the apparent lower cyclical sensitivity of inflation in Spain’s case, relative to the euro area (Chart 2.12) may be due to the greater relative rigidity of price and wage-setting in the Spanish economy⁴², despite the introduction of several new elements in recent years aimed at making the determination of these two variables more flexible.⁴³

4.3 The influence of the exchange rate on euro area inflation has increased in recent years

A currency’s depreciation exerts upward pressures on imported prices, with this passing through to the entire price chain and, ultimately, to the overall

41 The evidence for the case of Spain discussed in Box 2.4 would partially support this explanation. Specifically, it is estimated that the response of wages in Spain to cyclical movements in the unemployment rate increased in the phase immediately following the 2012 labour market reform, probably reflecting the impact of the different measures of internal flexibility approved. Regarding the recent period of recovery, the estimated wage elasticity is somewhat higher than that observed in similar cyclical phases, although the difference is not statistically significant.

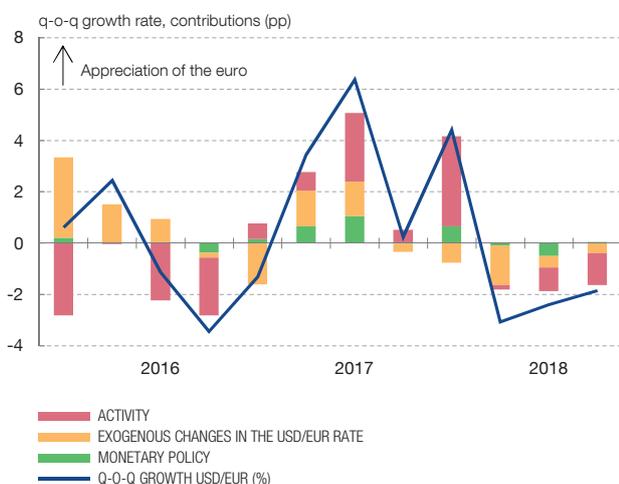
42 See, for instance, Cuadrado, Hernández de Cos and Izquierdo (2011).

43 Among the main reforms in this respect are those pertaining to the labour market, which added further flexibility to firms’ possibilities of adjusting labour costs in recessive periods, and the law on deindexation.

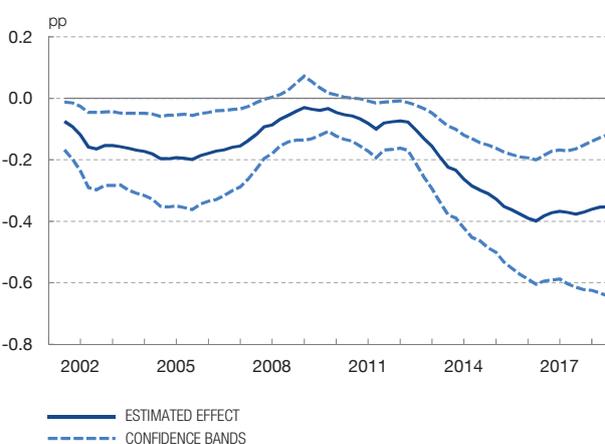
INFLATION RESPONSE TO THE EXCHANGE RATE

The pass-through of exchange rate shocks to euro area inflation is higher at present.

1 BREAKDOWN OF THE GROWTH OF THE NOMINAL EXCHANGE RATE OF THE DOLLAR AGAINST THE EURO



2 SPAIN: EFFECT OF EXOGENOUS EXCHANGE RATE SHOCKS ON INFLATION



SOURCE: Leiva-León, Martínez-Martín and Ortega (2019a).



level of consumer prices. The pass-through to consumer prices of changes in the exchange rate of the euro depends on a broad set of structural and cyclical factors.⁴⁴ Structural factors include most notably: the degree of trade openness and integration into the global value chains of production; the influence of competition on international markets and on the market power of exporting firms; the currency in which international trade is billed; and price stickiness. Influential among the cyclical factors are the situation of the economy in terms of growth and inflation, and monetary policy measures.

Exchange rate developments are determined by the effect of economic shocks. These may be domestic or external, or demand-side or supply-side. And they may also stem from monetary policy action or some other factors related to changes in the confidence of agents that operate on foreign exchange markets in favour of one economy against another. As Chart 2.13.1 shows, the depreciation of the euro against the dollar in the last three quarters of 2018, on average, might have been due, according to this analysis⁴⁵, mainly to the lower growth of the euro area relative to the United States. Along with this factor, others, not necessarily relating to

44 See Leiva-León, Martínez-Martín and Ortega (2018).

45 See Leiva-León, Martínez-Martín and Ortega (2018). On the determinants of the pass-through of the exchange rate to prices, see Forbes (2016).

fundamentals regarding economic activity or monetary policy, also played a relevant role. As a result, the capital markets placed relatively less confidence in the euro. Finally, to a lesser extent, the ECB's monetary policy was perceived to have become somewhat more lax – in relative terms – than the previous year, which also contributed to the depreciation in question.

The empirical evidence shows that, in particular, the effect on inflation of exchange rate movements due to factors not based on fundamentals has increased in the main euro area countries. These dynamics can be seen in Chart 2.13.2 for the Spanish economy, although the pattern is similar in Germany, France and Italy. In particular, it is the energy component in overall inflation – which is more volatile and has a high import content (and which is therefore more exposed to exchange rate fluctuations) – that would react most sharply to a change in the exchange rate.⁴⁶ Hence, an exchange rate movement due to exogenous factors, i.e. not based on fundamentals relating to economic activity or monetary policy, would currently have a greater impact on inflation than at the start of this century.

4.4 Prices, wage costs and mark-ups in the Spanish economy and the euro area

As earlier indicated, wage moderation has been a determinant of the lesser dynamism of domestic prices in Spain, in both absolute and relative terms vis-à-vis the euro area.⁴⁷ During the crisis, the containment of ULCs initially rested on apparent labour productivity gains, linked to the high rate of job destruction. But subsequently, the moderation in wage growth contributed to prolonging the path of compression of labour costs. The small increases in labour costs, however, were not unconnected to the low inflation environment in which wage bargaining unfolded, especially as from 2010 (see Box 2.4).

The pass-through of the reduction in labour costs to prices has been partial, as the behaviour of business mark-ups also plays a pivotal role in price-setting. Mark-ups reflect producers' capacity to pass through changes in costs to their sale prices. The trend of mark-ups during the crisis was markedly countercyclical in Spain, compared with the cyclical pattern seen in other European countries. From the standpoint of the behaviour of Spanish firms, the increase in mark-ups during the early years of the recession is largely due to their responding to more restrictive

46 See Leiva-León, Martínez-Martín and Ortega (2019).

47 In the foregoing sections, price developments have been analysed through the HICP. This measures the prices of a basket of goods and services intended for consumption, and includes both domestically produced and imported goods and services. Yet for other purposes it is useful to analyse a basket of goods intended also for investment or for export, and the role of the decisions of agents, workers and firms in price-setting. In this case, it is necessary to resort to the implicit GDP or value added deflator.

financing conditions, even at the risk of undergoing lasting losses in market share.⁴⁸ Continuing high mark-ups in the recovery period, from 2014, in a setting marked by much more favourable financial conditions both euro area-wide and in Spain, might point to competition problems in certain sectors.⁴⁹

More recently, however, the quickening in labour costs has coincided with an easing in business mark-ups. As a result, inflation has held at very moderate rates in Spain and in the euro area. Against a backdrop of economic recovery, the partial pass-through by firms of the increase in labour costs to prices would be due to their intention not to lose market share in the medium term.⁵⁰ This effect might be more persistent in those countries, such as Spain, in which the decline in labour costs did not feed through fully to prices in the initial years of the crisis. That provided for a substantial increase in business mark-ups in that period and, in the recent circumstances, they might act as a buffer for absorbing cost rises without significantly affecting prices.

The analysis by productive sector confirms the diagnosis of the differences in the inflationary trend of industrial goods and of services. Chart 2.14 shows the recent trend of the determinants of the value added deflator, labour costs and mark-ups (the latter proxied by the unit surplus), in different sub-periods, compared with the euro area. In the pre-crisis period, the higher relative increases in ULCs in Spain contributed significantly to creating Spain's positive inflation differential vis-à-vis the euro area, in particular in the case of services. During the 2008-2013 period the differences in inflation between both areas narrowed, essentially owing to the lesser dynamism in Spain of ULCs in both sectors. However, the relatively more expansionary behaviour of mark-ups in Spain contributed to lessening the intensity of the relative adjustment of prices. Thereafter, these two sectors have retained a negative inflation differential vis-à-vis the euro area, which is attributable to the lower growth of ULCs in services and of business mark-ups in industry.

5 Inflation outlook

Core inflation forecasts for the euro area have been systematically revised downwards in the past two years. Overall inflation forecasts have, for their part, followed a course greatly influenced by the profile of changes in energy prices.

48 See Montero and Urtasun (2014).

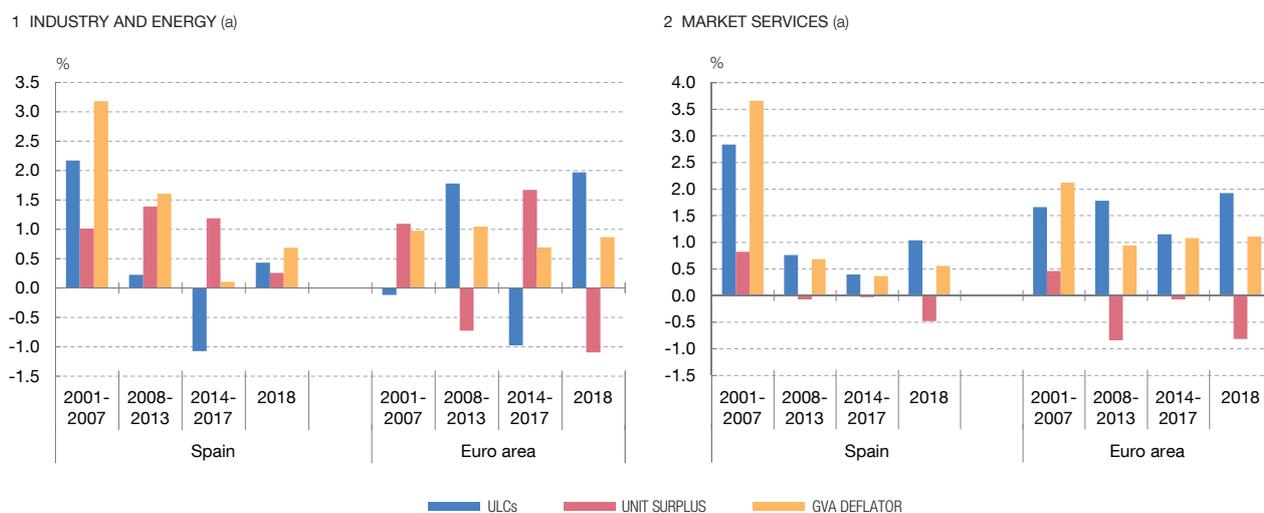
49 For a more detailed discussion on the macroeconomic implications of the latest dynamics of mark-ups and business competition, see, inter alia, IMF (2019) and Autor, Dorn, Katz, Patterson and Van Reenen (2017), and the references cited in these articles.

50 See Gilchrist, Schoenle, Sim and Zakrajšek (2017) and Roldán and Gilbukh (2018).

Chart 2.14

DEFLATORS AND COSTS: SPAIN AND EURO AREA

The analysis by productive sector confirms the diagnosis on the differences in inflation for industrial goods and for services.



SOURCES: INE and Eurostat.

a Average of several periods.

DOWNLOAD



Charts 2.15.1 to 2.15.3 illustrate both variables. They show how the forecasts for Spain and the euro area for 2018 and 2019 – published quarterly by the ECB and the Banco de España as part of their macroeconomic projections exercises – have been progressively revised. These revisions have come about in a context in which, taking the entire reference period (2017-2018), the GDP growth forecasts for the euro area and for Spain were revised upwards. According to the analysis provided in this chapter, this recent evidence would be consistent with a weak cyclical sensitivity of inflation.

In the specific case of 2018, the downward revisions of the core inflation rate were across the board in terms of countries and sectors, particularly in services. The more recent easing in services inflation, documented in this chapter, might hold over time. That would lessen the inflationary pressures in a sector that has historically contributed to rises in inflation at times of economic recovery, especially in countries such as Spain. Also, from the standpoint of composition by country, the current situation of low euro area inflation might be extended if the ongoing convergence of HICP rates of change in the traditionally more inflationary countries (Spain, Portugal, Greece and Italy) on those of the core countries were eminently permanent in nature. As described in Section 3.1, for this latter group of countries the recently observed core inflation levels are, on average and in historical terms, not in significant contrast to those posted in the first decade of EMU.

Chart 2.15

HICP INFLATION FORECASTS FOR SPAIN AND FOR THE EURO AREA

The core inflation forecasts have been revised systematically downwards in the past two years.

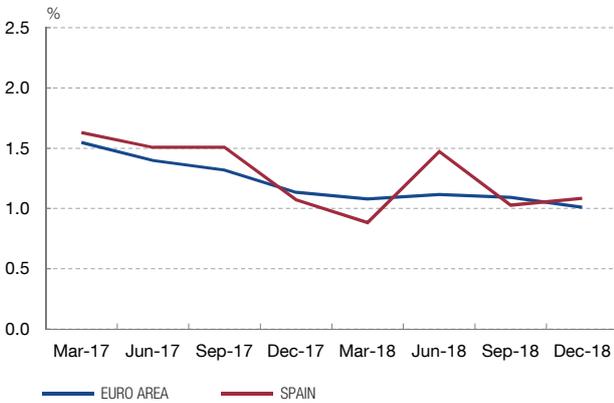
1 EURO AREA OVERALL INFLATION, 2018 AND 2019
2017 and 2018 forecasts



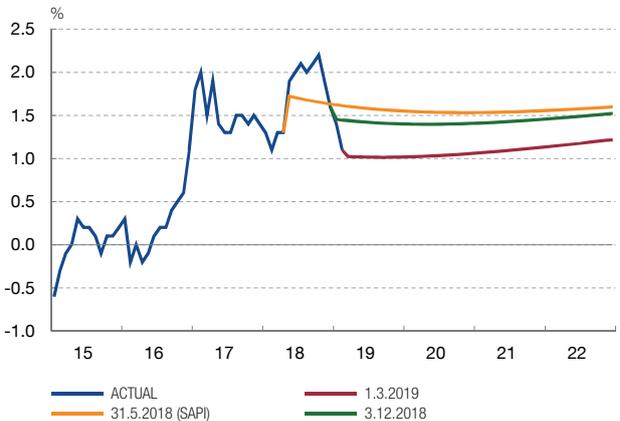
2 SPAIN OVERALL INFLATION, 2018 AND 2019
2017 and 2018 forecasts



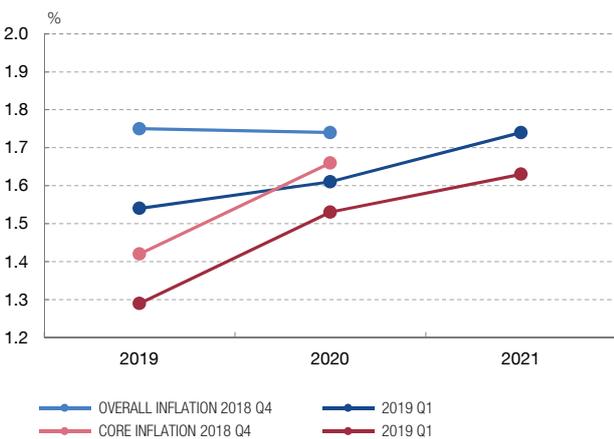
3 CORE INFLATION 2018
2017 and 2018 forecasts



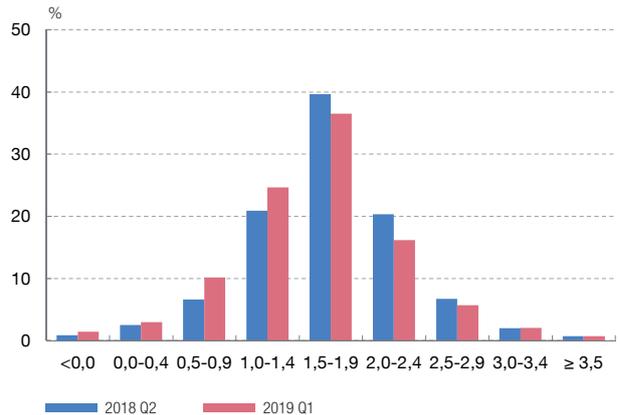
4 EURO AREA: ACTUAL INFLATION AND MARKET EXPECTATIONS (a)



5 EURO AREA INFLATION. REVISION OF FORECASTS (b)



6 EURO AREA: PROBABILITY DISTRIBUTION OF INFLATION FORECASTS FOR 2020 (b)



SOURCES: INE, ECB and Banco de España.

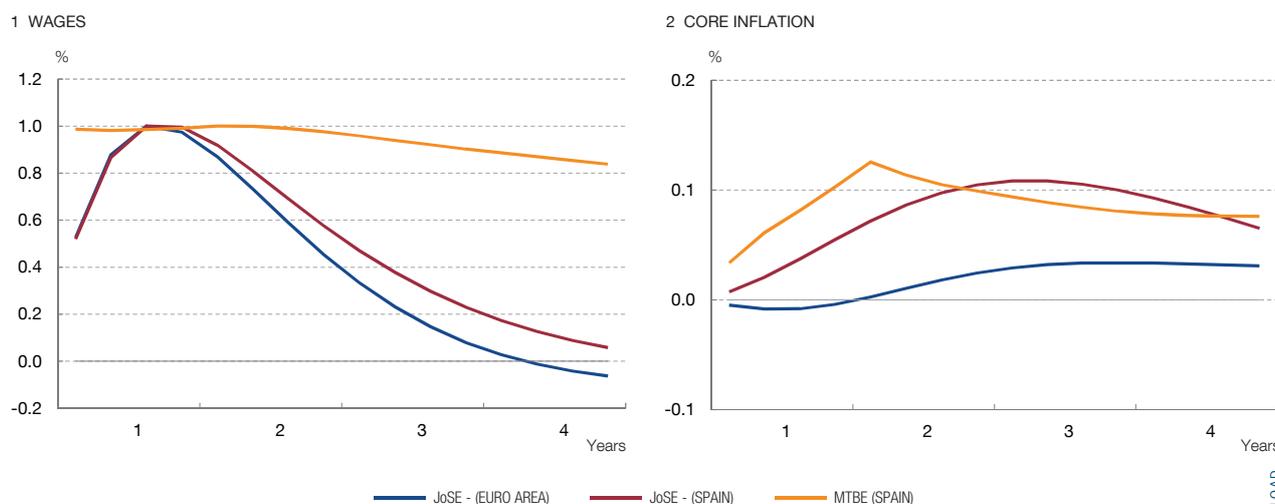
- a Instantaneous forward inflation rate obtained from inflation swap prices. Each point indicates the annual inflation to be observed at each future moment so that inflation swap agreements entered into on a specific day should not entail any transfer of money between the contracting parties. Given that in these agreements one of the parties offers protection to the other, these rates – in addition to expectations – include a premium for the transfer of the risk.
- b Data from the ECB's SPF survey.



Chart 2.16

EFFECTS OF AN INCREASE IN WAGES ACCORDING TO THE MTBE AND JoSE MODELS

In both models an increase in wages generates very moderate inflation effects.



SOURCES: Almeida, Hurtado and Rachedi (2019) and Arencibia, Hurtado, De Luis and Ortega (2017).



The recurrent underestimation of inflation in recent years might reflect a significantly higher than expected degree of persistence in deviations from target. In recent months, inflation expectations at different terms in the euro area as a whole, measured by break-even inflation rates obtained from inflation swap prices, have held clearly below the ECB's objective of 2% (see Chart 2.15.4). This circumstance has also come about in the rates for member countries taken individually. As for other indicators of long-term expectations, trend inflation measures⁵¹ averaged 1.5% for the euro area in 2018, with a degree of cross-country heterogeneity. Specifically, last year the average trend inflation rate for Spain, Italy, Portugal and Greece was estimated at 1.1%, while for the core euro area members (proxied by Germany, France, the Netherlands, Belgium, Austria, Finland and Luxembourg) it stood at 1.6%.

The latest results of the ECB Survey of Professional Forecasters (SPF)⁵² are along these same lines. Specifically, for 2019 Q1, the SPF shows downward revisions of inflation expectations for the 2019-2021 period (see Chart 2.16.5), but

51 Calculated using the models of Correa-López, Pacce and Schlepper (2019) and Leiva-Leon, Pérez, Pérez-Quirós and Urtasun (2019).

52 The SPF is conducted quarterly and captures expectations relating to the rates of inflation, real GDP growth and unemployment in the euro area for various time horizons, along with a quantitative assessment of the uncertainty surrounding these expectations. Survey participants are experts belonging to financial or non-financial institutions located in the EU.

also in its longer-dated expectations.⁵³ Chart 2.15.6 shows how, over the past year (comparing the 2018 Q2 survey with the current one), a larger amount of analysts assigned a higher probability of the inflation rate being lower in 2020, whereby the aggregate probability distribution shifted leftwards. At the same time, the probability distributions now show greater breadth, by historical standards, meaning that analysts differ more in their projections than a year ago. This suggests that uncertainty over the future course of inflation (measured by the disagreement in agents' outlook) has risen.

The rise in wages in the euro area, in the past few years, and in Spain, more recently, does not appear to be exerting a significant effect on inflation rates.

As analysed, the containment of wage costs played a significant role when it comes to explaining the low inflation during the last crisis, especially in the peripheral euro area economies. Foreseeably, the better current labour market conditions will ultimately be reflected in prices. However, the pass-through to inflation of wage shocks is very weak, according to the models available (*JoSE* and *MTBE*⁵⁴) (see Chart 2.16). Based on the discussion presented in the previous section, the dynamics of mark-ups may be offsetting some of the possible wage pressures on prices.

In this setting, moreover, supply-side factors might be operating. Their quantification in the short term is, however, very uncertain. According to the analysis in the chapter, the persistence of inflation at levels below the reference of 2% might also reflect, in part, the downward pressures on price stability arising from supply-side factors. These include the impact of digitalisation, globalisation and changes in labour supply linked to population ageing, as analysed in Chapters 3 and 4 of this Report. In sum, the different information sources about the foreseeable course of consumer prices suggest that agents expect the recent moderate pattern of inflation to continue in the near future.

53 For further details see the [press release](#) summarising the SPF findings.

54 See Arencibia, Hurtado, De Luis and Ortega (2017).

REFERENCES

- Aguilar, P., and J. Vázquez (2018). *Term structure and real-time learning*, Working Papers, No. 1803, Banco de España.
- Allington, N. F. B., P. A. Kattuman and F. A. Waldman (2005). “One market, one money, one price?”, *International Journal of Central Banking*, 1, pp. 73-115.
- Almeida, G., S. Hurtado and O. Rachedi (2019). *JoSE: Joint Spain Euro area model*, Occasional Papers, Banco de España, forthcoming.
- Altissimo, F., L. Bilke, A. Levin, T. Matha and B. Mojon (2006). “Sectoral and aggregate inflation dynamics in the euro area”, *Journal of the European Economic Association*, 4, pp. 585-593.
- Álvarez, L. J., L. Gadea y A. Gómez Loscos (2019a). *Low inflation in advanced economies*, Working Papers, Banco de España, forthcoming.
- (2019b). *Inflation interdependence in advanced economies*, Working Papers, Banco de España, forthcoming.
- Álvarez, L. J., A. Gómez Loscos y A. Urtasun (2015). “Asymmetries in the relationship between inflation and activity”, *Economic Bulletin*, November, Banco de España, pp. 47-53.
- Álvarez, L. J., and I. Hernando (2007). “The Pricing Behavior of Spanish Firms”, in S. Fabiani, C. Loupias, F. Martins and R. Sabbatini (eds.), *Pricing Decisions in the Euro Area: How Firms Set Prices and Why*, Oxford University Press.
- Álvarez, L. J., and I. Sánchez (2018). “Reference variables for analysing inflation in Spain”, Economic Notes, *Economic Bulletin*, 3/2018, Banco de España.
- Angeloni, I., L. Aucremanne and M. Cicarelli (2006). *Price setting and inflation persistence: did EMU matter?*, European Central Bank Working Papers, no. 597.
- Arencibia, A., S. Hurtado, M. de Luis and E. Ortega (2017), *New Version of the Quarterly Model of Banco de España (MTBE)*, Occasional Papers, no. 1709, Banco de España.
- Autor, D., D. Dorn, L. F. Katz, C. Patterson, y J. Van Reenen (2017). “Concentrating on the Fall of the Labor Share”, *American Economic Review*, no. 107, pp. 180–85.
- Ball, L. (1992). “How does inflation raise inflation uncertainty”, *Journal of Monetary Economics*, no. 29, pp. 371-388.
- Banco de España (2016). “The effect of the ECB’s monetary policies in the recent period”, Chapter 3 of *Annual Report 2015*.
- Bems, R., F. Caselli, F. Grigoli, B. Gruss and W. Lian (2018). *Expectations’ anchoring and inflation persistence*, IMF Working Papers, 18/280.
- Benati, L. (2008). “Investigating inflation persistence across monetary regimes”, *The Quarterly Journal of Economics*, no. 123, pp. 1005-1060.
- Berganza, J. C., P. del Río and F. Borrallo (2016). “Determinants and implications of low global inflation”, *Economic Bulletin*, November, Banco de España, pp. 54-70.
- Bils, M., and P. Klenow (2004). “Some Evidence on the Importance of Sticky Prices”, *Journal of Political Economy*, no. 112, pp. 947-985.
- Blanchard, O. (2018). “Should we reject the natural rate hypothesis?”, *Journal of Economic Perspectives*, no. 32, pp. 97-120.
- Brož, V., and E. Kočenda (2018). “Dynamics and factors of inflation convergence in the European Union”, *Journal of International Money and Finance*, no. 86, pp. 93-111.
- Caporale, G. M., L. Onorante and P. Paesani (2010). *Inflation and inflation uncertainty in the euro area*, European Central Bank Working Papers, no. 1229.
- Carney, M. (2015). “Inflation in a globalised world”, Economic Policy Symposium, Jackson Hole.
- Cicarelli, M., and C. Obstat (eds.) (2017). *Low inflation in the euro area: causes and consequences*, European Central Bank Occasional Papers, no. 181.
- Cogley, T., S. Morozov and T. J. Sargent (2005). “Expectations, learning and monetary policy”, *Journal of Economic Dynamics and Control*, 29(11), pp. 1893-1925.

- Coibion, O., and Y. Gorodnichenko (2015). "Information rigidity and the expectations formation process: a simple framework and new facts", *American Economic Review*, no. 105, pp. 2644-2678.
- Correa-López, M., M. Pacce and K. Schleppe (2019), "Exploring trend inflation dynamics in Euro Area countries", Working Papers, no. 1909, Banco de España.
- Cuadrado, P., and E. Moral-Benito (2016). "Thresholds in the relationship between inflation and economic activity", *Economic Bulletin*, December, Banco de España, pp. 47-52.
- Cuadrado, P., P. Hernández de Cos and M. Izquierdo (2011). "Wage adjustment to shocks in Spain", *Economic Bulletin*, February, Banco de España, pp. 45-55.
- Dvir, E. and G. Strasser (2018). "Does marketing widen borders? Cross-country price dispersion in the European car market", *Journal of International Economics* 112, pp. 134-149.
- ECB (2011). *The monetary policy of the ECB*, Frankfurt am Main.
- Elding, C., and R. Morris (2018). "Digitalisation and its impact on the economy: insights from a survey of large companies", *Economic Bulletin*, no. 7/2018, European Central Bank.
- Estrada, A., J. Galí, and D. López-Salido (2013). "Patterns of Convergence and Divergence in the Euro Area", *IMF Economic Review*, 61, pp. 601-630.
- Evans, M., and P. Wachtel (1993). "Inflation regimes and the sources of inflation uncertainty", *Journal of Money, Credit and Banking*, no. 25, pp. 475-511.
- Fischer, C. (2012), "Price convergence in the EMU? Evidence from micro data", *European Economic Review*, 56, pp. 757-776.
- Forbes, K. (2016). "Much ado about something important: how do exchange rate movements affect inflation?", *The Manchester School*, no. 84, pp. 15-41.
- Friedman, M. (1977). "Nobel Lecture: Inflation and Unemployment", *Journal of Political Economy*, no. 85, pp. 451-472.
- Galesi, A., y O. Rachedi (2019). "Services Deepening and the Transmission of Monetary Policy", *Journal of the European Economic Association*, forthcoming.
- Gilchrist, S., R. Schoenle, J. Simy and E. Zakrajšek (2017). "Inflation Dynamics during the Financial Crisis", *American Economic Review*, no. 107, pp. 785-823.
- Gilchrist, S., and E. Zakrajšek (2019). *Trade exposure and the evolution of inflation dynamics*, Finance and Economics Discussion Series 2019-007, Washington, Board of Governors of the Federal Reserve System.
- Gimeno, R., and E. Ortega (2018). "Euro area inflation expectations", Analytical Articles, *Economic Bulletin*, 1/2018.
- Helbling, T., F. Jaumotte and M. Sommer (2006). "How has globalization affected inflation?", *World Economic Outlook*, Chapter III, International Monetary Fund.
- International Monetary Fund (2019). "The rise of corporate market power and its macroeconomic effects", Chapter 2 of the *World Economic Outlook* (April 2019).
- Jordà, O., C. Marti, F. Nechio and E. Tallman (2019). *Inflation: Stress-Testing the Phillips Curve*, FRBSF Economic Letter 2019-05.
- Leiva-Leon, D., J. Martínez-Martín and E. Ortega (2018). "Recent movements in the euro exchange rate and the impact on inflation in the Spanish economy", Analytical Articles, *Economic Bulletin*, 4/2018, Banco de España.
- (2019). *Exchange Rate Shocks and Inflation Comovement in the Euro Area*, Working Papers, Banco de España, forthcoming.
- Leiva-Leon, D., J. J. Pérez, G. Pérez-Quirós and A. Urtasun (2019). *Structural Instabilities in the euro area: Okun vs. Phillips*, Working Papers, Banco de España, forthcoming.
- López, C., and D. H. Papell (2012). "Convergence of euro area inflation rates", *Journal of International Money and Finance*, no. 31, pp. 1440-1458.
- Loungani, P., S. Mishra, C. Papageorgiu and K. Wang (2017). *World Trade in Services: Evidence from A New Dataset*, IMF Working Paper WP/17/77.
- Luengo-Prado, M. J., N. Rao and V. Sheremirov (2018). "Sectoral inflation and the Phillips curve: What has changed since the Great Recession?", *Economics Letters*, no. 172, pp. 63-68.

- Mishkin, F. (2007). *Inflation dynamics*, NBER Working Papers, no. 13147.
- Mojon, B., and X. Ragot (2019). *Can an ageing workforce explain low inflation?*, BIS Working Papers, no. 776.
- Montero, J. M., and A. Urtasun (2014). *Price-Cost Mark-ups in the Spanish Economy: a Microeconomic Perspective*, Working Papers, no. 1407, Banco de España.
- Orphanides, A., and J. Williams (2005). *Monetary policy with imperfect knowledge*, Finance and Economic Discussion Series, 2005-51, Federal Reserve Board.
- Risksbank (2015). *Digitalisation and inflation*, Monetary Policy Report, February, pp. 55-59.
- Roldán, P., and S. Gilbukh (2018). *Firm dynamics and pricing under customer capital accumulation*, Working Papers, no. 1838, Banco de España.
- Rosas, E., and T. López (2018). "Inflación e incertidumbre inflacionaria: la postura del Banco de México, 1969-2017", *Revista Finanzas y Política Económica*, 10, pp. 348-372.
- Stevens, A., and J. Wauters (2018). *A time-varying parameter Phillips curve model*, National Bank of Belgium.
- Stock, J., and M. Watson (2007). "Why has US inflation become harder to forecast?", *Journal of Money, Credit and Banking*, no. 39, pp. 3-33.
- Williams, J. (2006). *Monetary policy in a low inflation economy with learning*, Working Paper Series, 2006-30, Federal Reserve Bank of San Francisco.

THE EFFECT OF RECENT ECB MONETARY POLICY MEASURES ON LONG-TERM INFLATION EXPECTATIONS

Inflation expectations play a key role in the price and wage setting process. Inflation-linked financial assets, which include a price for the protection they provide against future inflation, and which are available daily, are a valuable source of information for estimating agents' future inflation expectations. Inflation swaps are financial contracts in which one party undertakes to pay a multiple of inflation up to a certain date, in exchange for a set amount paid by the other party. This set amount can be understood as compensation for protection against future inflation, and as such contains important information on investor expectations. However, the information content of the price of these assets is clouded by the fact that, like any other form of insurance, it includes a premium for transfer of the risk and a liquidity premium. One alternative for measuring inflation expectations are the various surveys drawing on private analysts' expectations. The advantage of these surveys is that they avoid the problem of the risk and liquidity premia. The drawback is that they are less frequent, generally quarterly, which limits their usefulness for analysing monetary policy.

A recent Banco de España article¹ proposed a measure for long-term euro area inflation expectations combining both sources of information, i.e. surveys and financial market data. The surveys used are the Consensus Forecast surveys, the ECB's Survey of Professional Forecasters and the inflation flash estimate. Chart 1.1 depicts long-term euro area inflation expectations (five-year forward inflation five years ahead, or in other words, in between six and ten years' time), from which the estimated risk premium has been excluded. The chart shows that inflation expectations have remained clearly below 2% since 2005 (the first date from which the data availability permits this analysis) to date.

Over the course of the period studied, there were two notable dips in these inflation expectation indicators. The first, in 2008-09, during the global financial crisis following the collapse of Lehman Brothers, was very marked. The second, between 2013 and early 2015, was much more gradual and gave rise to growing concern regarding a possible deanchoring of expectations in the euro area. In both cases the ECB introduced non-standard monetary

policy measures to reverse the downward inflation trajectory. These measures generally proved effective, reversing the change observed. In particular, the launch of the ECB's asset purchase programme (the public sector purchase programme or PSPP) in early 2015 marked a turnaround in the long-term expectations, which have risen gradually since then, fortified by the subsequent extensions to the programme. Accordingly, in mid-2018, long-term inflation expectations were similar to those observed between 2005 and 2007 (and in 2011-12).

However, during 2018 Q4 long-term inflation expectations declined, against a backdrop of marked deterioration of euro area economic growth forecasts. This downturn in inflation expectations is still too incipient for firm conclusions to be drawn on its degree of persistence. In any event, the change observed demands that closer attention be paid to the possible signs emanating from these indicators, in order to correctly calibrate the future monetary policy stance.

Chart 1.2 presents a similar analysis for the United States. Here, long-term inflation expectations are much higher than in the euro area: around 2.5% before the crisis and around 2.3% since the start of monetary normalisation. This difference is consistent with the US economy's more advanced cyclical position, although there may also be other contributory factors. The chart shows that in the United States also, the various non-standard monetary policy measures introduced had varying impacts on inflation expectations. The slump in inflation expectations following the global financial crisis was successfully offset by the quantitative easing (QE) programmes.² Moreover, as is now happening in the euro area, when the net asset purchases came to an end inflation expectations also declined, although they ultimately reversed, so that expected inflation has steadied at just over 2.3%.

To conclude, following the crisis the monetary policies of the main economies have had to offset certain downward moves in inflation expectations, using measures not until then included among central banks' tools, in order to steady this key component of the price and wage setting process.

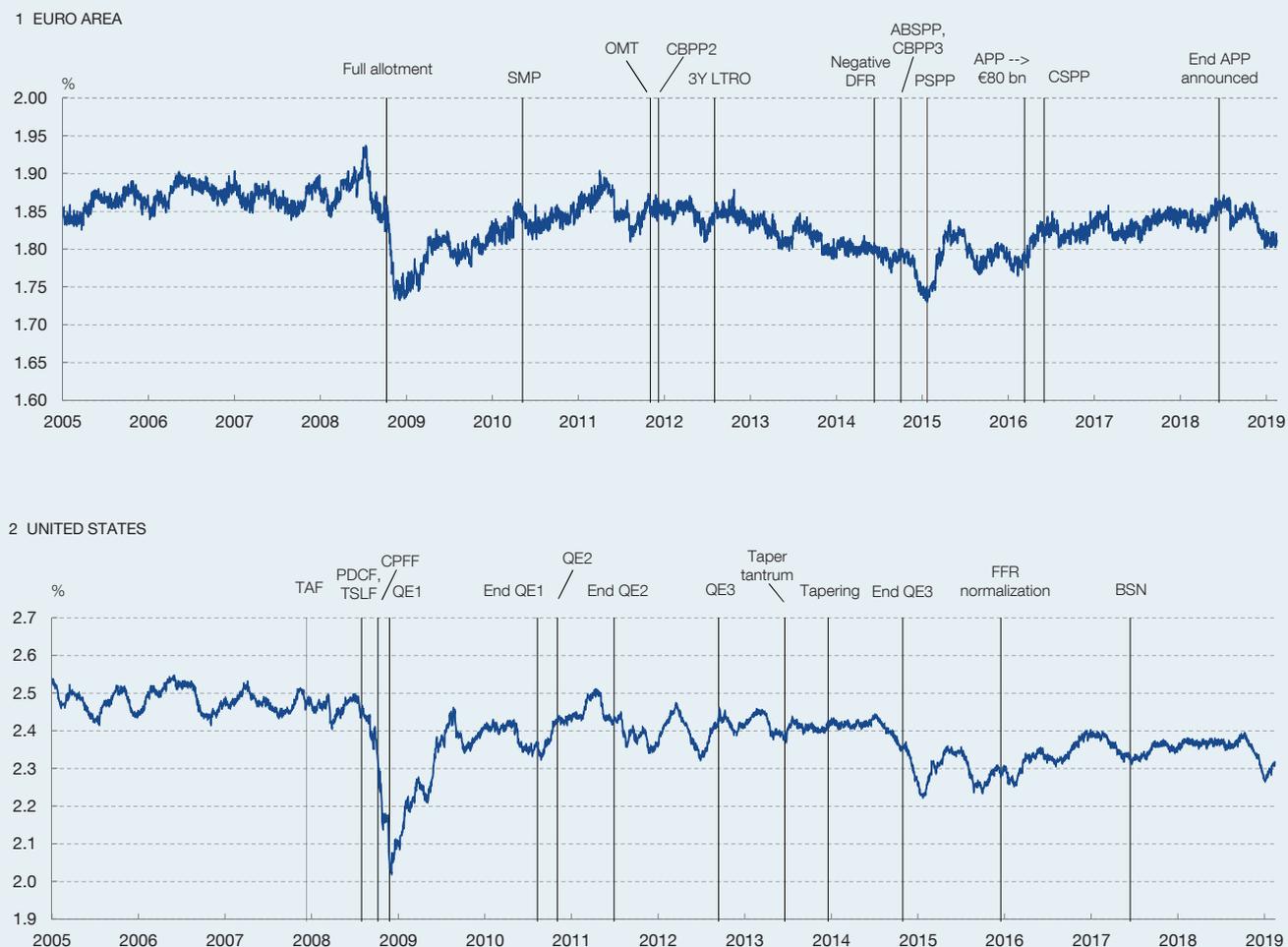
1 See R. Gimeno and E. Ortega (2018), "Euro area inflation expectations", *Economic Bulletin*, 1/2018, Banco de España.

2 See R. Reis (2016), *Funding Quantitative Easing to Target Inflation*, CEPR Discussion Paper No. DP11505.

THE EFFECT OF RECENT ECB MONETARY POLICY MEASURES ON LONG-TERM INFLATION EXPECTATIONS (cont'd)

Chart 1
MARKET INFLATION EXPECTATIONS IN THE EURO AREA AND THE UNITED STATES

The Eurosystem’s non-standard monetary policy measures proved effective in reversing the downward path of long-term inflation expectations in the euro area, both when they fell sharply during the global financial crisis in 2008-09 and when they declined more gradually between 2013 and early 2015, when concerns arose regarding a possible deanchoring of expectations in the euro area. In the United States, non-standard monetary policy measures also shaped long-term inflation expectations, to a varying extent.



SOURCE: Banco de España, based on swap rates at different terms supplied by Datastream.

STRUCTURAL FACTORS AND INFLATION DYNAMICS

Recent literature has identified a set of factors that could be pushing global inflation rates persistently downwards, particularly in advanced economies. Noteworthy among these factors are the structural consequences of population ageing, the globalisation process (with greater trade openness and exposure to international competition) and the impact of new technologies (digitalisation and new forms of trade).

In particular, the process of population ageing in advanced economies could contribute to a more reduced trend inflation through several channels, as described in Chapter 4 of this report. First, the weight in the older population’s consumption basket of the more inflationary goods and services is, overall, comparatively lower than for other age groups, leading to lower general price increases owing to a composition effect. Also, since the accumulation of net

Chart 1
FACTORS CONDITIONING INFLATION IN THE LONG TERM

Demographic changes and globalisation may affect inflation dynamics. The so-called “digital revolution” is also one of the global factors that might be inducing downward pressure on prices.

1 WORLD TRADE IN GOODS AND SERVICES (REAL)
Volume index



2 IMPORT PRICES IN REAL TERMS (a)



3 ANNUAL TECHNOLOGICAL PRODUCT INFLATION IN SPAIN AND IN THE EURO AREA (b)



4 CONTRIBUTION OF TECHNOLOGICAL PRODUCTS TO OVERALL INFLATION IN SPAIN AND IN THE EURO AREA



SOURCES: ECB Digitalisation Survey, Eurostat and ECB calculations.

- a Unit value indices of imported goods.
- b Technological products: telephone and fax equipment and services, and audiovisual, photographic and information processing equipment.

wealth generally increases with age, a larger proportion of elderly people could lead to a greater counter-inflationary bias in society and, therefore, to more support for counter-inflationary monetary policies. Population ageing may drive average wage growth downwards, given that wages tend to grow at the start of a person's working life and are relatively steady towards the end. Additionally, there is recent evidence that the greater labour supply for workers between 55 and 64 years old generates downward pressures on wage growth.¹

Population ageing also affects the natural rate of interest by lowering it, since it induces people to save more during their working life to be able to finance their retirement. A very low natural rate of interest conditions the effectiveness of monetary policy by making it more difficult, in a low inflation environment, for the real interest rate to stand at levels aligned with the natural rate. Chapter 3 of this report examines in detail the role played by the natural rate of interest in monetary policy strategies and the importance of demographic factors for its determination. Also, according to the estimates presented in that chapter, the natural rate of interest was negative in the euro area during the past decade, hindering the ability of conventional monetary policy to combat low inflation, since in such a situation nominal interest rates aligned with their lower bound with very limited room for further reductions would not suffice to generate the inflationary effects desired. In this situation, unconventional monetary policy was what provided expansionary stimuli to try to approximate the inflation observed to its medium-term target.

Globalisation also contributed to reducing global inflation rates, through several channels. Specifically,² both

greater trade openness (see Chart 1) and the development of global value chains – reflected in an increase in the weight of trade in intermediate goods and services in the total – contributed to reducing inflation sensitivity to internal supply and demand conditions against a background of more synchronised world economic activity. Additionally, globalisation limited price and wage increases, mainly in those sectors more exposed to international competition.

The so-called “digital revolution” is another global factor that could be giving rise to downward pressures on price changes.³ First, the development of information and communication technologies leads to direct cost savings in the production of genuinely digital consumer goods and services (such as software or communication services), and to indirect cost savings through the use of the latter as intermediate consumption in the production of other consumer goods and services. Second, aside from the cost channels, increasingly widespread electronic trading may affect consumer prices through both direct channels (owing to lower operating costs for internet-based firms) and indirect channels (owing to greater price transparency and a higher degree of competition in goods and services purchased online). A recent ECB survey of non-financial corporations in the euro area confirms that the new technologies provide firms with more flexibility for reducing costs.⁴

The decrease in the level of inflation in recent decades was accompanied by a significant fall in uncertainty over price changes. Chart 2 shows that it is estimated that inflation volatility in the euro area has declined since the 1980s.⁵ This lower uncertainty can be largely associated

1 See B. Mojon and X. Ragot (2019), *Can an Ageing Workforce Explain Low Inflation?*; BIS Working Paper 776.

2 See, among others, T. Helbling, F. Jaumotte and M. Sommer (2006), “How has globalization affected inflation?”, *IMF World Economic Outlook*, Chapter 3.

3 See C. Elding and R. Morris (2018), “Digitalisation and its impact on the economy: insights from a survey of large companies”, *ECB Economic Bulletin* 7/2018.

4 See C. Elding and R. Morris (2018), “Digitalisation and its impact on the economy: Insights from a Survey of Large Companies”, *ECB Economic Bulletin* 7/2018.

5 Estimated in the context of the decomposition model presented in D. Leiva-León, J. J. Pérez, G. Pérez-Quirós and A. Urtasun (2019), *Structural Instabilities in the Euro Area*, Banco de España Working Paper (forthcoming). Similar results for the aggregate euro area can be found in G. M. Caporale, L. Onorante and P. Paesani (2010), *Inflation and Inflation Uncertainty in the Euro Area*, ECB Working Paper 1229. The results for the euro area countries taken individually corroborate the estimation for the euro area as a whole [see, in particular, M. Correa-López, M. Pacce and K. Schlepper (2019), *Exploring Trend Inflation Dynamics in Euro Area Countries*, Banco de España Working Paper 1909]. In J. Stock and M. Watson (2007), “Why Has US Inflation Become Harder to Forecast?”, *Journal of Money, Credit and Banking*, 39, pp. 3-33, evidence is provided that a similar process took place in the United States.

STRUCTURAL FACTORS AND INFLATION DYNAMICS (cont'd)

with the preparation and launch of the monetary union, which involved a step towards a monetary policy regime more geared towards price stability than the preceding regime, especially in periphery countries.⁶ A similar phenomenon also occurred in most advanced economies.

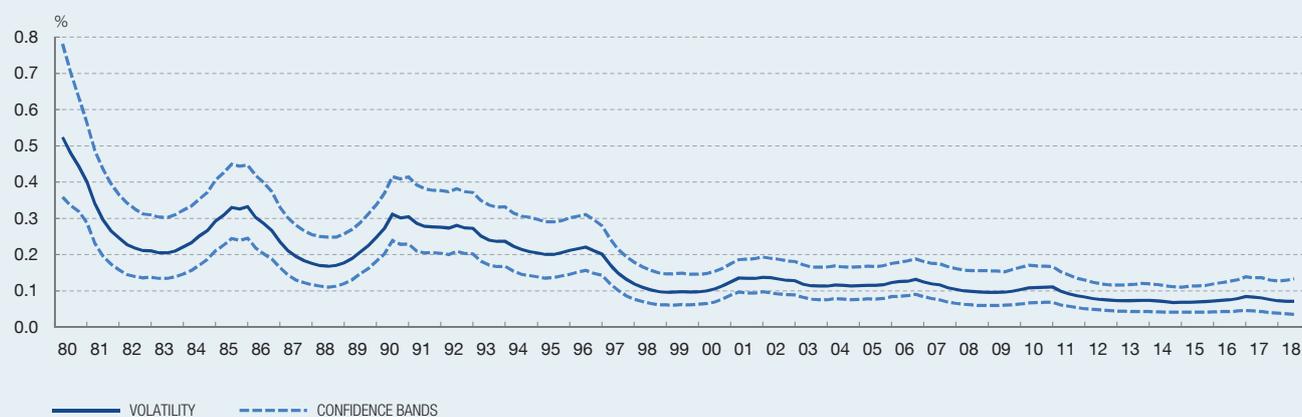
The literature suggests that there is a positive relationship between the degree of inflation uncertainty and the level of inflation.⁷ In an environment of low inflation uncertainty, a shock impacting this variable (upwards or downwards)

allows for a more precise response from the monetary authority, which therefore generates certainty about future developments in the pace of price changes. In this connection, a central bank with a commitment to price stability may also reduce this uncertainty. However, some analyses also suggest that, in this environment of lower uncertainty over inflation the effectiveness of monetary policy could be hampered because a central bank's ability to generate inflation surprises would be lower.

Chart 2
STOCHASTIC VOLATILITY IN EURO AREA INFLATION

The decline in the level of inflation has been accompanied by a significant decrease in uncertainty over price changes.

INFLATION VOLATILITY IN THE EURO AREA



SOURCES: ECB and Banco de España [Leiva-León, Pérez, Pérez-Quirós and Urtasun (2019b)].

6 See M. Evans and P. Wachtel (1993), "Inflation Regimes and the Sources of Inflation Uncertainty", *Journal of Money, Credit and Banking*, 25, pp. 475-511.

7 This relationship is called the Friedman-Ball hypothesis [see M. Friedman (1977), "Nobel Lecture: Inflation and Unemployment", *Journal of Political Economy*, 85, pp. 451-472, and L. Ball (1992), "How Does Inflation Raise Inflation Uncertainty", *Journal of Monetary Economics*, 29, pp. 371-388]. In connection with theoretical arguments and empirical evidence in favour of this hypothesis, see the revisions of economic references about these issues in Caporale, Orante and Paesani (2010) *op. cit.* and E. Rosas and T. López (2018), "Inflación e incertidumbre inflacionaria: la postura del Banco de México, 1969-2017", *Finanzas y Política Económica* no. 10, pp. 348-372. Nonetheless, the literature is inconclusive about the existence of a causal relationship between the two variables, as it depends on the institutional framework in which monetary policy is conducted.

GLOBAL FACTORS AND THE INTERDEPENDENCE OF INFLATION

Recent decades have witnessed an increase in the degree of interdependence among the various economies, which is associated with growing economic and financial integration between countries. This globalisation process is impacting not only real but also nominal macroeconomic variables, such as inflation.

There are different factors which prompt some interdependence between the different countries' inflation rates:

Fluctuations in commodity prices which are determined in global markets and affect many countries simultaneously.

Since inflation rates are connected, inflation expectations in the different economies and monetary policies will also be connected.

The global synchronisation of the different economies' business cycles results in some interrelationship of inflation fluctuations through the Phillips curve mechanism, which relates inflation to national business cycles.

The above-mentioned mechanism is strengthened when the inflation of an economy not only hinges on national business cycles but also on the global business cycle.

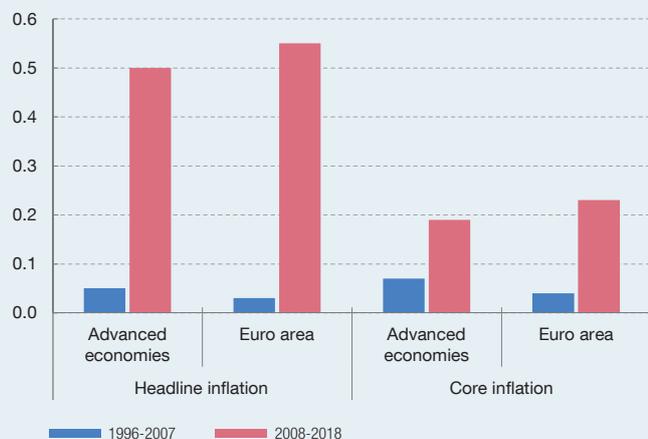
Some technological innovations may simultaneously bring about productivity gains in different economies.

To illustrate changes in the interdependence of inflation rates, Chart 1 shows a measure of this interconnection for a broad range of advanced economies and for the euro area economies.¹ The upper bound of this measure is 1 and the lower bound is 0 and, the higher its value, the

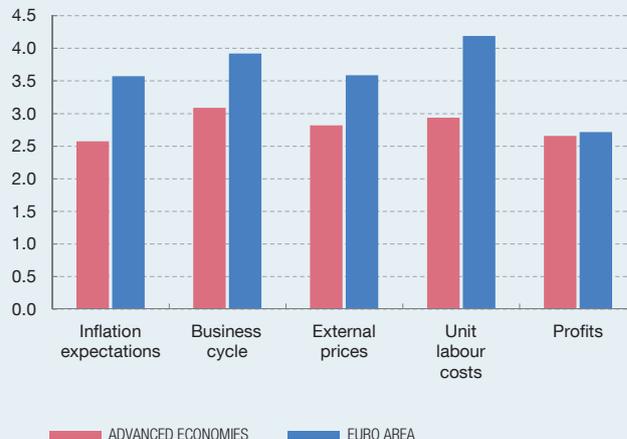
Chart 1
THE INTERDEPENDENCE OF INFLATION

The interdependence of inflation between countries is estimated to have increased significantly in the post-crisis period and would be higher for headline inflation than for core inflation. The interdependence could be attributed to comovements of inflation expectations, the economic cycle, external prices and unit labour costs.

1 GLOBAL INTERDEPENDENCE OF INFLATION RATES (a)



2 DETERMINANTS OF THE INTERDEPENDENCE OF INFLATION (b)



SOURCES: Eurostat, OECD and Banco de España.

a Estimates for different sample periods.

1 For more details see L. J. Álvarez, L. Gadea and A. Gómez-Loscos (2019b), *Inflation Interdependence in Advanced Economies*, Banco de España Working Paper (forthcoming). A sample of 24 advanced economies is used for the period 1996-2018. The measure of interdependence used is that proposed in J. Stock and M. Watson (2018), "The Evolution of National and Regional Factors in US Housing Construction", in T. Bollerslev, J. Russell and M. Watson (Eds.), *Volatility and Time Series Econometrics: Essays in Honor of Robert F. Engle*, Oxford University Press. See also M. Carney (2017), *Globalisation and Inflation*, speech given at the 2017 IMF Michel Camdessus Central Banking Lecture.

GLOBAL FACTORS AND THE INTERDEPENDENCE OF INFLATION (cont'd)

greater the degree to which the inflation rates are interconnected. As the chart shows, interdependence in the period before the global financial crisis was very small, both in the advanced economies as a whole and in the euro area countries. However, in the post-crisis period, the interdependence of inflation between countries has increased significantly. In addition, a reflection of the greater trade and financial integration of euro area countries is that the degree to which they are interconnected is higher than in the advanced economies as a whole. Also, the degree of interdependence observed is higher for headline inflation than for core inflation since the former includes food and energy product prices, which are more closely linked to prices in global commodity markets.

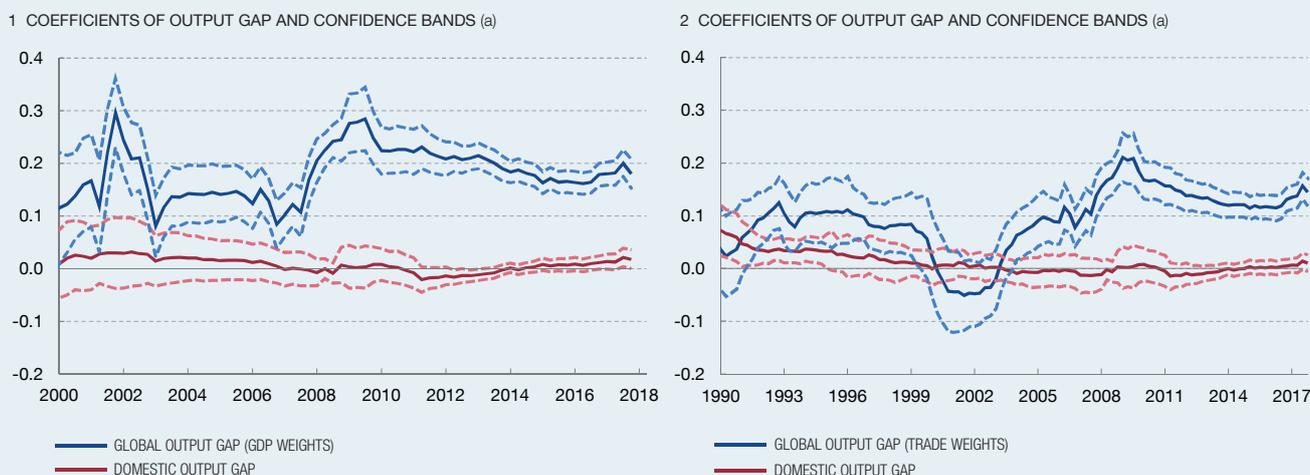
To shed some light on the macroeconomic variables which explain the degree of interdependence, Chart 1

shows the findings of a statistic which determines whether the interdependence between the variables is similar to that observed in headline inflation. Specifically, the findings obtained identify five significant variables, which include the three usual variables in neo-Keynesian open-economy models (i.e. inflation expectations, slack and external prices), together with unit labour costs and profit margins. Similarly, it can be seen that these variables explain the interconnection of inflation in euro area countries more accurately than in advanced economies as a whole.

As regards the significance of global factors in explaining national inflation rates, the globalisation hypothesis assumes that, as countries increase their economic integration, the global business cycle may be an increasingly important factor in determining national inflation.² In order to take into account the impact of

Chart 2
IMPACT OF GLOBAL FACTORS ON PHILLIPS CURVE

Global output gap measures have gained relatively more importance with respect to the domestic output gap in determining inflation, especially since the beginning of the 21st century. The impact is greater when we calculate the global output gap weighted by the PPP based GDP weights, which suggests that large emerging low-cost economies are gaining importance in determining domestic inflation.



SOURCES: Datastream and Banco de España.

a The coefficients are estimated on the basis of a sample of 22 OECD countries and China.

2 See J. Ha, M. A. Kose and F. Ohnsorge (2018), *Inflation in Emerging and Developing Economies: Evolution, Drivers and Policies*, World Bank; C. Borio and A. Filardo (2007), *Globalisation and Inflation: New Cross-country Evidence on the Global Determinants of Domestic Inflation*, BIS Working Paper, 227; and I. Mikolajun and D. Lodge (2016), *Advanced Economy Inflation: the Role of Global Factors*, ECB Working Paper, 1948.

GLOBAL FACTORS AND THE INTERDEPENDENCE OF INFLATION (cont'd)

global phenomena, Phillips curves have been estimated³ considering measures of global output gaps and external prices (see Chart 2). Specifically, measures of global output gaps specific to each economy are used. The weights are derived from the breakdown of foreign trade by country,⁴ and, alternatively, from the importance of each country in the global economy, in terms of GDP expressed in purchasing power parities. The results obtained show that global slack measures are significant for determining short-term inflation and that their importance in comparison with the domestic output gap has increased over the present century. In addition, the relative importance of global slack measures for inflation increases when the second weighting method is used

(based on the weights in global GDP), which suggests that competition from large emerging low-cost economies, such as China or India, might be exerting downward pressure on global inflation.

It should be noted that the importance of global factors such as those presented in this box has implications for monetary policy. On the one hand, the importance of these factors requires monetary authorities to pay increasing attention to activity and to international prices. On the other, in a world where economies are increasingly interconnected and where inflation largely responds to global factors, the effectiveness of the different central banks' monetary policies in controlling national inflation might be hampered.

3 The specification is a Phillips curve with adaptive expectations where the dependent variable is quarter-on-quarter percentage changes in the CPI and our variables of interest are the domestic and global output gaps, the latter with weights deriving both from trade relationships and from GDP weights in the purchasing power parity. Regressions are estimated using a ten-year window and country fixed effects. Quarter-on-quarter percentage changes of import, food and energy prices, the real and nominal exchange rate and four inflation lags, which were selected based on information criteria, were introduced as control variables. The sample used comprises 23 countries and the sample period ranges from 1980 to 2017.

4 See Borio and Filardo (2007), *op. cit.*

WAGE FORMATION IN A LOW INFLATION ENVIRONMENT

Wage formation is driven, among other factors, by inflation expectations. Insofar as the latter have been influenced by the low inflation rates in the Spanish economy in recent years, the result will have been lower upward pressure on nominal wages. This mechanism is more important in countries, like Spain, in which the coverage of collective bargaining is greater.

In particular, the low inflation of recent years may have been a key factor in explaining the lesser degree of indexation of wages to price developments, which has been a very notable change in the wage formation process in recent years. Traditionally, the system of collective bargaining in Spain was highly linked to past

inflation through two channels. First, the wage increases under multi-year agreements were highly indexed to past inflation. Second, approximately three-quarters of collective agreements had indexation clauses providing for compensation for deviations of actual inflation from the inflation forecast at the time the agreement was signed. Recently, however, there has been a very significant reduction in the use of these clauses, which have been present in less than 20% of the collective agreements signed over the last four years (see Chart 1).

Of the various factors that may explain this steep reduction, low inflation seems to stand out, according to

Chart 1
WORKERS WITH INFLATION INDEXATION CLAUSE



Chart 2
MODEL-BASED PHILLIPS CURVE BREAKDOWN
Deviations from period average

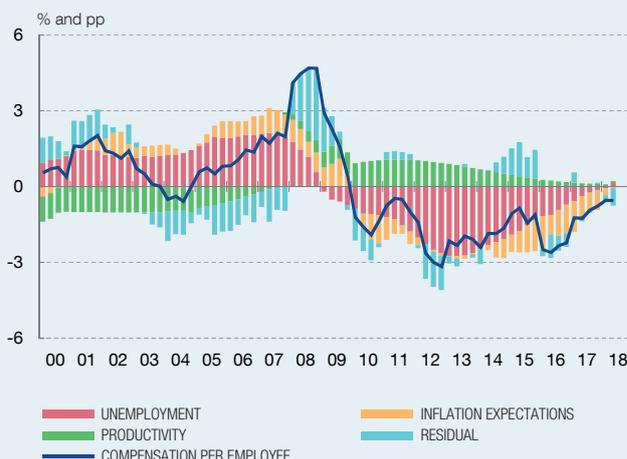


Chart 3
DISTRIBUTION OF WAGE GROWTH IN 2008
Full-time employees working two years running for the same firm

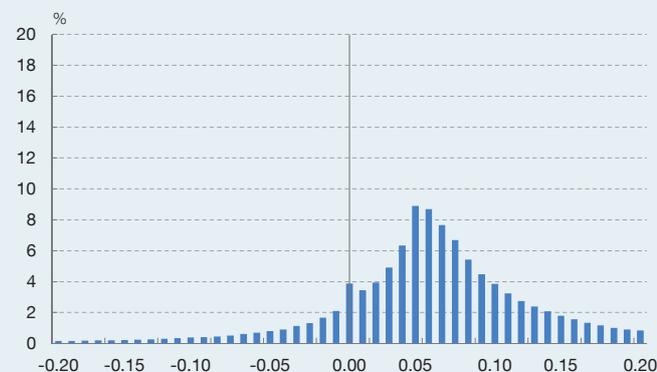
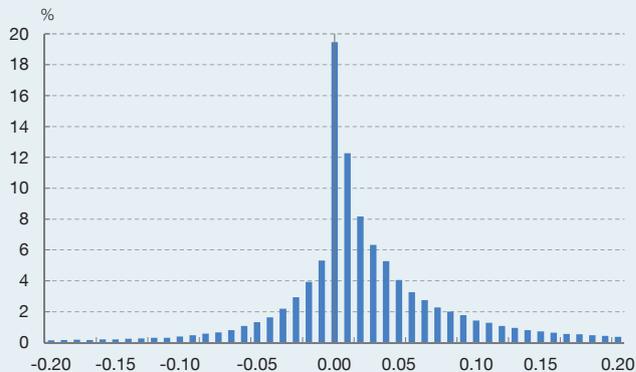


Chart 4
DISTRIBUTION OF WAGE GROWTH IN 2015
Full-time employees working two years running for the same firm



SOURCES: Ministerio de Trabajo, Migraciones y Seguridad Social, INE, Continuous Sample of Working Histories and Banco de España.

WAGE FORMATION IN A LOW INFLATION ENVIRONMENT (cont'd)

the latest wave of the survey conducted by the Wage Dynamics Network.¹

One of the effects of low inflation rates is that they may hamper downward wage adjustment in response to adverse shocks. The empirical evidence available points to the existence of nominal rigidities that make it difficult for nominal wages to fall. In a persistently low inflation environment, this means that wages cannot be reduced in real terms. Indeed, since the start of the crisis and in the context of very low inflation, there has been a growing incidence of wage freezes. Charts 3 and 4 show that between 2008 and 2015 the proportion of workers whose wages grew at 0% increased very significantly, to 25%. This may be indicative of the presence of obstacles that have limited the possibility of negative rates of change in compensation during this period.

Chart 2 shows the factors that explain actual wage developments, according to a breakdown based on a Phillips curve model. This model relates wage growth in the economy as a whole to a number of determinants, including inflation, productivity and indicators of labour market slack. As can be seen, the high level of unemployment was the main factor restraining wage rises between 2008 and 2012. However, from 2014, low inflation played a very significant role in explaining the low growth of compensation per employee, against a background of

gradual economic recovery and declining unemployment. This factor contributed significantly (along with the high degree of slack that continues to characterise the labour market) to the fact that observed wage growth from that year onwards has been two percentage points lower than on average since the year 2000.²

In the latest period, negative residuals have begun to appear in the estimated wage equation, i.e. wages have grown somewhat less than would have been expected given the behaviour of their usual determinants. However, these residuals tend to disappear when broader measures of cyclical slack are used that take into account, in addition to the unemployed, those working part-time involuntarily and discouraged job-seekers who have withdrawn from the labour market as a result of their inability to find a job. In any event the reaction of wages to unemployment or, more generally, the cyclical conditions of the economy is low in Spain, as testified by the scant dispersion of wage growth observed across sectors of activity, which is well below that seen in employment and productivity.³

These findings on the wage determination process can be usefully supplemented by an analysis of individual worker data, since at this level, unlike at the aggregate level, possible changes in employment composition can be controlled for. In particular, research has been carried out

Table 1
ELASTICITY OF REAL WAGES WITH RESPECT TO UNEMPLOYMENT (SEVEN PHASES)

	Recession low unemployment (1)	Recession high unemployment pre-2009 (2)	Recession high unemployment 2009-2012 Q1 (3)	Recession high unemployment post-2012 Q2 (4)	Expansion high unemployment pre-2013 (5)	Expansion high unemployment post-2013 (6)	Expansion low unemployment (7)
Coefficients	0.097 (0.077)	0.053 (0.068)	-0.084* (0.046)	-0.260*** (0.038)	-0.104* (0.060)	-0.159*** (0.041)	-0.063 (0.087)

SOURCES: Labour Force Survey (INE) and Continuous Sample of Working Histories.

NOTE: *, **, *** statistically significant at 0.10, 0.05 and 0.01, respectively.

1 See M. Izquierdo and J. F. Jimeno (2015), *Employment, Wage and Price Reactions to the Crisis in Spain: Firm-level Evidence from the WDN Survey*, Occasional Paper 1503, Banco de España.

2 See P. Cuadrado and F. Tagliati (2018), "Wage moderation in Spain and in the euro area", *Economic Bulletin*, 4/2018, Banco de España.

3 See, for example, Box 5 of the "Informe trimestral de la economía española", *Boletín Económico*, December 2014, Banco de España.

WAGE FORMATION IN A LOW INFLATION ENVIRONMENT (cont'd)

to see whether the cyclical response of real wages to unemployment has changed during the recent period of low inflation, taking into account, moreover, whether the unemployment rate is above or below average.⁴ In addition, the reaction of wages during the crisis has been distinguished for the periods before and after 2012, in order to investigate the possible effects of the labour reform of that year. Finally, the current phase of economic recovery has been compared with a similar expansionary period in the past, in which unemployment was high, but decreasing.

The main results of these exercises are shown in Table 2.1. First, the responsiveness of wages in Spain to cyclical

changes in unemployment is generally found to be low (and below that estimated for other countries with similar data). That said, it increased in the stage immediately after the 2012 labour market reform, probably reflecting the impact of the various measures approved to increase firm-level flexibility. As regards the recent period of recovery, the elasticity of wages with respect to the business cycle (-0.16) is somewhat higher than in similar cyclical phases in the past (-0.10), although the difference is not statistically significant. Thus, it may be concluded that, at least on the basis of the information available to end 2017, wage formation patterns have not changed significantly, as regards their traditionally relatively low level of cyclical sensitivity.

4 Following P. Font, M. Izquierdo and S. Puente (2015), "Real Wage Responsiveness to Unemployment in Spain: Asymmetries along the Business Cycle", *IZA Journal of European Labor Studies*, (2015) 4(13).