Recent changes in investment in Spain from a macroeconomic perspective

Rationale

Cyclical fluctuations in investment are usually sharper than fluctuations in other components of aggregate demand. This article aims to analyse, based on an econometric model, the role played by interest rates, demand and agents' confidence (the drivers traditionally studied in the literature) in the behaviour of investment under such atypical cyclical circumstances as those derived from the pandemic and the energy crisis.

Takeaways

- The results show that investment responds negatively to interest rate rises, while enhanced agents' confidence and greater demand have the opposite effect.

- In the absence of new shocks, the bulk of the impact of interest rates on investment occurs with a lag of several quarters, whereas agents' confidence and demand operate with shorter lags. Given these lags, the interest rate increases and the decline in confidence which took place in 2022 appear to have had a negative effect on investment in 2023, partially offset by the positive impact of the buoyancy of demand recorded last year.

- In order to analyse the changes in investment, the effects deriving from any shocks that may arise this year, including those deriving from the variables analysed in this article and other shocks not addressed in this model, should be added to the above-mentioned effects.

Keywords

Investment, impulse response function, monetary policy, confidence

JEL classification

E22, E43, C11, C32.

Authors:

Pablo Aguilar
Economic Developments Department
Banco de España

Corinna Ghirelli
Economic Developments Department
Banco de España

Blanca Jiménez-García
Economic Developments Department
Banco de España

Introduction

Investment has traditionally been a major topic of economic research.[1] First, it is an essential driver of long-term economic growth. Second, it intensifies economic cycles, given its procyclical and volatile nature. As regards the latter aspect, the changes in investment since the onset of the pandemic have been greater than those in total GDP[2] (see Chart 1, where sharper fluctuations are observed in investment than in demand, both in times of growth (values above 0) and in times of economic contraction (values below 0)). Following a sharp decline at the start of the health crisis, investment experienced an equally robust recovery as demand improved and uncertainty eased, in a setting also characterised by investment-friendly financial conditions.[3] However, it gradually lost momentum in 2022 H2. A priori, this can be attributed, inter alia, to the fall in agents' confidence and the worsening of growth prospects for Spain, amid enormous geopolitical uncertainty.

This article aims to analyse how three determinants of investment traditionally addressed in the literature (interest rates, agents' confidence and demand) can explain recent developments in investment and the extent to which they could influence investment dynamics in the short term. However, other factors with a potential impact on investment have not been considered in this analysis. These include, for example, production bottlenecks and the development of projects associated with Next Generation EU (NGEU) funds.

Firstly, according to the accelerator theory, firms will tend to invest if they observe an increase in demand for the goods and services they produce and they expect this increase to be sustained over time, leading to the full use of their installed capacity.

Secondly, the literature notes the importance of agents' expectations about the future changes in the economy as a driver of investment. In a Keynesian theoretical framework, expectations are the main drivers of economic cycles.[4] In empirical research, such expectations are usually proxied using confidence indicators obtained from surveyed firms. The economic sentiment indicators improved steadily as the economy gradually re-opened after the pandemic, between 2020 H2 and end-2021. However, 2022 saw a deterioration in the economic growth outlook as a result of

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1 Some examples of previous papers on investment are M. Andersson, C. Di Stefano, Y. Sun and F. Vinci (2022), J. González Mínguez, D. Posada and A. Urtasun (2014), and WGEM Team on Investment (2018).

2 In this article, investment in real terms is defined as gross fixed capital formation, excluding the public and private construction component. Therefore, it includes investment in capital goods (machinery and transport equipment), non-cultivated biological resources and intellectual property products. This definition has been used, for instance, in an analysis by M. Andersson, C. Di Stefano, Y. Sun and F. Vinci (2022), which explains recent developments in investment in several euro area countries.
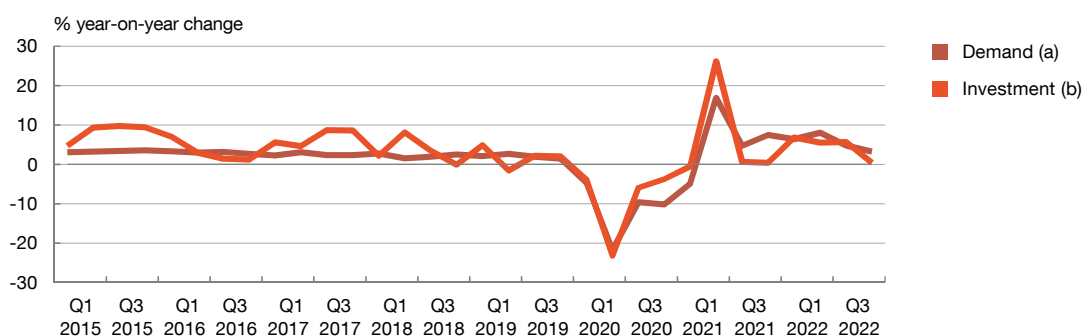
3 P. Aguilar, O. Arce, S. Hurtado, J. Martínez-Martín, G. Nuño and C. Thomas (2020) detail the monetary policy measures implemented by the ECB in the early months of the pandemic, and their impact on financial conditions and economic activity in Spain and in the euro area as a whole.

4 See Dées and Zimic (2016). In Keynesian theory, the main drivers of investment are expectations about future investment yields (whose fluctuations are the result of "animal spirits").

Chart 1
Recent changes in economic activity in Spain

1.a Recent changes in economic activity

% year-on-year change

Legend:
- Demand (a)
- Investment (b)

X-axis: Q1 2015, Q3 2015, Q1 2016, Q3 2016, Q1 2017, Q3 2017, Q1 2018, Q3 2018, Q1 2019, Q3 2019, Q1 2020, Q3 2020, Q1 2021, Q3 2021, Q1 2022, Q3 2022

SOURCES: INE and Banco de España.

a Demand is calculated as GDP excluding the investment without construction component.
b Investment relates to gross fixed capital formation without construction.

the energy crisis and Ukraine's invasion, which seems to have adversely affected business expectations and, therefore, investment (see Chart 2).

Lastly, monetary policy is a key factor for explaining changes in investment, as it determines the cost of financing, which is a variable firms must take into account when making decisions about fixed capital expenditure.[5] In addition, by changing firms' debt burden from past borrowing (in the case of variable interest rate debt), interest rate fluctuations determine the volume of cash flows available for investment. In this connection, the monetary policy stance in the euro area has tightened since end-2021 in response to the severe bout of inflation of mid-2021 (see Chart 3). The resulting interest rate hike appears to have adversely affected investment.

The rest of the article uses an empirical model to quantify the contribution of the three drivers mentioned (interest rates, confidence and demand) to the developments in investment observed in Spain.

Methodology and data

To analyse the extent to which these three factors have influenced recent developments in investment, this article uses a structural vector autoregressive (SVAR) model. This type of model is useful to capture the inertial behaviour of economic aggregates and to study the pass-through of the different shocks to them, as well as their subsequent persistence. More specifically, a SVAR helps quantify the contribution of different shocks to the change in the variable of interest (in this case, investment).

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5 See, inter alia, E. Durante, A. Ferrando and P. Vermeulen (2020). Although the real interest rate is the determinant in investment models, the nominal interest rate has been considered in this exercise, as it is considered the most significant variable.
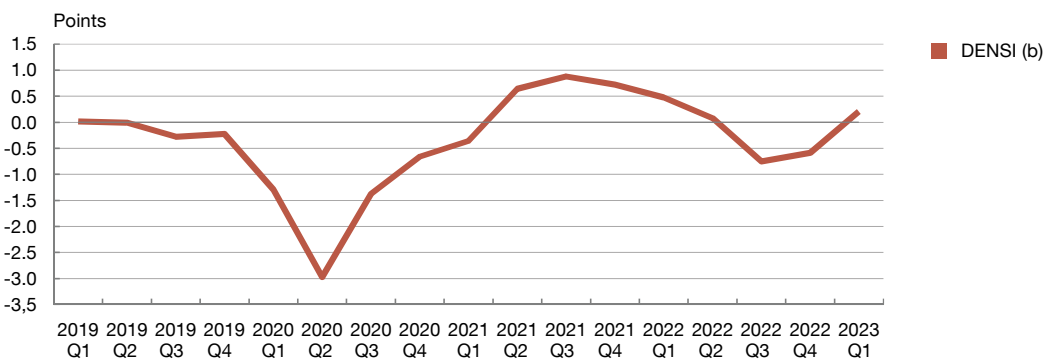
Chart 2
Recent changes in confidence in Spain

2.a Confidence indicators

Points
Points (a)

- Industrial confidence indicator
- Manufacturing output PMI (r-h scale)
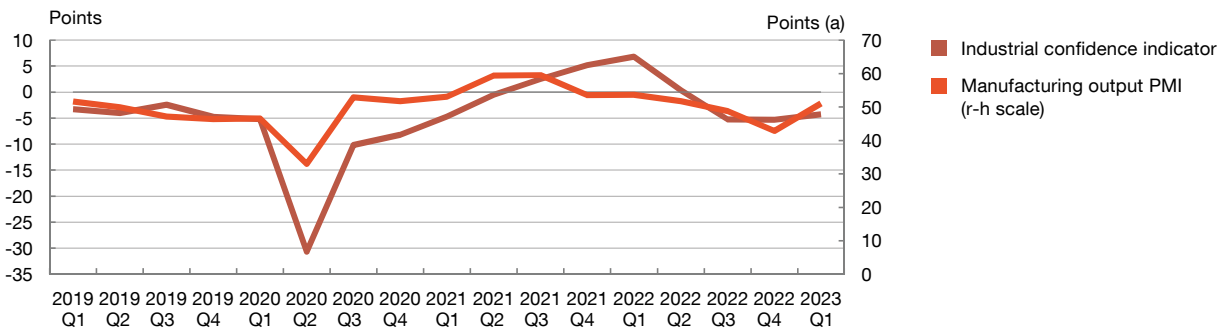
2.b Economic sentiment indicator

Points

- DENSI (b)

**SOURCES:** European Commission, S&P Global and Banco de España.

a A level above 50 points indicates growth.
b DENSI is an economic sentiment indicator for agents based on news in the press, where values above 0 indicate a higher-than-average economic sentiment. For further details, see Aguilar, Ghirelli, Pacce and Urtasun (2021).

DESCARGAR

Gráfico 3
Recent interest rate changes in Spain

3.a Recent changes in nominal interest rates

%

- 3-month EURIBOR
- 12-month EURIBOR
- NFC rate

SOURCE: Banco de España.

DOWNLOAD
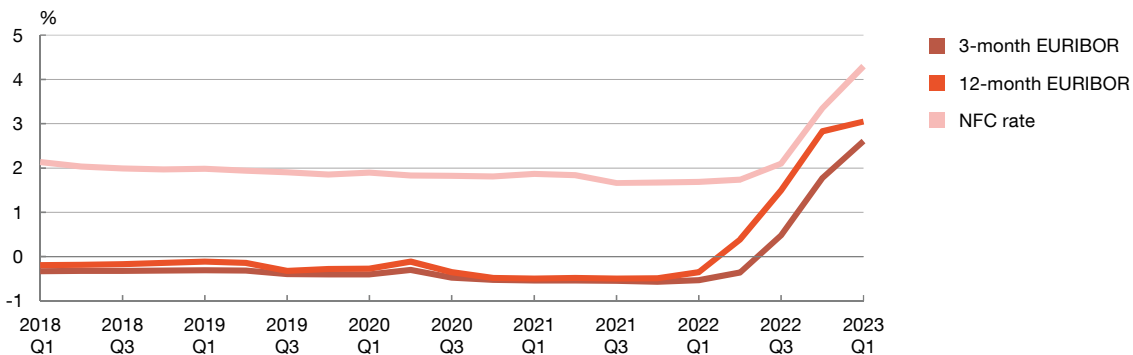
In this specific case, the variables in the model include, first, the quarter-on-quarter growth rates of investment, defined, as mentioned earlier, by the total gross fixed capital formation discounting construction.[6] Meanwhile, the drivers of investment are changes in demand, agents' confidence and the monetary policy stance, variables which are proxied through the quarter-on-quarter growth rate of GDP excluding investment, the Daily Economic News Sentiment Indicator (DENSI)[7] and the 3-month EURIBOR, respectively. The sample used, which is quarterly, comprises the period 1999-2019.[8]

In the reduced form of the model the variables do not depend on the contemporaneous values of the others, but rather only on all of their past values. Once the reduced form has been estimated (by means of Bayesian techniques, as is advisable when the sample period is short), the model's so-called structural form can be recovered. This helps to analyse the contribution of demand, confidence and monetary policy shocks to changes in investment. To this end, use is made of the relationship that links the residuals of the reduced form to the shocks of the structural form by means of the Cholesky decomposition. This decomposition ranks the variables on the basis of their degree of exogeneity. Thus, interest rate is the system's most exogenous variable, as it is determined at euro area level, rather than domestically. It is followed by the DENSI, as the economic sentiment indicator, demand, which includes movements in real activity and may be affected by domestic and external shocks, and, lastly, investment, which is the most endogenous variable used here.

Once the variables are ordered from most to least exogenous,[9] the model can be expressed as follows:

$$\begin{bmatrix} i_t \\ DENSI_t \\ D_t \\ I_t \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \end{bmatrix} + \beta_1 \begin{bmatrix} i_{t-1} \\ DENSI_{t-1} \\ D_{t-1} \\ I_t - 1 \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{bmatrix}, \qquad [1]$$

Where i_t is interest rate, $DENSI_t$ is the variable that proxies confidence, D_t is the variable that measures demand (through the quarterly growth rate of GDP without the component of investment in construction), I_t is the quarterly growth rate of investment without construction and ε_t are the residuals of the system's equations which, as mentioned earlier, can be expressed, in their reduced form, as a function of the structural shocks (u_t) and the related impact matrix: $\varepsilon_t = B^{-1}u_t$. The model only includes one lag for each of the variables.[10]

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6   As a robustness check, two alternative models have been estimated where investment without construction is replaced by two sub-sets: investment in capital goods and investment in intangibles. The results are qualitatively similar in the former case but differ more in the latter.

7   For further details, see P. Aguilar, C. Ghirelli, M. Pacce and A. Urtasun (2020).

8   The period following the onset of the pandemic is excluded because it is advisable to limit the risk of making model specification errors (L. Álvarez and F. Odendahl, 2022).

9   This assumption is in line with the literature (see, inter alia, S. Baker, N. Bloom and S. Davis, 2018). As noted later, the results are robust to changes in the order of the system's variables. In particular, the investment responses are qualitatively similar if demand is allowed to affect confidence contemporaneously, but not vice versa.

10 The application of the Schwarz information criterion indicates that this is the optimal number of lags. Also, not including a higher number of lags helps minimise over-identification problems, given the sample's small size.

How does investment react to shocks in its determinants?

The impulse response functions obtained from the SVAR model help quantify the investment response to different structural shocks arising from the system's variables (interest rates, confidence and demand). This makes it possible to study the impact of different shocks on investment and their persistence over time. For each structural shock, an unexpected increase of a size equal to one standard deviation of the variable in question is considered.

As expected, the results of the estimations show that investment growth responds negatively to positive interest rate shocks. Specifically, a 175 basis point (bp) increase in interest rates (one standard deviation) results in a negative response in investment growth of 0.26 pp in annualised terms. Moreover, the impact is lasting: the response is negative and statistically significant during several years (see Chart 4.a[11]). There are two reasons why investment and monetary policy tightening are negatively correlated to an increasing degree over time, with a maximum impact of 0.57 pp in annualised terms after seven quarters. First, because monetary policy affects new investment decisions, but not any projects already under way. Second, because the key interest rates for investment decisions tend to be the bank lending rates, and it usually takes a few months before the 3-month EURIBOR rate (the one used in the model) passes through to such rates. As a robustness check, alternative specifications have been estimated using different interest rate variables such as the 12-month EURIBOR or the bank lending rate for non-financial corporations (NFCs). In both cases, the findings are qualitatively similar to those obtained using the 3-month EURIBOR.[12] Furthermore, where the NFC bank lending rate is used in the model, in place of the 3-month EURIBOR, the maximum impact emerges after four quarters rather than seven, thus confirming the lag in the pass-through of market interest rates to bank rates.

As expected, investment growth is positively correlated with confidence, as measured by the DENSI. Specifically, a one standard deviation increase in confidence results in a 0.5 pp boost to investment growth in the first quarter in annualised terms (see Chart 4.b). The maximum impact on investment can be seen one year later (0.7 pp in annualised terms). Just under two years later, the effect is no longer statistically different from zero. Again, as a robustness check, alternative specifications have been estimated using other confidence indicators, such as the European Commission's industrial confidence indicator or the S&P Global Purchasing Managers' Index (PMI). In both cases, the findings are not qualitatively different from those obtained using the DENSI.[13]

Lastly, the findings confirm that demand has a positive impact on investment growth, which increases by 0.6 pp in annualised terms given a one standard deviation rise in demand (see Chart 4.c). Compared with interest rates and confidence, investment growth responds to a demand shock more quickly (the maximum impact coming in the second quarter after the shock) and for a shorter period (ceasing to be statistically significant after one year).

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11   Note that Chart 4 shows how investment responds in annualised terms, with confidence bands of 84%.

12   Lane, P. (2023) documents the lags in monetary policy transmission.

13   These robustness checks also included a measure of uncertainty, the Economic Policy Uncertainty Index (EPU). For more details on this variable, see C. Ghirelli, J. Pérez and A. Urtasun (2019). Use of this variable is warranted by the fact that uncertainty leads firms to postpone their investment projects until they have better information (see, for example, M. Bussière, L. Ferrara and J. Milovich, 2015, inter alia). The results confirm that greater uncertainty leads to a fall in investment.
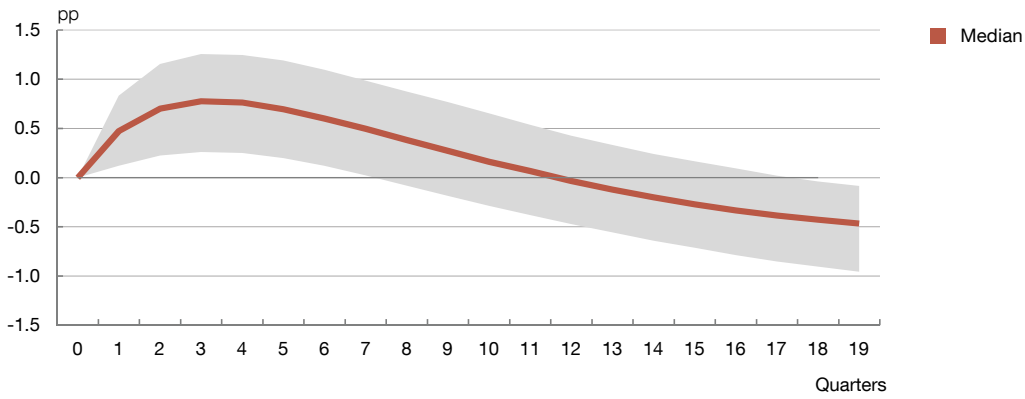
Chart 4

Quarter-on-quarter investment growth responds negatively to interest rate increases, and positively to confidence and demand shocks
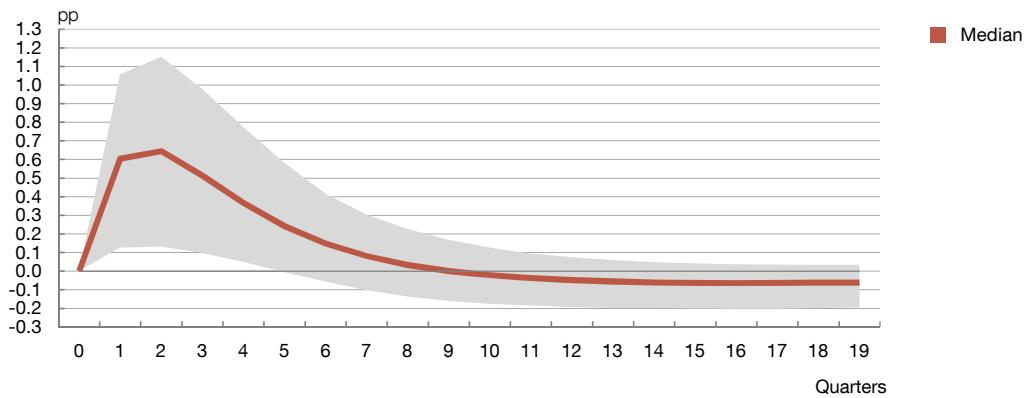
4.a Annualised response of investment to an interest rate shock
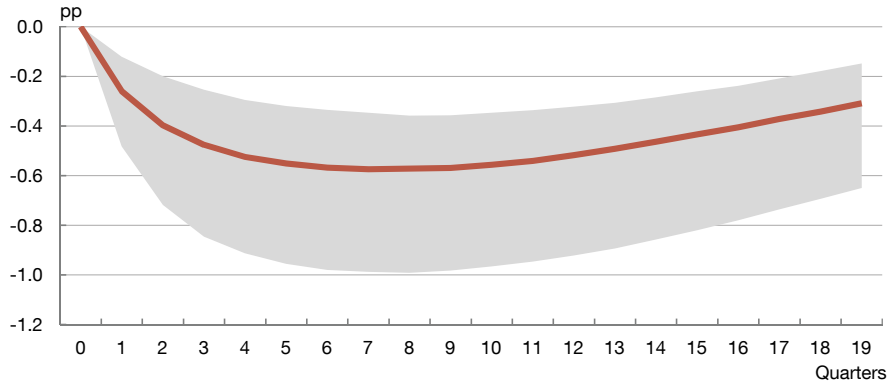
4.b Annualised response of investment to a confidence shock

4.c Annualised response of investment to a demand shock

SOURCE: Banco de España.

How did the different factors shape investment in 2022?

The above exercise shows the response of investment to its different determinants when faced with shocks of a standardised scale in the 1999-2019 sample period. Using the historical decomposition provided by the structural model, the extent to which each of the three determinants contributed to investment can also be analysed, both for the sample period and for the period that followed (i.e. the period that interests us here). In particular, this analysis focuses on the recent period, drawing a distinction between the contribution made to investment in 2022 by the shocks materialising in 2022 and that made by the shocks arising in previous years, bearing in mind that such shocks pass through to investment with the lags detailed in the preceding section. This is possible thanks to the recovery of the shocks enabled by the decomposition of the errors in the model in its reduced form (see equation [1]).[14]

Broadly speaking, demand and confidence rallied in 2021 and early 2022, thanks to the gradual lifting of the pandemic-related restrictions and the economic reopening that followed. However, both variables later deteriorated over the course of 2022, in the wake of the invasion of Ukraine (see Chart 1 again in the case of demand and Chart 2 in the case of confidence).

The fact that the maximum impact of demand and confidence shocks is felt after two and three quarters, respectively (see Chart 4), means that part of the impact of the structural shocks associated with these two variables in 2021 was not appreciable until 2022. For this reason, the contributions made by demand and confidence that owed exclusively to the inertia of past shocks were positive in 2022 (see the solid bars in Chart 5.a). Similarly, the deterioration in agents' confidence observed in 2022 also operates with something of a lag. With this in mind, while part of this deterioration can be seen in 2022 (the striped contributions in Chart 5.a), it is likely to become more apparent in 2023 (see Chart 5.b).

Meanwhile, interest rates made a very small contribution in 2022. The 2022 rate hikes barely affected investment that year (see Chart 5.a), with the bulk of the impact coming in 2023, to an increasing degree as the year progresses (see Chart 5.b).[15]

How are these factors likely to shape the outlook for investment in 2023?

Chart 5.b shows the contributions made by past shocks to investment growth in 2023, as a result of their inertia and in the absence of (unforeseen) further shocks. For example, while confidence improved in early 2023, it could worsen going forward if geopolitical tensions were to re-emerge or further episodes of financial turmoil were to be unleashed, as was the case in March this year.
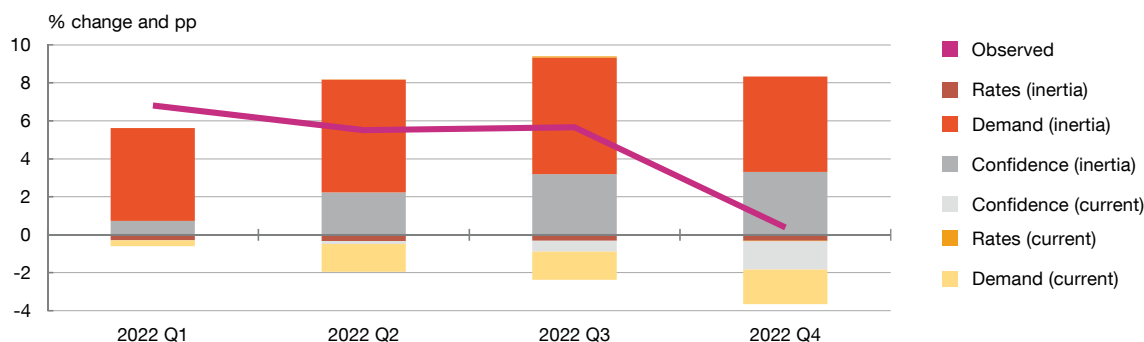
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14 As noted above, this analysis does not include other factors that could shape long-term investment. Thus, the part of the change in investment that cannot be explained by the three determinants analysed here (interest rates, confidence and demand) would be captured by the investment variable itself, which is influenced by various factors.

15 Specifically, the first deposit facility rate hike (50 bp) took place on 27 July. This increase was followed by another three hikes in 2022 (75 bp on both 14 September and 2 November, and 50 bp on 21 December). In 2023, the Governing Council of the ECB has decided to raise rates three more times: by 50 bp on 8 February and 22 March, and by 25 bp on 4 May.
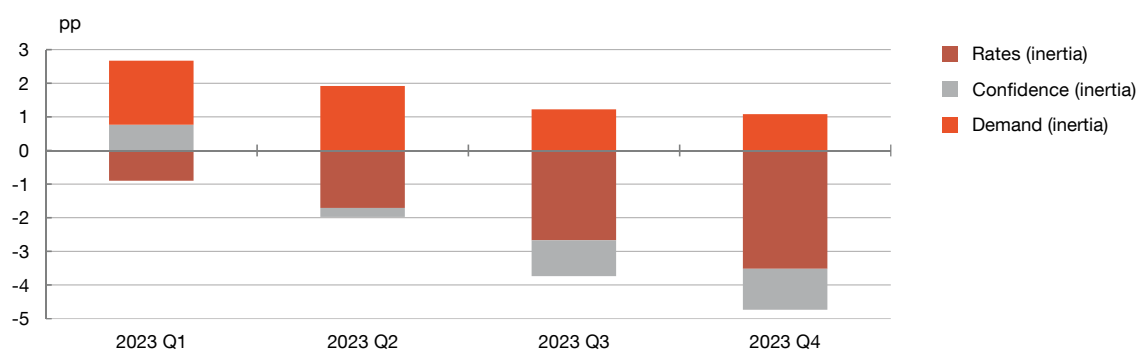
Chart 5
Contribution of the different factors to year-on-year investment growth in 2022 and 2023

5.a Contribution of the shocks to year-on-year investment growth in 2022: inertia of past shocks vs current shocks

% change and pp

Legend:
- Observed
- Rates (inertia)
- Demand (inertia)
- Confidence (inertia)
- Confidence (current)
- Rates (current)
- Demand (current)

5.b Contribution of the inertia of past shocks to year-on-year investment growth in 2023

pp

Legend:
- Rates (inertia)
- Confidence (inertia)
- Demand (inertia)

SOURCE: Banco de España.

The role played by the inertia of the past shocks analysed here could have a negative impact on investment growth in 2023 (see Chart 5.b). In particular, the 2022 interest rate increases could weigh significantly on investment, increasingly so as the year progresses. Needless to say, this would be compounded by the effects of the 2023 hikes.

Similarly, based on the model, the impact on investment growth of the deterioration in confidence observed over 2022 is likely to persist in 2023 owing to the lag with which this variable operates (see Chart 4.b). Thus, factoring in only the inertia of past shocks and in the absence of further shocks, the downturn in confidence during 2022 is likely to undermine investment growth in 2023.

Conversely, according to the model, the performance of demand in 2022 ought to make a positive contribution to investment growth in 2023, given that such effects are felt with a lag, with a maximum impact after two quarters (see Chart 4.c). This contribution stemming from developments in 2022 would be compounded by the fallout from any further shocks that might emerge in 2023. For example, if the prospects of a recovery in demand over the course of the year prove well-founded, investment could perform better than in the recent past, thereby partially making up for the declining impact of the inertial contributions from the 2022 demand shocks.

Given the partial equilibrium nature of this analysis, it cannot fully account for the investment growth in 2022 and 2023. Rather, only the contribution of the three factors considered (which are those most often singled out in the literature and which, intuitively, are also highly relevant in the current context) can be quantified. The analysis conducted shows that the combination of demand, confidence and interest rates sustained investment growth in 2022, thanks to the positive inertial effects carried over from 2021. Nonetheless, the effects of the way these variables performed in 2022 (particularly, the interest rate hike and the worsening of confidence) are likely to constrain investment growth in 2023, and the trend is also likely to be shaped, in different directions and to differing degrees, by how the three determinants perform this year, together with other factors not analysed here, such as the unwinding of the bottlenecks that still persist in global production chains or the more widespread roll-out of the NGEU funds.

Conclusions

The analysis set out in this article helps to understand how the three types of recent shocks pass through to investment (one of the most volatile components of aggregate demand). The three shocks considered are shifts in monetary policy stance (measured by changes in short-term interest rates), variations in agents' confidence and fluctuations in demand. Although the three variables affect investment contemporaneously, they continue to pass through with something of a lag, and their maximum impact is therefore felt several quarters later.

Specifically, investment growth in 2022 was shaped more by the positive inertial contribution of the shocks that occurred in 2021 than by the opposing contribution made by the 2022 shocks. In 2023, the inertia of the 2022 interest rate and confidence shocks appears to be slowing investment growth. Conversely, the 2022 demand shocks appear to be propping up investment in 2023, although their positive contribution is likely to decline gradually.

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