

EVALUATION OF AIReF's MACROECONOMIC AND FISCAL FORECASTS 2023

TECHNICAL DOCUMENT 2/24

September 13th, 2024



Independent Authority
for Fiscal Responsibility



The Independent Authority for Fiscal Responsibility (AIReF) was created with the mission of ensuring strict compliance with the principles of budgetary stability and financial sustainability enshrined in Article 135 of the Spanish Constitution.

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EXECUTIVE SUMMARY

By publishing this technical document, the Independent Authority for Fiscal Responsibility, A.A.I. (AIReF) maintains its commitment to analysing the quality of the macroeconomic and fiscal forecasts it has been making since 2015, incorporating the fiscal year 2023 into the study. Due to their nature, under normal circumstances, forecasts are subject to great uncertainty, which has been extraordinarily accentuated in recent years as a result of the pandemic and the outbreak of the war in Ukraine and other geopolitical tensions. In this highly shifting context, the analysis of forecast errors becomes even more important as it makes it possible to identify macroeconomic aggregates where AIReF's forecasts may be less accurate and remedy potential biases and weaknesses in the estimate process. This transparency exercise is in line with AIReF's core values and places it on par with other independent fiscal institutions that already perform this type of exercise. This is in response to one of the OECD's main recommendations and to the content of AIReF's Strategic Plan 2020-2026.

Macroeconomic forecasts

Forecasts of GDP growth, employment and inflation form the basis for the projections of public revenue and expenditure that are incorporated into budgetary plans. Unrealistic macroeconomic forecasts make it difficult to plan the budgetary process, comply with fiscal rules and, in short, ensure medium- and short-term fiscal discipline.

Accordingly, EU Regulation 473/2013 establishes that the macroeconomic forecasts that serve as the basis for drawing up budgetary plans and stability programmes must be produced or endorsed by independent fiscal institutions, such as AIReF. Directive 2011/85/EU also establishes that the macroeconomic

and budgetary forecasts contained in budgetary plans should be subject to regular evaluations to improve their quality and determine the potential existence of systematic biases.

In this regard, AIReF regularly includes in its reports an evaluation of the Government's forecasts on the basis of a methodology developed for this purpose (see Report 21/22). Furthermore, in order to increase transparency, AIReF also carries out an ex-post evaluation of its own forecasts, which are the basis for analysing the degree of compliance with the Government's scenarios and, in the case of macroeconomic forecasts, to endorse them.

This evaluation exercise of AIReF's macroeconomic forecasts is undertaken using two approaches:

1. A short-term focus on analysing the magnitude of the forecast error made in 2023 with regard to the first estimate of the Spanish National Accounts for the year published by the National Statistics Institute (INE) in March 2024 and the factors underlying this error. The Spanish economy maintained a very dynamic performance beyond what was anticipated. As a reference, the forecasts made in October 2022, which serve as a basis for the preparation of the General State Budget (GSB) for 2023, the positive surprises were led by private and particularly public consumption, while investment once again showed more restrained performance. On the foreign trade side, although exports performed as expected, imports, as a result of the negative surprises in investment, grew at a notably lower rate than expected. From the perspective of the factors contributing to explaining this forecast error, the statistical revisions corresponding to 2022 stand out. Both the new Spanish National Accounts information corresponding to 2022, published throughout 2023, and the revisions of the quarterly profiles of the aggregates of the Quarterly Spanish National Accounts, as a result of the new revision policy implemented since January 2023 for this summary statistic, had a major impact on the forecast errors throughout 2023. The improvement in the quality of economic forecasts must be enhanced in terms of the explanatory factors underlying these revisions, and in this regard, the INE is urged to provide the National Accounts Department with the means to achieve effective compliance with the recommendations of the technical working group on the use of the sources of circumstantial information underlying the main macroeconomic indicators in the context of the pandemic.
2. The medium-term approach is made with a longer time perspective on the basis of a range of statistics that are commonly used to evaluate

the quality of forecasts, following the methodological approach of Technical Document 2/2022 of February 18th, 2022. The purpose is to analyse the magnitude of errors and the potential existence of biases and their persistence. The main conclusions drawn are as follows:

- a. The incorporation of the year 2023 entails hardly any changes to the statistical quality measures in AIReF's forecasts. The measures continue to be satisfactory in terms of efficiency, accuracy and lack of bias.
- b. AIReF's GDP forecasts for the current year continue to be the most accurate, in terms of mean squared error, of all the agencies considered. In the case of expenditure, a negative bias continues to be observed. This pessimistic bias, both for the forecasts for the current year and for the one-year forecasts, has been slightly exacerbated by the latest forecasts. In general, this bias is common to all the agencies analysed.
- c. As has been the case in recent fiscal years of forecast evaluation, statistically significant biases can be seen in some demand aggregates for one-year forecasts. However, it can be seen that the mean squared errors are decreasing or starting to decrease after reaching historical highs due to the outbreak of COVID-19. This indicates that improvements in the accuracy of the estimates are taking place despite continuing high levels of uncertainty. For next year's forecasts, a high contribution of investment to the forecast error continues to be observed, which is associated with the delays in the execution of the RTRP compared with AIReF's initial expectations.
- d. There is still no persistence in the errors, except in gross fixed capital formation at one year, where overestimates at one year tend to be accompanied by overestimates for the following year. This persistence is also linked to the full implementation assumptions of the RTRP used by AIReF.
- e. Compared with other institutions, there are still no significant differences between the biases and the accuracy of the forecasts of the different institutions and AIReF. AIReF continues to forecast GDP growth in the current year with greater certainty, but it is less accurate in forecasting the evolution of the foreign sector in the current year and of gross fixed capital formation.

Fiscal forecasts

The inclusion of 2023 in the analysis confirms the absence of significant biases in AIReF's fiscal forecasts over the whole period. AIReF's deficit forecasts were, on average, 0.2 points higher than the actual deficit. In the initial forecasts, AIReF forecast a lower fiscal balance as the extension of the measures was unknown. In contrast, it then went on to forecast a deficit almost 0.5 points higher than the one finally achieved. This deviation can be mainly explained by a higher forecast for expenditure, primarily relating to the Central Government in expenditure related to the measures and capital expenditure associated with military investment and court rulings. For its part, the Government maintained the same reference rate of 3.9% of GDP throughout the period, 0.3 points above the value finally observed.

The revenue and expenditure forecasts were strongly affected by the denominator effect. The updating of the nominal GDP series and the macroeconomic forecasts entailed a correction of the level of revenue and expenditure of around 1.5 points of GDP. In terms of millions of euros, AIReF's revenue forecasts were around the flash estimate figure. In contrast, AIReF forecast a higher amount of expenditure that did not finally materialise.

AIReF continues to work on improving the areas identified as having the greatest weaknesses. In this regard, it is worth highlighting the new RTRP monitoring tool that AIReF has developed, although the limited availability of information on the impact of the plan in national accounting terms for the revenue and expenditure of the General Government is beyond AIReF's scope. This improvement in the monitoring of the RTRP will make it possible to reduce errors in headings such as gross capital formation. Furthermore, as from the start of 2024, improvements have been introduced to the Corporate Income Tax forecasting methods, breaking down the level of analysis with separate projections on the tax bases of the instalment payments by type of company and method of calculating the tax liability. Despite these improvements, it should be stressed that it is impossible to anticipate the impact on the forecasts of unannounced measures, due to their discretionary nature.

1. ANALYSIS OF MACROECONOMIC FORECASTS

1.1. AIReF's macroeconomic forecast errors in 2023

In 2023, GDP growth was 2.5%, 1 point higher than AIReF's forecast of October 2022. This underestimate of growth was common among analysts who made economic forecasts after the summer of 2022, given the prospects of gas supply rationing prevailing at that time as a result of the war in Ukraine, which would have entailed a Europe-wide energy and industrial crisis on a large scale, which it was eventually possible to avert. The measures deployed by governments to mitigate energy shortages and rising energy prices and to mitigate the impact of the crisis on household income help to explain the forecast error. There is also a substantial population increase due to a high net migration fiscal balance over the course of 2023, the highest in ten years.

An analysis of the composition of the forecast errors shows that the biggest errors were concentrated in private consumption, particularly in public consumption, which grew much more than expected (see Table 1). The growth in the number of households and the good performance of the labour market driven, among other causes, by the influx of the foreign population, favoured an expansion in consumption above that considered in AIReF's and the Government's scenarios. Private consumption grew by 1.8% in real terms, exceeding AIReF's and the Government's forecast (1.3% in both cases). However, in per capita terms, the increase was practically zero in a context of low growth in real wages and tighter financing conditions. Public consumption was undoubtedly the most dynamic component of demand, with an increase

of 3.8% in 2023 in real terms, much higher than expected by AIReF and by the Government. Both the growth in public employment and in intermediate consumption help explain this upward deviation.

In contrast, investment grew well below what AIReF and the Government had forecast. One of the factors that could be behind this performance is the pace of execution of the RTRP funds, which turned out to be less intense than expected by AIReF in October 2022. All in all, the sluggishness in business investment and private construction investment that has been observed since the pandemic in a context of high uncertainty is one of the most notable features of the Spanish economy's growth pattern.

TABLE 1. FORECAST ERRORS OF THE OCTOBER 2022 SCENARIO ESTIMATES. FORECAST MINUS OBSERVATION

| Year-on-Year Rates of Change | AIReF October 2022 | | | Government October 2022 | | | Observed March 2024 |
|--|-----------------------|-------------|----------------|----------------------------|-------------|----------------|---------------------------|
| | 2023 | Error | Cont. Error | 2023 | Error | Cont. Error | |
| Private Domestic Final Consumption Expenditure | 1,3 | -0,5 | -0,3 | 1,3 | -0,5 | -0,3 | 1,8 |
| General Government Final Consumption Expenditure | 0,8 | -3,0 | -0,6 | 0,4 | -3,4 | -0,7 | 3,8 |
| Gross Fixed Capital Formation | 3,9 | 3,1 | 0,6 | 7,9 | 7,1 | 1,4 | 0,8 |
| Change in Inventory* | 0,0 | 0,2 | 0,2 | 0,0 | 0,2 | 0,2 | -0,2 |
| Domestic Demand* | 1,7 | 0,0 | 0,0 | 2,4 | 0,7 | 0,7 | 1,7 |
| Exports of Goods and Services | 2,5 | 0,2 | 0,1 | 7,3 | 4,9 | 2,0 | 2,3 |
| Imports of Goods and Services | 3,0 | 2,6 | -1,0 | 8,2 | 7,9 | -3,1 | 0,3 |
| External Balance* | -0,2 | -1,0 | -1,0 | -0,3 | -1,1 | -1,1 | 0,8 |
| Gross Domestic Product | 1,5 | -1,0 | | 2,1 | -0,4 | | 2,5 |
| Nominal Gross Domestic Product | 5,9 | -2,7 | | 6,0 | -2,6 | | 8,6 |
| Gross Domestic Product Deflator | 4,3 | -1,6 | | 4,1 | -1,8 | | 5,9 |
| Full-Time Equivalent Employment | 0,3 | -2,9 | | 0,6 | -2,6 | | 3,2 |
| Unemployment Rate (% of Active Population) | 12,8 | 0,7 | | 12,2 | 0,1 | | 12,1 |

* Contribution to GDP growth

Source: INE, Ministry of Economy, Trade and Industry and AIReF

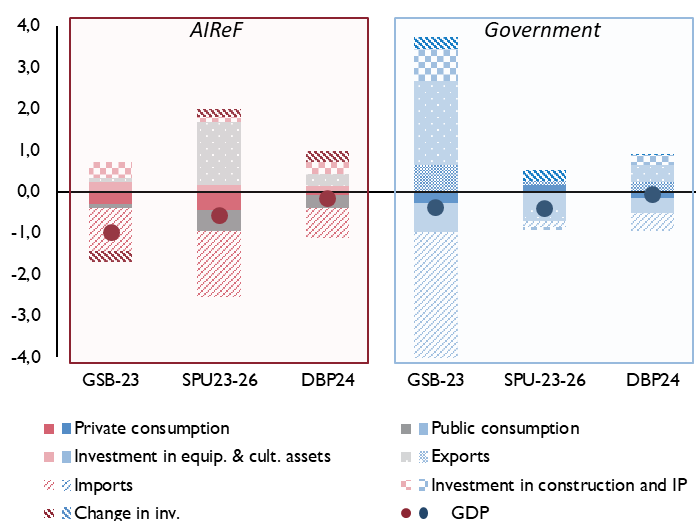
In the case of external demand, exports grew in 2023 in line with AIReF's expectations, while imports grew at a notably slower rate than expected.

Exports maintained positive growth in 2023, in line with AIReF's expectations, reflecting the good performance of income from tourism - with tourist arrivals once again hitting record highs in that year - and exports of other services related to business activities, telecommunications and IT. In contrast, goods exports grew at a moderate pace due to the fall in energy sales. The Government had expected much higher export growth than observed.

Imports grew less than expected (0.3% compared with the 3% forecast by AIReF). This lower dynamism is mainly due to the negative surprises in investment. For its part, the Government's error in the estimate for imports was higher.

Overall, AIReF's estimate of growth in domestic demand was accurate - albeit not in its composition - although the overestimate of import growth was reflected in lower expected GDP growth compared with what finally materialised. In the case of the Government, the overestimate of domestic demand growth was offset by the error made in the estimate of imports (see Figure 1).

FIGURE 1. DECOMPOSITION OF THE DEMAND SIDE (P.-P.-) CONTRIBUTIONS TO THE 2023 REAL GDP FORECAST ERROR-. FORECAST MINUS OBSERVATION

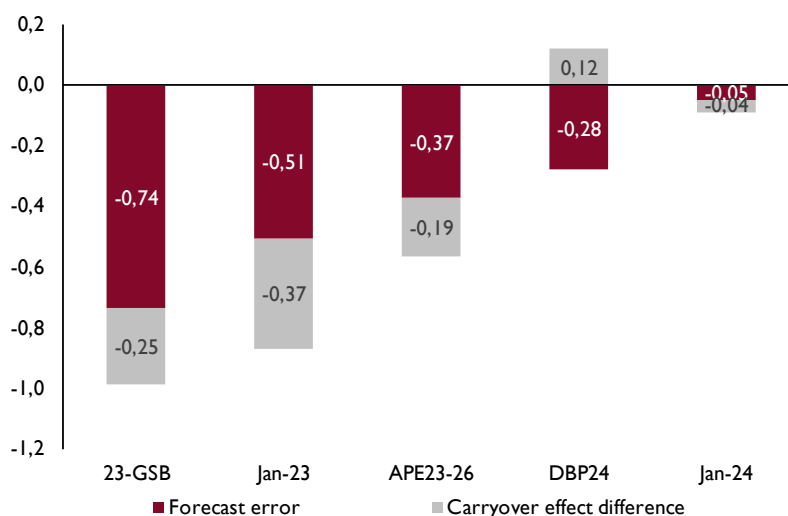


Source: INE, Ministry of Economy, Trade and Enterprise and AIReF

From the perspective of the factors that contribute to explaining this forecast error, the statistical revisions corresponding to 2022 stand out. These revisions refer to the new information corresponding to the year 2022 derived from the publication of the revised Spanish National Accounts series announced throughout 2023 and to the revisions of the quarterly profiles of the Quarterly National Accounts (QNA). Specifically, the INE, in the Spanish National Accounts published in September 2023, revised average GDP growth in 2022, raising this growth to 5.8% compared with the 5.5% estimated by this institution in its first estimate in March 2023. The quarterly profile also saw a particularly sharp upward revision in the last two quarters of 2022 (the quarter-on-quarter change in the third quarter of 2023 was revised, from the 0.1% initially estimated by INE, to 0.5%, and in the fourth quarter from 0.4% to 0.5%). These revisions in the QNA figures explain almost half of the forecast error made by AIReF in January 2023. The revisions to the quarterly accounting figures were particularly strong in the case of private consumption and justify the forecast

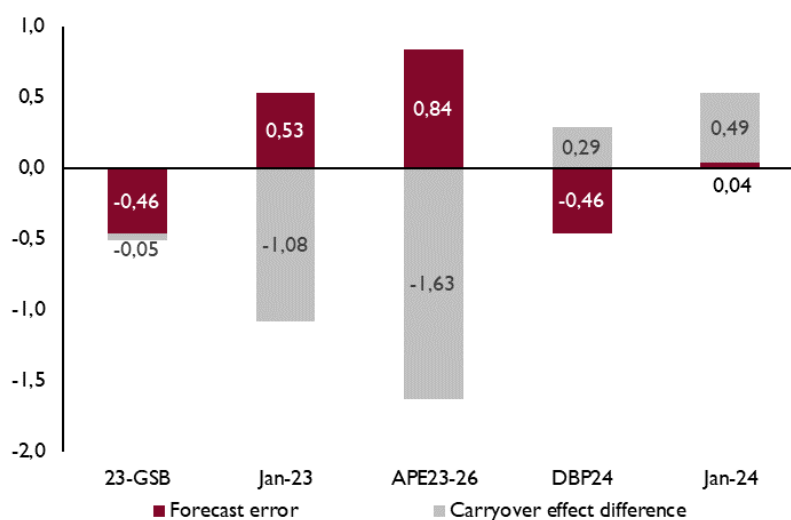
error made in that component (see Figure 2). Given that the magnitude of the revisions to the quarterly accounting figures is greater than in the past as a result of the new revision policy implemented by the INE in January 2023, AIReF considers, and has conveyed this to that body, that it should provide more breakdown information on the factors underlying these revisions so as to be able to improve the quality of the economic forecasts (see Box 1).

FIGURE 2. GDP IN TERMS OF VOLUME 2023. AIREF FORECAST ERROR DECOMPOSITION (P. P.)



Source: INE and AIReF

FIGURE 3. PRIVATE CONSUMPTION IN TERMS OF VOLUME 2023. LA AIREF FORECAST ERROR DECOMPOSITION (P. P.)



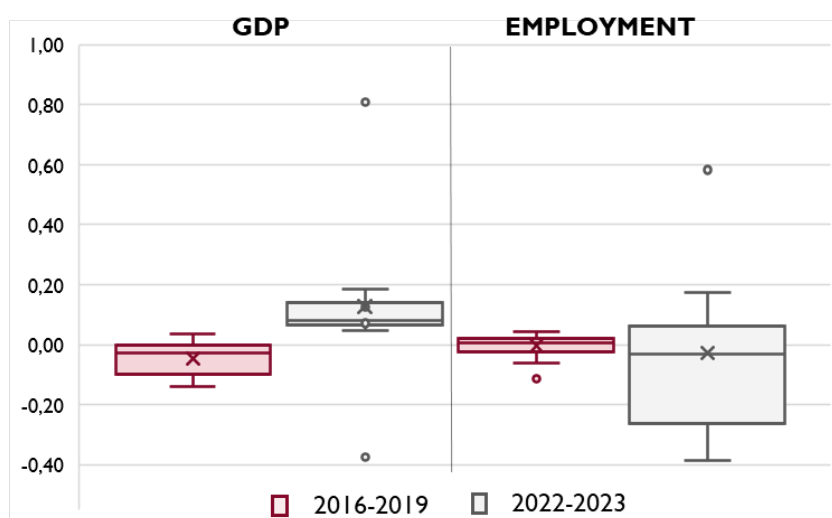
Source: INE and AIReF

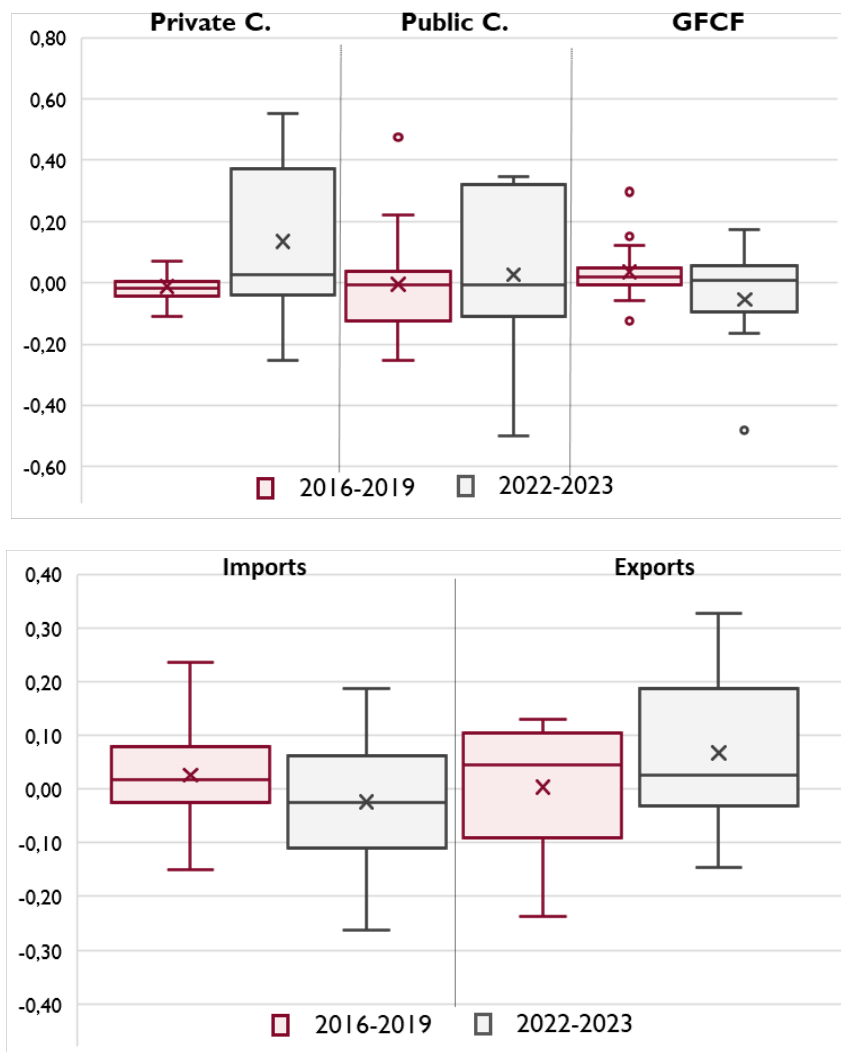
BOX 1. The revisions to the Quarterly National Accounts

The INE's Quarterly National Accounts is a statistical operation which, based on the synthesis of a set of economic indicators, makes it possible to obtain an estimate of GDP and its composition 30 days after the end of the reference quarter. Given that at that time, for most of the basic indicators, information is only available up to the second month of the quarter, the preliminary data are updated when more complete information becomes available, which may result in upward or downward revisions of the figures initially published.

However, in recent years, the revisions are comparatively higher, for most aggregates, relative to the historical average, with successive estimates showing a larger dispersion than was observed in the pre-COVID-19 period (see Annex III). The following cash figures show, both for the pre-COVID-19 period and for the years 2022 and 2023, the distribution and degree of dispersion of the first five estimates of the quarter-on-quarter rates of the demand- and expenditure-side aggregates. These figures include both the minimum, the first quartile (Q1), the median (Q2), the third quartile (Q3), and the maximum and mean. Outside these values, outliers are denoted by a circle. Specifically, in the case of GDP, there has been an upward revision streak since 2022 (reflected in the positive median and a positive interquartile range). In contrast, over the period 2016-2019, while a negative median value of revisions is observed, the interquartile range spans 0, with no such clear trend in the revisions. Although the width of the interquartile range for GDP does not seem to have altered significantly, it has done so for the demand and expenditure aggregates.

FIGURE RE.1.1. SCATTER FIGURE FOR THE FIRST FIVE REVISIONS OF THE CNTR





Source: INE and AIReF

The INE notes in its press releases the difficulties in accurately estimating the evolution of economic activity given the strong shocks experienced in recent years due to the pandemic and the war in Ukraine. These shocks may originate in the core indicators and their relationship with economic activity, as in the case of electricity consumption or in the employment series given the impact of the application of the furlough programmes (ERTEs) and the implications of the labour reform. There are also changes in seasonal patterns, as in the tourism series, with the consequent difficulties in correcting for seasonality in this context.

AIReF thus considers that resources should be made available to implement the recommendations of the technical working group on the use of circumstantial information sources underlying the main macroeconomic

indicators in the context of the pandemic¹. This working group identified revisions as one of the areas in which more work needs to be done on transparency, given that unexpected significant revisions can cause problems for users engaged in macroeconomic forecasting and analysis and, consequently, for the design of public policies. In particular, AIReF considers that the following recommendations made within that group should be implemented as soon as possible:

Recommendation 03. "Accompany the dissemination of quarterly GDP results with a table in which, in a simplified form, the user can see how the revisions in the main circumstantial base indicators determine the corresponding revisions in the GDP components". A better understanding of the information incorporated in the estimate process of the quarterly accounts would lead to a better understanding of the results and their possible revisions.

Recommendation 09. "Consider the reintroduction of an additional estimate of the quarterly accounts, at t+60 days after the end of the reference quarter, in addition to those already existing at t+30 and t+90", given that at that time, complete information is available for most of the core indicators used in the QNA estimate.

The more adverse evolution of export markets compared with what was considered at the time the budgets were drawn up would have led to lower GDP growth, although this could have been offset by lower energy prices. In particular, export markets in 2023 recorded a notably lower increase than that incorporated by AIReF and the Government when drawing up their scenarios in October 2022. However, the impact of this element may have been offset by the lower gas prices observed, relative to those prevailing in the futures markets for this commodity in October 2022. It is difficult to quantify the net impact of both effects as gas prices are not explicitly incorporated in AIReF's econometric models, which only incorporate the price of oil.

¹ See the following [report](#).

TABLE 2. EXOGENOUS ASSUMPTIONS OF AIREF'S MACROECONOMIC OUTLOOK TABLE FOR 2023

| | Current | 23-GSB | Differences |
|---|---------|--------|-------------|
| Euribor 3 months (%) | 3,4 | 2,4 | ▲ 1,0 |
| Interest Rate 10-year State Debt (%) | 3,5 | 3,4 | ▲ 0,1 |
| Broad NEER | 121,8 | 114,5 | ▲ 7,3 |
| Exchange rates \$/€ | 1,08 | 0,98 | ▲ 0,1 |
| Oil (US \$/barrel) | 83,8 | 85,8 | ▼ -2,0 |
| MIBGAS (€/MWh) | 39,7 | 176,9 | ▼ -137,2 |
| Export markets (annual %) | -0,2 | 2,3 | ▼ -2,5 |

Source: IMF, Refinitiv and MIBGAS

1.2. Statistical analysis of forecast errors in the macroeconomic outlook 2016-2023

AIReF's GDP forecasts for the current year continue to be the most accurate, in terms of the mean squared error, of all the agencies considered. Furthermore, the average error in the estimates made by AIReF for GDP in volume terms is not significantly different from zero, both for the current year and for the following year. Moreover, the errors made are not persistent over time.

Significant biases are apparent in some demand aggregates for the forecasts for the following year. In general, there are positive biases, i.e. more optimistic estimates than those finally observed when estimating private consumption, investment and imports for the following year. A negative bias is also observed in the government consumption projections for the following year, by assuming lower expenditure than actually observed. However, these biases have also occurred, in most cases, for the rest of the agencies.

The greatest contributions to the error in estimating GDP growth come from the estimates for the foreign sector. Despite AIReF's efforts to improve the models that serve as the basis for export and import estimates, the succession of shocks experienced in recent years in the foreign trade environment and the volatility traditionally shown by these aggregates mean that they continue to be one of the main sources of error in AIReF's macroeconomic forecasts.

The greater contribution of private consumption and investment to the estimate error that had been observed since the outbreak of COVID-19 has returned to pre-pandemic values. However, for the forecasts for the following year, investment continues to make a contribution to the forecast error, which is associated with the delays in the execution of the RTRP, given that AIReF has

maintained the assumption of full execution of the budgeted revenue in its macroeconomic forecasts.

In the case of employment, AIReF has tended to underestimate its growth, incurring statistically significant biases for both the current year and the following year. This could be explained by the resilience shown by the Spanish labour market, whose higher values have surprised all the forecasts made by the different agencies.

The breakdown of the statistics and tests supporting these conclusions can be found in Annexes I and II.

2. EVALUATION OF THE FORECASTS IN THE FISCAL SCENARIO

In this document, AIReF analyses the errors made in its fiscal forecasts for 2023.

To give continuity to the regular self-assessment and transparency exercise, AIReF analyses the forecasts contained in the reports linked to the budget cycle relating to 2023, a total of six revisions, which are compared with the IGAE's first publication on the year-end accounting forecast (published at the end of March 2024), henceforth referred to as flash estimates. The breakdown is performed on the basis of the revenue and expenditure of the General Government Sector as a whole. The breakdown performed for the revenue and expenditure of the General Government Sector is carried out by breaking down the different causes:

- Error due to macroeconomic scenario forecasts.
- Error due to the effect of policy measures, considering both the incorporation of measures adopted between revisions and changes in the assessment of measures as more information has become available.
- Error due to AIReF's own fiscal estimates.

AIReF's fiscal balance forecasts are also compared with those of the Government and other institutions and the error made in each of the expenditure and revenue headings is analysed. Once the deviations over the last year have been analysed, an evaluation is made of the evolution of

AIReF's forecasts over the period 2016-2023 in order to identify relevant biases, systematic deviations and possible weaknesses in the estimates.

2.1. Forecast errors 2023

The fiscal projections for 2023 were marked by inflation and the measures adopted to counteract its effects, the lack of regular information on the execution of the RTRP in National Accounts and the underestimate of economic activity. At the end of 2022 and during 2023, given the persistence of inflation, the Government adopted successive extensions of the measures to mitigate the effects of the conflict in Ukraine and the price increases, the impact of which was incorporated into the forecasts as they were announced. In September 2023, the revision of the INE's National Accounts entailed an upward revision of the levels of nominal GDP and its composition for the fiscal years 2022 and previous years, which had an impact on AIReF's forecasts, both because of the higher rate of growth and because of its denominator effect on revenue and expenditure in terms of weight of GDP. Furthermore, the prospects for growth in revenue and expenditure are conditional on the degree of execution of the projects associated with the RTRP in national accounting terms², on which there is no regular and detailed information.

TABLE 3. 2023 CAP/NEC FINANCING PROJECTIONS IN NATIONAL ACCOUNTS (% GDP)

| Net lending/borrowing 2023 | | | |
|----------------------------|------------|-------|------------|
| Revision | Date | AIReF | Government |
| 1 | 12/05/2022 | -3,3 | -3,9 |
| 2 | 25/10/2022 | -3,3 | -3,9 |
| 3 | 05/04/2023 | -4,2 | |
| 4 | 11/05/2023 | -4,1 | -3,9 |
| 5 | 06/07/2023 | -4,1 | |
| 6 | 26/10/2023 | -4,1 | -3,9 |
| Flash estimate IGAE | 11/04/2024 | | -3,6 |
| OBJECTIVE | | | Suspended |

Source: IGAE, GSB, SPU and AIReF

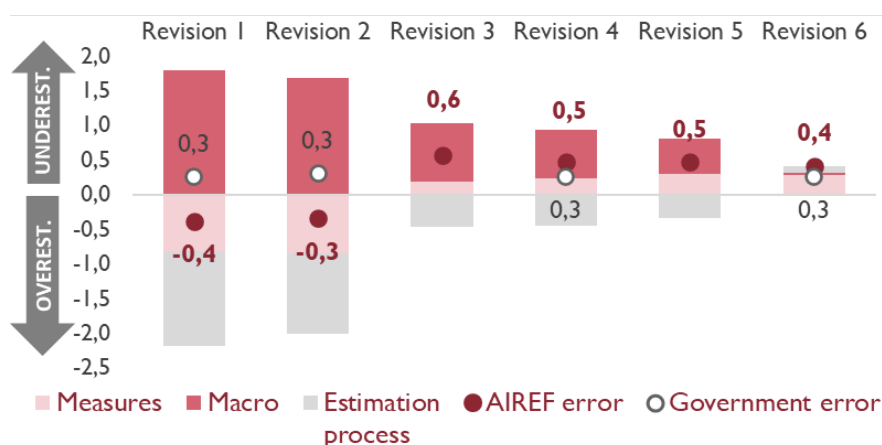
The joint average error of the headline deficit for the six revisions considered was 0.2 points above the deficit observed. The first two reports, drawn up in May and October 2022, respectively, did not include the impact of the regulatory measures approved in Royal Decree-Law 20/2022 of December

² Those that reach the final recipient and therefore affect the economy.

27th³. These measures led to an increase in AIReF's deficit forecasts for 2023, hovering around half a percentage point of GDP above the flash estimate. For its part, the Government maintained its deficit estimate unchanged at 3.9% throughout its revisions, 0.3 points above the actual figure.

AIReF's deviations are a consequence of the underestimate of economic activity and the overestimate of expenditure measures. For its part, although the first revisions did not include the regulatory measures approved at the end of 2022, from the third revision onwards and during the rest of the announcements made in 2023, the error in the estimate of expenditure due to the impact of the measures persisted. Conversely, the deviations were partially offset by the error due to the estimate processes themselves. In general terms, the deviation from AIReF's forecasts is mainly explained by a higher expenditure forecast than that finally recorded.

FIGURE 4. 2023 FORECAST ERRORS IN CAP/NEC FINANCING BY COMPONENTS (% GDP)



Source: IGAE, GSB, SPU and AIReF

Note 1: A positive deviation (underestimate) means that a smaller fiscal balance, and hence a larger deficit, is planned than in the flash estimate. A negative deviation (overestimate) indicates that a higher fiscal balance/lower deficit is planned.

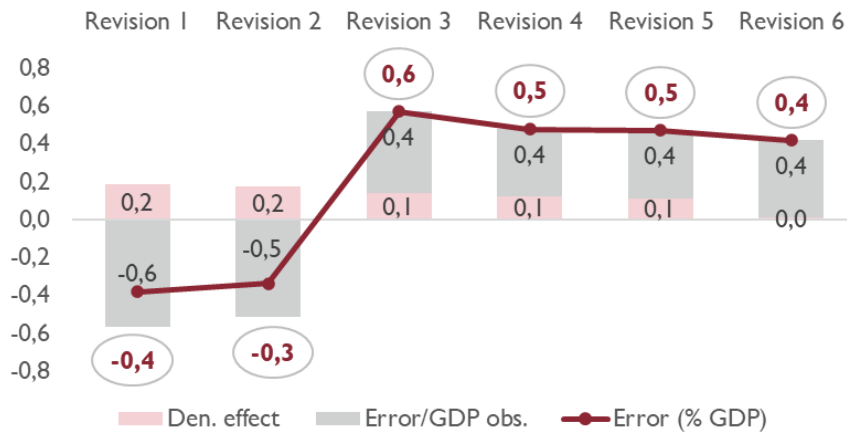
Note 2: $\text{Error} = 100 * (\text{Observed value} / \text{Observed GDP} - \text{Estimated value} / \text{Estimated GDP})$

The denominator effect, produced by an estimate of nominal GDP lower than the value finally observed, intensified the value of the deviations in terms of weight of GDP. It should be noted that in the initial revisions, the observed value of GDP in 2022 was not yet available, which in nominal terms was some €12 bn

³ Royal Decree-Law 20/2022 of December 27th, on measures to respond to the economic and social consequences of the war in Ukraine and to support the reconstruction of the island of La Palma and other situations of vulnerability.

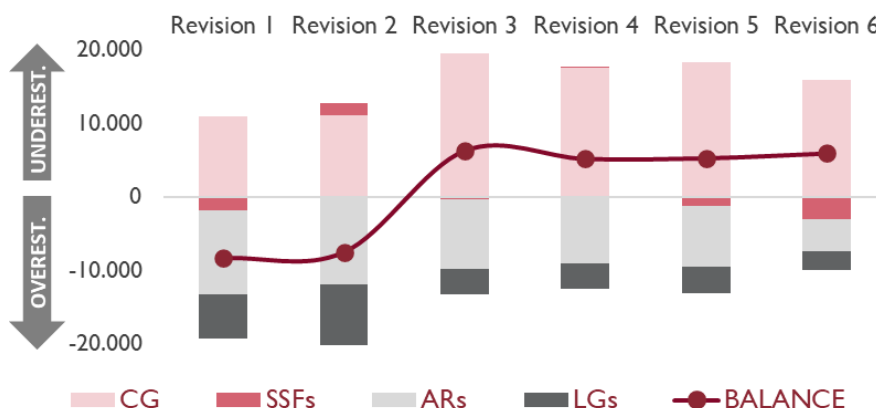
higher than expected and which, in September 2023, underwent a revision of its historical series by the INE that implied an additional increase of some €19 bn in 2021 and some €34 bn in 2022. Consequently, the error due to the underestimate of economic activity was reduced as these updates to GDP were incorporated.

FIGURE 5. DENOMINATOR EFFECT ON THE 2023 FORECAST ERROR IN THE CAP/NEC FINANCING



Source: IGAE, GSB, SPU and AIReF

AIReF forecast a higher deficit for the Central Government as opposed to a lower deficit for the Autonomous Regions and Local Governments compared with the values finally observed. Whereas during the first two reports, published in 2022, the deviations were concentrated in the overestimate of the balance of the Autonomous Regions and Local Governments, throughout the following revisions carried out in the reference year, the main deviation was due to the underestimate of the Central Government balance, which was partially offset by the deviations of the opposite sign in the forecasts of the Autonomous Regions and Local Governments. For its part, the Social Security Funds recorded the most minor errors over the successive revisions, with a slight increase in the overestimate of the fiscal balance in the last revision.

FIGURE 6. FORECAST ERRORS IN THE 2023 CAP/NEC FUNDING BY SUB-SECTOR (EURO MILLION)


Source: IGAE and AIReF

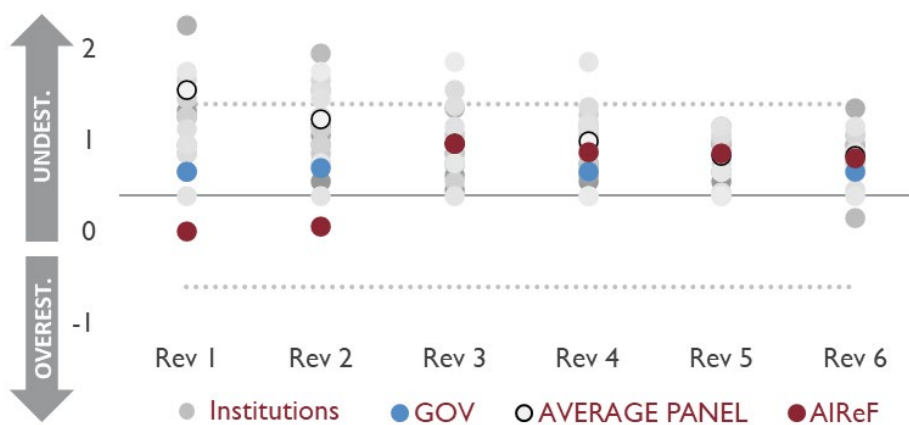
Note 1: A positive deviation (underestimate) means that a smaller fiscal balance, and hence a larger deficit, is planned than in the flash estimate. A negative deviation (overestimate) indicates that a higher fiscal balance/lower deficit is planned.

Note 2: $\text{Error} = 100 * (\text{Observed value} / \text{Observed GDP} - \text{Estimated value} / \text{Estimated GDP})$

AIReF's forecasts made in 2023 were in line with the average of the Funcas Spanish Economic Forecast Panel⁴. If we eliminate the first two reports, drawn up in 2022, in which AIReF did not yet assess the regulatory measures approved subsequently, which led to an increase in the deficit, the average deficit of the Forecast Panel, like AIReF's, was half a point higher than the flash estimate. It should be noted that, since the third revision, 47% of the agencies recorded a higher deviation than AIReF on average, with deviations that on 12% of occasions exceeded 1 point of GDP, while AIReF's deviation remained below that threshold at all times. If we consider all the announcements analysed (revisions 1 to 6), AIReF was 0.5 points of GDP more accurate.

⁴International Financial Analysts (AFI); BBVA Research; CaixaBank Research; Chamber of Commerce of Spain; Centre for Economic Studies of Madrid (CEEM-URJC); Centre for Economic Prediction (CEPREDE-UAM); CEOE; Economic Team (Ee) ; Ethifinance Ratings; Funcas; Complutense Institute of Economic Analysis (ICAE-UCM) ; Institute of Economic Studies (IEE); Intermoney; Mapfre Economics; Oxford Economics; Repsol; Santander; Metyis; Universidad Loyola Andalusia.

FIGURE 7. FORECAST ERRORS (% GDP): COMPARISON WITH OTHER INSTITUTIONS (2023)



Source: IGAE, GSB, SPU, AIReF and Funcas.

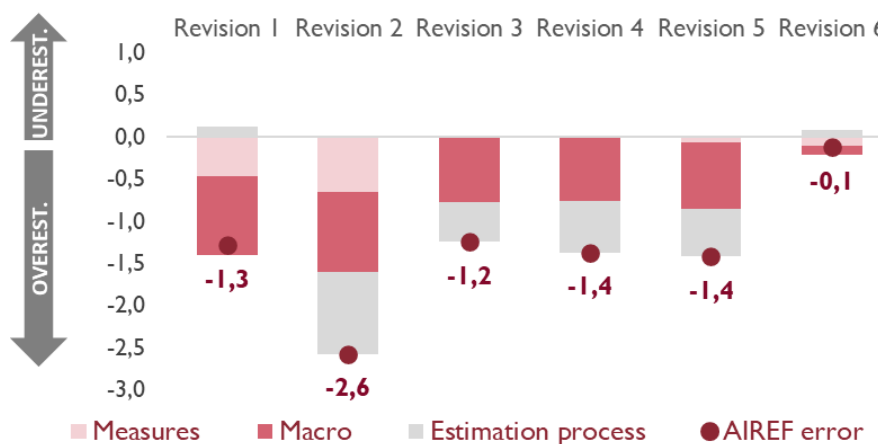
Note 1: A positive deviation (underestimate) means that a smaller fiscal balance, and hence a larger deficit, is planned than in the flash estimate. A negative deviation (overestimate) indicates that a higher fiscal balance/lower deficit is planned.

Note 2: $Error = 100 * (Observed\ value / Observed\ GDP - Estimated\ value / Estimated\ GDP)$

2.1.1. Revenue

AIReF's forecasts for revenue were close to the flash estimate in nominal terms, although they turned out to be lower in terms of weight of GDP due to the denominator effect. The deviations in the economic activity projections and the estimate processes themselves meant that the revenue forecast by AIReF exceeded the values finally achieved in terms of weight of GDP. In nominal terms, there was an underestimate of the revenue due to the macro effect that was offset by the overestimate caused by the estimate processes themselves. As from the third revision, the error components decreased after incorporating the extension of the tax cuts approved at the end of 2022 and the value of nominal GDP observed in 2022 into the forecast, which was higher than expected. However, the denominator effect maintained a deviation in terms of weight of GDP of more than 1 point until the last update, which incorporated the revision of the GDP series published by the INE in September 2023.

FIGURE 8. 2023 FORECAST ERRORS IN RESOURCES BY COMPONENTS (% GDP)

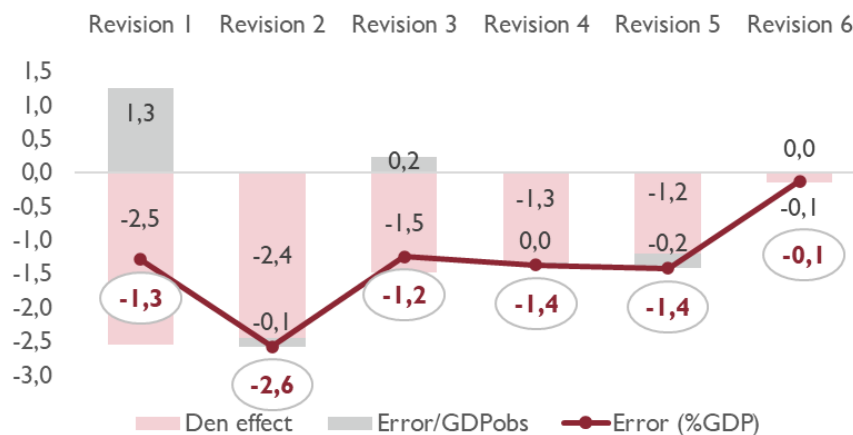


Source: IGAE and AIReF

Note 1: A positive deviation means that fewer resources are planned than in the forward figure and a negative deviation means that more resources are planned.

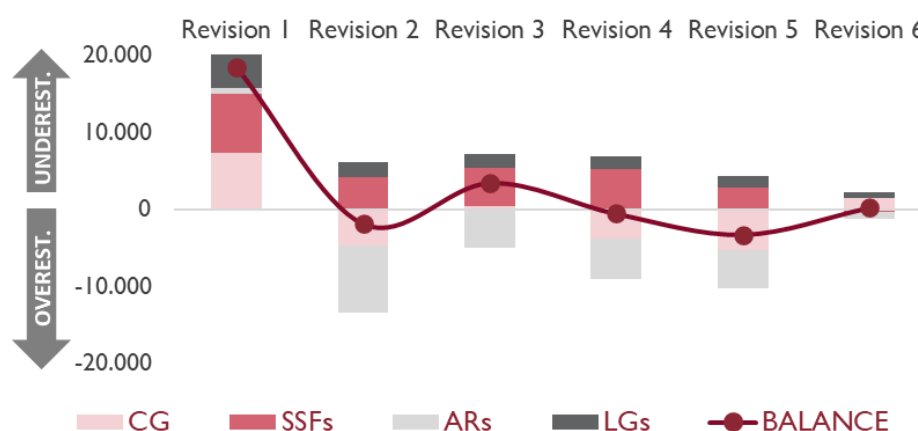
Note 2: $Error = 100 * (Observed\ value / Observed\ GDP - Estimated\ value / Estimated\ GDP)$

FIGURE 9. DENOMINATOR EFFECT ON THE 2023 FORECAST ERROR ON REVENUE



Source: IGAE and AIReF

AIReF forecast lower revenue for the Social Security Funds and the LGs which were offset by the overestimate of the Central Government and Autonomous Regions' revenue with respect to the values finally observed. In the first report, the deviation was common to all sub-sectors. Once the 2022 cut-off was known, the deviation downwards of Social Security and LG revenue was maintained while it was overestimated for the Central Government and the Autonomous Regions. Throughout the following revisions carried out in the reference year, the deviations were lower in all sub-sectors, although the overestimate was more persistent in the case of the ARs and LGs.

FIGURE 10. 2023 FORECAST ERRORS IN REVENUE BY SUB-SECTOR (EURO MILLION)


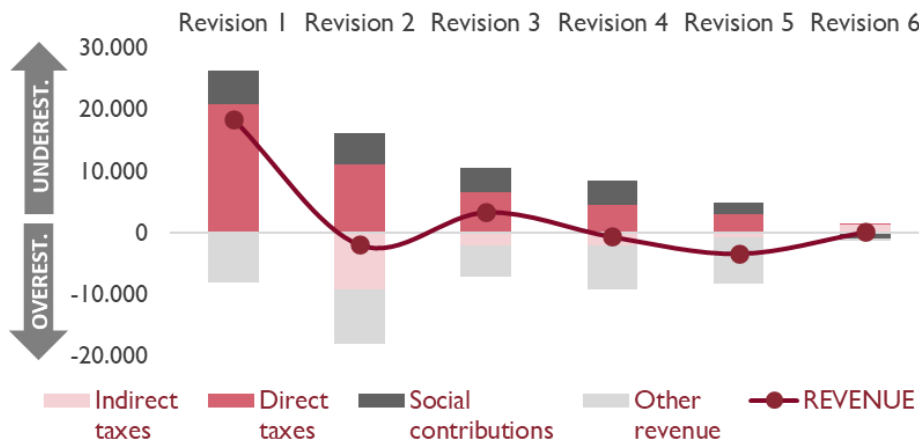
Source: IGAE and AIReF

Note 1: A positive deviation (underestimate) means that a smaller fiscal balance, and hence a larger deficit, is planned than in the flash estimate. A negative deviation (overestimate) indicates that a higher fiscal balance/lower deficit is planned.

Note 2: $\text{Error} = 100 * (\text{Observed value} / \text{Observed GDP} - \text{Estimated value} / \text{Estimated GDP})$

AIReF forecast lower tax collection in levels (million euros) than that observed in direct taxes and social contributions, which was offset by a higher forecast for indirect taxes and the rest of the revenue from the RTRP. The error arising from AIReF's models for the projection of direct taxes and social contributions was affected by the underestimate of economic activity. Furthermore, the extension to 2023 of the reductions in VAT rates, of the rate of the Special Tax on Electricity and the suspension of the Tax on the Value of Electricity Production (IVPEE), adopted to mitigate the effects of inflation, was not approved until the end of 2022, so the forecast for indirect taxes was overestimated in the first revisions and was corrected as the Government approved successive extensions. The underestimate of direct taxes was lower once the data on Corporate Income Tax collection in 2022 became available. With regard to the rest of the revenue, the deviation from their forecast was due to the overestimate of the RTRP, whose execution rate turned out to be lower than initially expected.

FIGURE 11. 2023 FORECAST ERRORS IN REVENUE BY HEADING (EURO MILLION)



Source: IGAE and AIReF

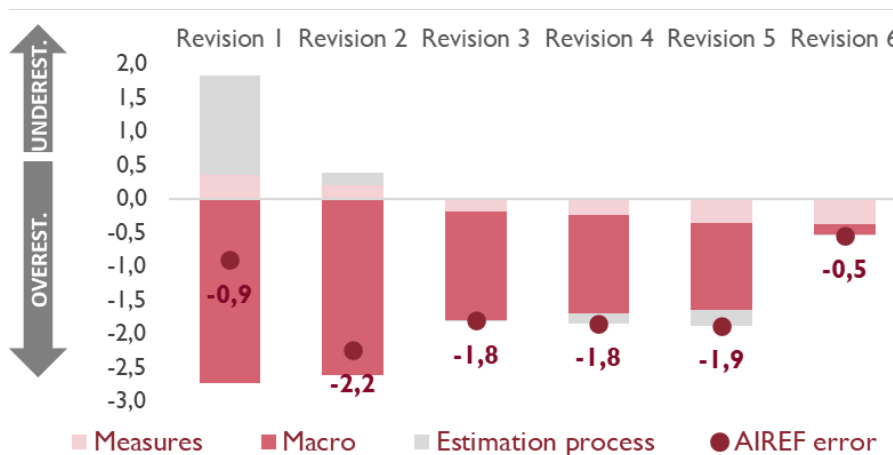
Note 1: A positive deviation means that fewer resources are planned than in the forward figure and a negative deviation means that more resources are planned.

Note 2: $Error = 100 * (Observed\ value / Observed\ GDP - Estimated\ value / Estimated\ GDP)$

2.1.2. Expenditure

AIReF's forecasts went from underestimating expenditure in 2023 in nominal terms to overestimating it after the close of 2022 and the approval of the extension of the measures, although it always forecast a higher weight of GDP due to the denominator effect. In all the revisions, more expenditure than finally recorded as a weight of GDP was forecast. Up to the third revision, the estimate error and the error arising from the valuation of the measures together partially offset the overestimate due to the macro effect. However, as from the incorporation of the flash estimate on the 2022 accounting close (revision 3) and the extension to 2023 of the measures included in RD-Law 20/2022, of December 27th, the overestimate accumulated, due to the effect of all the components.

FIGURE 12. 2023 FORECAST ERRORS IN EXPENDITURE BY COMPONENT (% GDP)



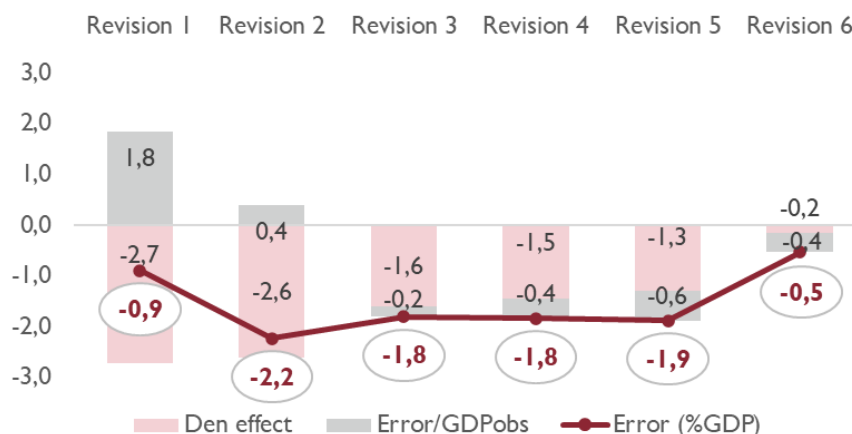
Source: IGAE and AIReF

Note 1: A positive deviation means that lower expenditures than in the flash estimate are foreseen and a negative deviation means that higher expenditures are foreseen.

Note 2: $Error = 100 * (Observed\ value / Observed\ GDP - Estimated\ value / Estimated\ GDP)$

The overestimate was mainly due to the effect of macroeconomic forecasts during the revisions as a whole. The denominator effect resulted in higher values in terms of weight of GDP as a result of the underestimate of nominal GDP. The overestimate derived from this denominator effect diminished as the year progressed and the information became more complete until it was reduced to 0.2 points of GDP once the revision of the National Accounts took place in September 2023. AIReF also forecast a higher cost of the measures approved, which contributed to the overestimate of expenditure in the reports issued in 2023.

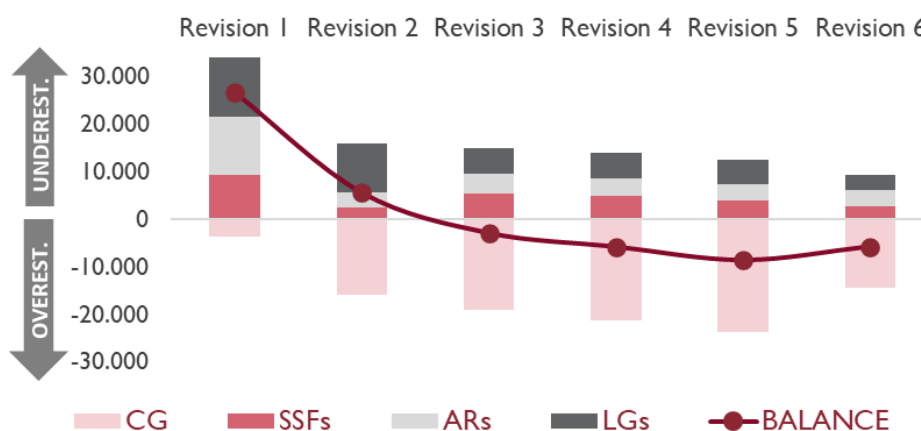
FIGURE 13. DENOMINATOR EFFECT ON EXPENDITURE FORECAST ERROR 2023 (% GDP)



Source: IGAE and AIReF

By sub-sector, in 2023 AIReF overestimated the amount of expenditure for the Central Government, while for the rest of the sub-sectors the expenditure was higher than AIReF's forecasts. For the Central Government (CG) there was an overestimate in all the revisions, which, in fact, grew until the penultimate announcement, which was substantially corrected in the last report, when it was still more than €15 bn. In the other sub-sectors, however, there was an underestimate of expenditure for 2023, especially for the Autonomous Regions and Local Governments, which also tended to be corrected in the different announcements as the year progressed, but did not offset the CG deviation.

FIGURE 14. FORECAST ERRORS IN EXPENDITURE BY SUB-SECTOR (EURO MILLION)



Source: IGAE and AIReF

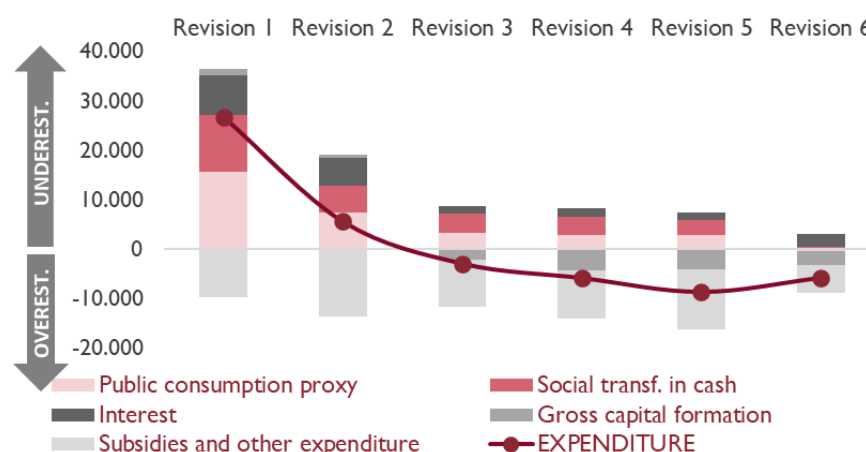
Note 1: A positive deviation means that lower expenditures than in the flash estimate are foreseen and a negative deviation means that higher expenditures are foreseen.

Note 2: Error s. Observed GDP= $100 \times (\text{Observed value} - \text{estimated value}) / \text{Observed GDP}$

The analysis by heading and by level (million euros) shows an overestimate, mainly in the forecast of subsidies and other expenditure and, since the third revision, in gross capital formation. These headings were particularly influenced by the overestimate of the RTRP and the valuation error in expenditure measures, which were concentrated in these items. There was an overestimate in spending on subsidies, as several of the measures approved during the year materialised in smaller amounts than expected. Noteworthy among these measures were the Tariff of Last Resort for gas for homeowners' associations, whose final impact was almost half of what had been expected since its approval, and the compensation to the CNMC for the suspension of the IVPEE, which was estimated at just over €1.1 bn although in the end it had no effect on expenditure. In gross fixed capital formation, there was an overestimate of the impact on this heading of the commitment to NATO to

increase defence spending, as AIReF expected an increase with respect to the 2022 level, although, in the end, there was a fall of more than €2 bn. Lastly, the heading for other capital transfers, mainly associated with court rulings, showed a lower value than expected, standing at very low values in historical terms.

FIGURE 15. 2023 FORECAST ERRORS IN EXPENDITURE BY HEADING (EURO MILLION)



Source: IGAE and AIReF

Note 1: A positive deviation means that lower expenditures than in the flash estimate are foreseen and a negative deviation means that higher expenditures are foreseen.

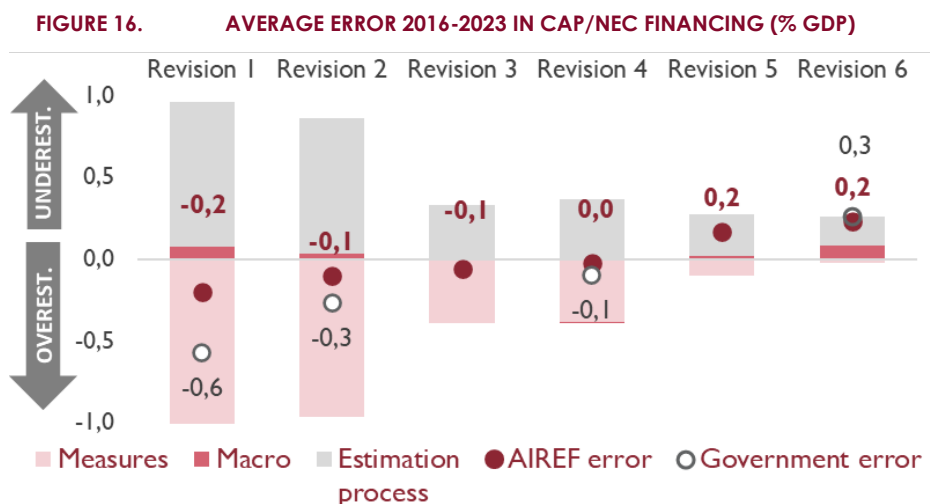
Note 2: Error= Observed Value - Estimated Value

In contrast, AIReF forecasts lower expenditure on public consumption, which was gradually corrected until the fifth revision, and on interest throughout the entire period under consideration. With regard to public consumption, there was an underestimate in all the revisions except the last one, with a slight overestimate of almost €300 m. Interest was also underestimated throughout the whole period, and although this error was corrected up to the third revision, the last three announcements resulted in a lower forecast of interest spending by €1.9 bn on average.

2.2. Evolution of forecast errors 2016-2023

The average error of AIReF's forecasts for the fiscal balance of the General Government for the period 2016-2023 was practically zero, and was 0.2 points more accurate than the average error of the Government. The average deviations in terms of weight of GDP committed in each of the forecasts (revisions) issued in the eight reference years analysed, stood at between 0.2 points too high and 0.2 points too low. The error components became smaller as the revisions progressed and tended to offset each other. In this regard, the

underestimate of the fiscal balance (overestimate of the deficit) due to the estimate procedures themselves was counterbalanced by subsequent government action, while deviations due to macroeconomic forecasts balanced out over the period analysed.



Source: IGAE, GSB, SPU and AIReF

Note 1: A positive deviation means that a smaller fiscal balance, and thus a larger deficit, is planned than in the flash estimate (pessimistic deviation). Overestimate indicates that a smaller deficit is expected (optimistic deviation).

Note 2: $\text{Error} = 100 * (\text{Observed value} / \text{Observed GDP} - \text{Estimated value} / \text{Estimated GDP})$

The inclusion of 2023 maintains the conclusion that there are no significant biases. Throughout the eight years analysed AIReF's forecasts showed alternating deviations due to over- and under-estimates with no significant biases. The percentage of occasions when AIReF underestimated the fiscal balance was 44% compared with 56% of overestimates, resulting in a balanced distribution, just the opposite of the Government, which overestimated the fiscal balance 56% of the time and underestimated it 44% of the time. If we take into account that the deviation is conditioned by the year under study and by the number of revisions considered⁵, AIReF's average deviations were underestimated in four of the eight years analysed, while those of the Government were underestimated in three of the eight years analysed, although AIReF underestimated the fiscal balance in all the revisions in two of the years analysed and overestimated it in another two, alternating

⁵ Government forecasts are only available for revisions 1, 2, 4 and 6, corresponding to reports on Draft Budgets and Stability Programme Updates (SPU).

in the remaining years, compared with the Government which has continuously underestimated the fiscal balance since the end of 2020.

TABLE 4. DEVIATION IN CAP/NEC FINANCING 2016-2023 (% GDP)

| | | Sign of deviation | | | | | | Deviation in % GDP | | | | | | | | |
|------------|------|-------------------|---|---|---|---|---|--------------------|----------------|----------|------|------|------|------|------|-------------|
| | Year | Revision | | | | | | TOTAL | Year | Revision | | | | | | AVERAGE |
| | | 1 | 2 | 3 | 4 | 5 | 6 | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| AIReF | 2016 | - | - | - | - | - | - | 18 | 2016 | -0,7 | -0,5 | -0,4 | -0,5 | -0,4 | - | -0,5 |
| | 2017 | + | + | + | + | + | + | | 2017 | 0,1 | 0,1 | 0,1 | 0,3 | 0,2 | - | 0,2 |
| | 2018 | - | - | - | - | + | + | | 2018 | -0,2 | -0,2 | -0,1 | -0,1 | 0,1 | 0,2 | -0,1 |
| | 2019 | - | - | - | - | - | - | | 2019 | -0,6 | -0,9 | -0,8 | -0,7 | -0,8 | -0,7 | -0,7 |
| | 2020 | - | - | - | - | + | + | | 2020 | - | - | 0,0 | 0,0 | 1,0 | 0,6 | 0,4 |
| | 2021 | + | + | + | + | + | + | | 2021 | 0,6 | 1,1 | 0,8 | 1,0 | 1,1 | 1,1 | 0,9 |
| | 2022 | - | + | - | - | - | - | | 2022 | -0,2 | 0,0 | -0,6 | -0,6 | -0,3 | -0,2 | -0,3 |
| | 2023 | - | - | + | + | + | + | | 2023 | -0,4 | -0,3 | 0,6 | 0,5 | 0,5 | 0,4 | 0,2 |
| | + | 2 | 3 | 2 | 2 | 4 | 5 | | Average | -0,2 | -0,1 | -0,1 | 0,0 | 0,2 | 0,2 | 0,0 |
| | - | 5 | 3 | 5 | 5 | 3 | 2 | | | | | | | | | |
| Government | 2016 | - | - | - | - | - | - | 15 | 2016 | -1,7 | -1,8 | - | -0,9 | - | - | -1,5 |
| | 2017 | - | + | + | + | + | + | | 2017 | -0,2 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | -0,1 |
| | 2018 | - | - | - | - | + | + | | 2018 | -0,4 | -0,3 | -0,4 | -0,4 | 0,1 | - | -0,3 |
| | 2019 | - | - | - | - | - | - | | 2019 | -1,5 | -1,1 | - | -0,8 | -0,8 | - | -1,0 |
| | 2020 | - | - | - | - | + | + | | 2020 | - | - | -0,7 | -0,7 | 0,3 | - | -0,2 |
| | 2021 | + | + | + | + | + | + | | 2021 | 0,8 | 0,8 | 1,6 | 1,6 | 1,5 | 1,3 | 1,3 |
| | 2022 | + | + | + | + | + | + | | 2022 | 0,2 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 | 0,2 |
| | 2023 | + | + | + | + | + | + | | 2023 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 | 0,3 |
| | + | 2 | 4 | 4 | 4 | 5 | 5 | | Average | -0,6 | -0,3 | -0,1 | -0,1 | 0,3 | 0,3 | -0,2 |
| | - | 4 | 3 | 4 | 4 | 1 | 1 | | | | | | | | | |

Source: IGAE, GSB, SPU and AIReF

Note 1: A positive deviation (underestimate) means that a smaller fiscal balance, and hence a larger deficit is planned than in the flash estimate. A negative deviation (overestimate) indicates that a higher fiscal balance/lower deficit is planned.

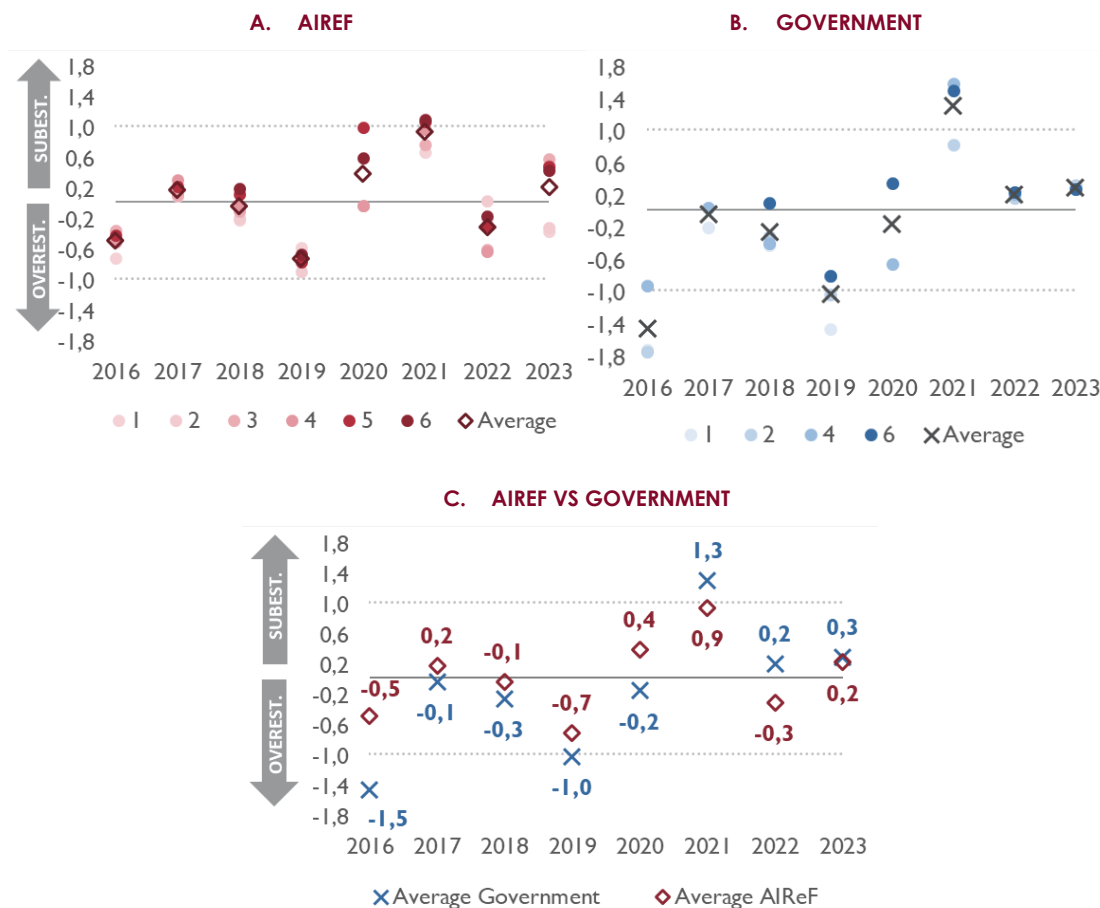
Note 2: $\text{Error} = 100 \times (\text{Observed value} / \text{Observed GDP} - \text{Estimated value} / \text{Estimated GDP})$

Note 3: In 2016 and 2017, the last report is omitted because the closure was already known at the time of issuance. In 2020, the first two reports are excluded because the arrival of the pandemic was not known at the time of their preparation.

Quantitatively AIReF's forecasts were better than the Government's in average terms for the whole period. As regards their magnitude, AIReF's deviations remained below 1 point of GDP on 91% of occasions (40 out of 44 revisions) while those of the Government did so in 88% of its forecasts (21 out of 27 revisions). Finally, 2019 and 2021 were the years with the largest deviations in

AIReF's case, with 2016, 2019 and 2021 being the years with the largest errors by the Government.

FIGURE 17. DEVIATION IN CAP/NEC FINANCING IN SUCCESSIVE REVISIONS (%GDP)



Source: IGAE, GSB, SPU and AIReF

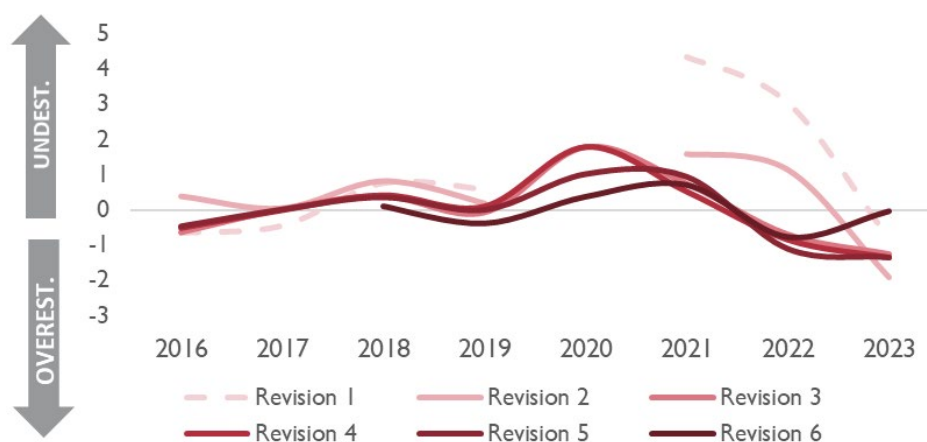
Note 1: A positive deviation (underestimate) means that a smaller fiscal balance, and hence a larger deficit, is planned than in the flash estimate. A negative deviation (overestimate) indicates that a higher fiscal balance/lower deficit is planned.

Note 2: $Error = 100 * (Observed\ value / Observed\ GDP - Estimated\ value / Estimated\ GDP)$

2.2.1. Revenue

The error in the revenue forecast decreased in 2022, following increases in 2020 and 2021. The error arising from AIReF's models for the forecast of both the macroeconomic scenario and revenue (macro error + estimate error) decreased over the successive updates, with alternating signs. Of note is the underestimate of revenue that occurred in the first revisions of 2021 and 2022 which fell in the 2023 forecasts. Also noteworthy is the reduction in the deviation in terms of weight of GDP that occurred in the last revision in 2023, following the incorporation of the revision of the historical GDP series.

FIGURE 18. MODELLING ERROR (MACRO ERROR + ESTIMATE ERROR) IN REVENUE FORECASTS 2016-2023 (% GDP)



Source: IGAE and AIReF

Note 1: A positive deviation means that fewer resources are planned than in the forward figure and a negative deviation means that more resources are planned.

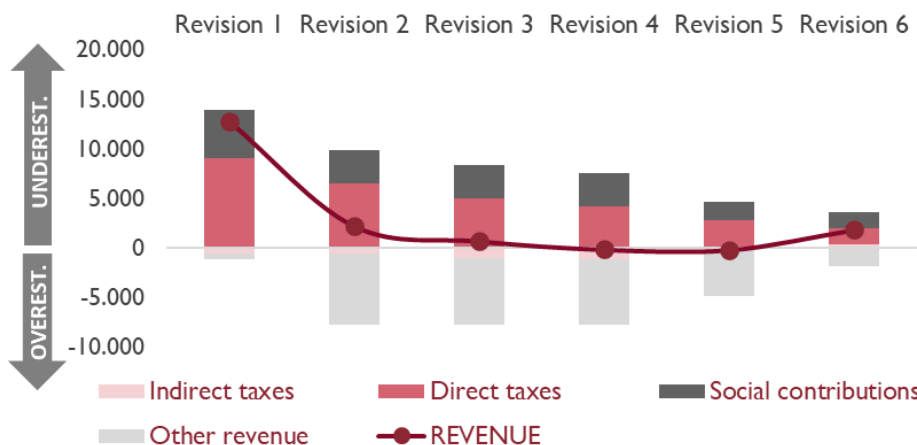
Note 2: $\text{Error} = 100 * (\text{Observed value} / \text{Observed GDP} - \text{Estimated value} / \text{Estimated GDP})$

Note 3: In 2016 and 2017, the last report is omitted because the closure was already known at the time of issuance. In 2020, the first two reports are excluded because the arrival of the pandemic was not known at the time of their preparation.

With the addition of 2023, the underestimate of direct taxes decreases and, to a lesser extent, the overestimate due to the RTRP. The deviations in the forecasts for direct taxes were overestimated in most of the years analysed. Indirect tax forecasts showed a change in the sign of the deviation, from an overestimate until 2020 to an underestimate from 2021 onwards, coinciding with an increase in the elasticity of tax bases with respect to economic activity⁶, which reached maximum values in 2021 and returns to historical values in 2023. Social contributions also showed an underestimate that became more pronounced during the pandemic and declined in recent years. Finally, the deviations of other revenue, whose deviation up to 2020 was neither positively nor negatively biased, showed an overestimate since the introduction of the RTRP.

⁶ See [Technical Document 2/23](#)

FIGURE 19. EVOLUTION OF THE FORECAST ERROR IN RESOURCES BY HEADING: AVERAGE 2016-2023 ACCORDING TO REVIEWS (EURO MILLION)

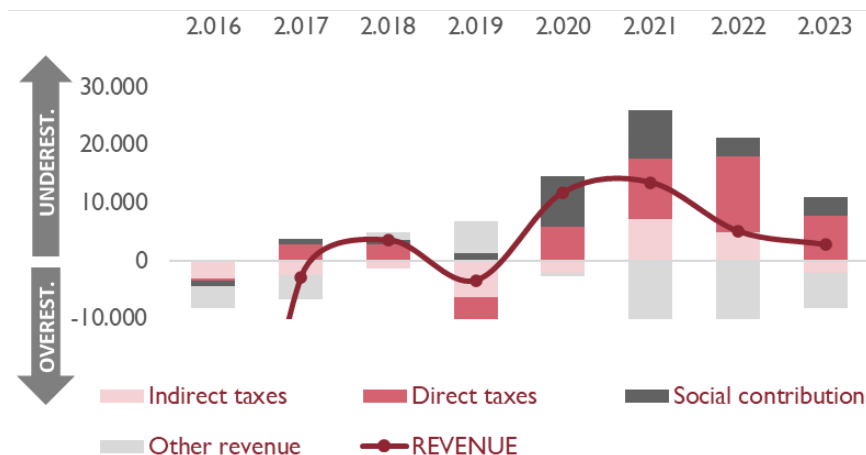


Source: IGAE and AIReF

Note 1: A positive deviation means that fewer resources are planned than in the forward figure and a negative deviation means that more resources are planned.

Note 2: Error= Observed value- Estimated value

FIGURE 20. EVOLUTION OF FORECAST ERRORS IN RESOURCES BY HEADING: AVERAGE REVISIONS IN EACH YEAR (EURO MILLION)



Source: IGAE and AIReF

Note 1: A positive deviation means that fewer resources are planned than in the forward figure and a negative deviation means that more resources are planned.

Note 2: Error= Observed Value - Estimated Value

On average, AIReF's forecasts for revenue deviated by 0.5% from their final value over the years analysed. In relative terms with respect to the value finally observed, the biggest deviations occurred in other revenue, including the RTRP, with an overestimate of 7.3% with respect to its final value, although the

opposite direction of the final deviation was defined by the greater weight of the deviations in the forecasts for direct taxes and social contributions, which were 3.2% and 1.9% respectively less than the published value. On the other hand, the smallest deviations corresponded to the forecast of indirect taxes, which exceeded the value published in the flash estimate by 0.6% on average.

TABLE 5. AVERAGE RELATIVE ERROR 2016-2023 BY REVENUE HEADING (%)

| | Average relative error | | | | |
|----------|------------------------|----------------|--------------|--------------|-------|
| | REVENUE | Indirect taxes | Direct taxes | Social cont. | Other |
| Average | 0,5 | -0,6 | 3,2 | 1,9 | -7,3 |
| 2016 | -2,0 | -2,4 | -0,4 | -0,7 | -8,6 |
| 2017 | -0,7 | -1,8 | 2,3 | 0,7 | -9,4 |
| 2018 | 0,8 | -0,9 | 2,1 | 0,6 | 2,6 |
| 2019 | -0,7 | -4,5 | -3,0 | 0,8 | 10,1 |
| 2020 | 2,5 | -1,6 | 4,7 | 5,4 | -1,4 |
| 2021 | 2,6 | 4,9 | 7,2 | 4,8 | -19,1 |
| 2022 | 0,9 | 3,1 | 8,0 | 1,8 | -24,6 |
| 2023 | 0,4 | -1,3 | 4,2 | 1,6 | -7,7 |
| Av. Str. | 100,0 | 29,1 | 26,7 | 32,1 | 12,1 |

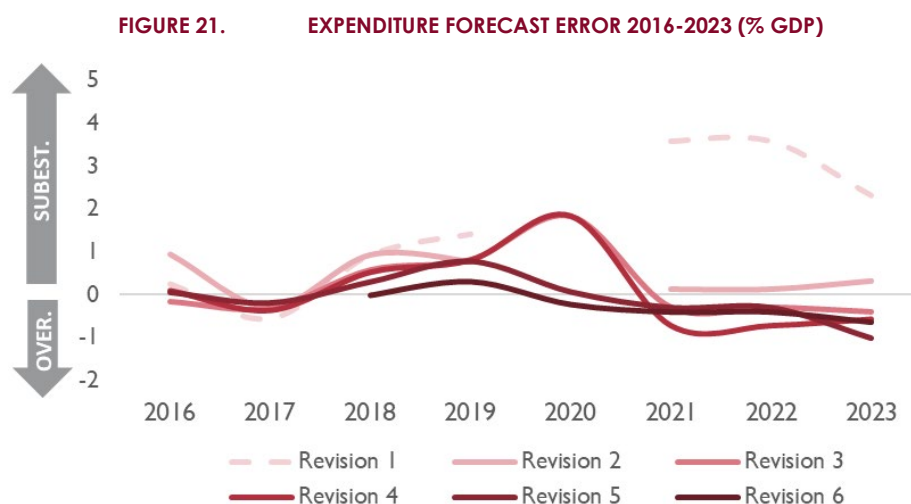
Source: IGAE and AIReF

Note1: A positive deviation means that fewer resources are planned than in the forward figure and a negative deviation means that more resources are planned.

Note 2: Relative error= 100*(Observed value - Estimated value)/Observed value.

2.2.2. Expenditure

AIReF tends to underestimate expenditure due to measures that have not been previously announced, and this effect is corrected as they become known throughout the fiscal year. Up to 2020, with the exception of 2017, all the revisions of the estimate tended to underestimate expenditure on average. Since 2021, in the first two revisions, this underestimate continues to occur due to measures not previously envisaged, first due to the outbreak of the pandemic and since 2022 due to the effects of the war in Ukraine on public accounts, but since the third revision the trend has been reversed and the overestimate occurs due to a lower execution than expected for these measures.



Source: IGAE and AIReF

Note 1: A positive deviation means that lower expenditures than in the flash estimate are foreseen and a negative deviation means that higher expenditures are foreseen.

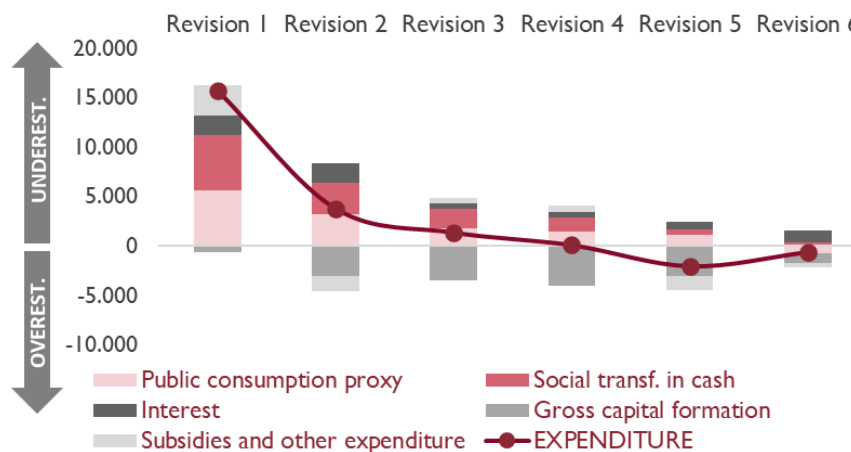
Note 2: $\text{Error} = 100 \times (\text{Observed value} / \text{observed GDP} - \text{estimated value} / \text{estimated GDP})$

Note 3: In 2016 and 2017, the last report is omitted because the closure was already known at the time of issuance. In 2020, the first two reports are excluded because the arrival of the pandemic was not known at the time of their preparation.

The adoption of measures during the fiscal year accounts for much of the average underestimate of expenditure between 2020 and 2023. The uncertainty associated with the economic, social and political context has also passed through to the expenditure forecasts through the measures the GG sub-sectors have taken as risks materialised. In the first instance, measures to mitigate the effects of COVID-19 were extended in 2020 and 2021. Subsequently, accelerating inflation, with a particular impact on energy and food, exacerbated by the impact of Russia's invasion of Ukraine, led to the adoption of successive packages of measures from the second half of 2021. In addition, inflation also had an impact on expenditure through different channels and headings, such as interest, social transfers and public consumption.

By heading, in nominal terms and taking the average since 2016, it can be seen that higher gross fixed capital formation is estimated than observed throughout all the revisions. In contrast to the other headings, gross fixed capital formation is the only one in which there is a positive estimate error (higher expenditure) in all of the revisions. The rest of the headings show a correction of the error as the year progresses, especially in government consumption and social transfers in cash.

FIGURE 22. EVOLUTION OF THE FORECAST ERROR IN EXPENDITURES BY HEADING: AVERAGE 2016-2023 ACCORDING TO REVIEWS (EURO MILLION)



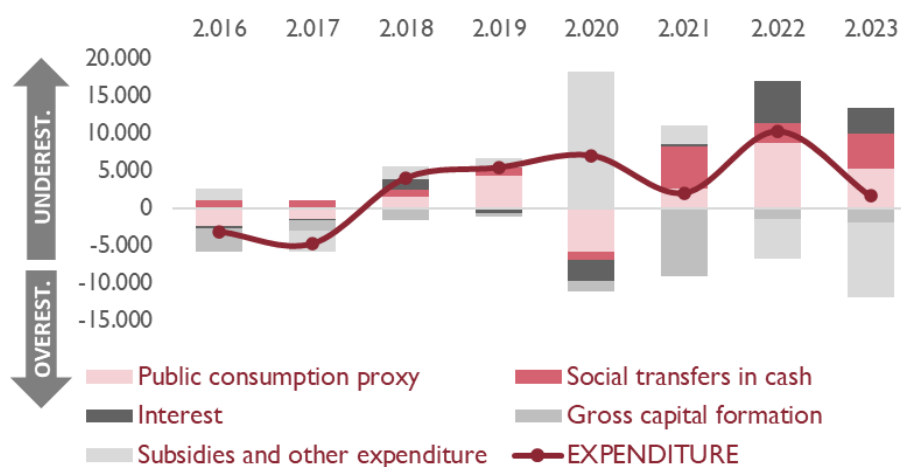
Source: IGAE and AIReF

Note 1: A positive deviation means that lower expenditures than in the flash estimate are foreseen and a negative deviation means that higher expenditures are foreseen.

Note 2: Error = Observed value - Estimated value.

The analysis by heading of the average of all revisions, for each year and in millions of euros, shows a lower average expenditure forecast for all headings except gross capital formation. The year 2020 stands out, when the outbreak of the pandemic caused a significant underestimate of expenditure on subsidies of more than 18 billion euros and a significant overestimate in other expenditure, possibly due to an incorrect distribution by heading of the new measures approved to alleviate the situation and the concentration of many of the non-recurrent expenditure operations in that year. From 2022 onwards, the opposite effect occurred, and the overestimate began to appear in subsidies and other expenditure, where most of the measures approved to protect the different productive sectors and the population on low income were expected to have an impact, while there was an error in the opposite direction with an estimate of lower expenditure than expected for other expenditure.

FIGURE 23. EVOLUTION OF FORECAST ERRORS IN EXPENDITURES BY HEADING: AVERAGE REVISIONS IN EACH YEAR (EURO MILLION)



Source: IGAE and AIReF

Note 1: A positive deviation means that lower expenditures than in the flash estimate are foreseen and a negative deviation means that higher expenditures are foreseen.

Note 2: Error = Observed value - Estimated value.

On average, AIReF's expenditure forecasts deviated by 0.4% from their final value over the years analysed. In relative terms with respect to the value finally observed, the largest deviations occurred in gross fixed capital formation, due to the inclusion of the RTRP, with an overestimate of 8.9% with respect to its final value, although the opposite direction of the final deviation was defined by the greater weight of the deviations in compensation of employees, intermediate consumption and social transfers in cash, which were 0.5%, 0.8% and 0.9% respectively less than the published value and together account for 75% of the average structure of the expenditure. The smallest deviations were for social benefits in cash, which, on average barely exceeded the value finally published.

TABLE 6. AVERAGE RELATIVE ERROR 2016-2022 BY EXPENDITURE HEADINGS (%)

| | Average relative error | | | | | | | |
|------------------|------------------------|------|-----------------|------------------|-------------------|----------|-------|------------------|
| | EXPENDITURE | CoE | Interm. Consum. | Soc. Trans. kind | Soc. Transf. cash | Interest | GFCF | Subs. and others |
| Average | 0,4 | 0,5 | 0,8 | 0,0 | 0,9 | 2,4 | -8,9 | 1,3 |
| 2016 | -0,7 | -0,2 | -3,0 | -1,6 | 0,6 | -0,9 | -14,6 | 4,2 |
| 2017 | -1,0 | -1,0 | 0,2 | -1,3 | 0,6 | -0,3 | -6,5 | -7,6 |
| 2018 | 0,8 | 0,4 | 1,5 | 0,4 | 0,5 | 4,7 | -6,2 | 4,3 |
| 2019 | 1,0 | 1,3 | 2,3 | 3,5 | 0,6 | -2,6 | -1,8 | 2,8 |
| 2020 | 1,2 | -1,1 | -4,7 | -3,7 | -0,5 | -11,1 | -5,1 | 28,3 |
| 2021 | 0,3 | 1,4 | 0,6 | 0,4 | 2,5 | 1,4 | -28,6 | 3,7 |
| 2022 | 1,6 | 1,8 | 6,8 | 2,2 | 1,1 | 18,1 | -3,7 | -8,2 |
| 2023 | 0,2 | 1,7 | 2,9 | 0,3 | 1,9 | 9,7 | -4,4 | -17,0 |
| Estr. Av. | 100,0 | 24,9 | 11,9 | 6,1 | 37,1 | 5,3 | 5,7 | 9,0 |

(Public consumption proxy)

Source: IGAE and AIReF

Note 1: A positive deviation means that lower expenditures than in the flash estimate are foreseen and a negative deviation means that higher expenditures are foreseen.

Note 2: Relative error= 100*(Observed value - Estimated value)/Observed value

3. CONCLUSIONS

The Spanish economy maintained a markedly expansionary tone in 2023, beyond the forecasts of practically all analysts. The positive evolution of consumption, particularly public consumption, together with a more moderate increase in investment compared with what was initially forecast and a very subdued performance of imports, meant that the growth expectations for 2023 made at the end of 2022 were exceeded. According to the analysis of the factors explaining the estimate error, both the new National Accounts data referring to 2022 and the new revision policy implemented in 2023, although they do not fully explain it, did contribute significantly to explaining this result. In this regard, it should be stressed that the improvement in the quality of economic forecasts should involve further information on the explanatory factors underlying these revisions. Taking a more medium-term approach, the statistical analysis of the forecast errors shows how the quality metrics of the forecast errors made by AIReF in estimating the macroeconomic outlook remain high, albeit with some weaknesses as regards investment and expenditure. Although these weaknesses are statistically indistinguishable from those of other forecasts, AIReF will continue to improve its models and tools.

At the budgetary level, the analysis does not identify any significant biases in AIReF's fiscal forecasts over the period 2016-2023. Over the entire period, the average error was practically zero, with deviations that were offset. On average, the deviation in the fiscal balance was low, with larger deviations in the expenditure and revenue forecasts since the outbreak of the pandemic

as a result of the adoption of measures at later times and a slower execution of the RTRP than initially forecast, also affected by the underestimate of the recovery in economic activity that has been corrected following the revision of the National Accounts series performed by the INE in September 2023.

AReF's forecasts were, on average, more accurate than those of the Government. Despite the fact that at the close of 2023, AReF's forecasts were 0.2 points less accurate than the Government's, in general, for all the time horizons analysed, AReF's forecasts were more accurate and balanced, being on average 0.2 points more accurate and with alternating under and over deviations, from which we can conclude there were no significant biases, compared with the Government's deviations which, since the close of 2020, have remained above the deficit finally observed.

AReF continues to work on improving the areas identified as having the greatest weaknesses. In this regard, it is worth highlighting the new RTRP monitoring tool that AReF has developed, although the limited availability of information on the impact of the plan in national accounting terms for the revenue and expenditure of the GG is beyond AReF's scope. This improvement in the monitoring of the RTRP will make it possible to reduce errors in headings such as gross capital formation. Also, as from the start of 2024, improvements have been made to the Corporate Income Tax forecasting methods, breaking down the level of analysis with separate projections on the tax bases of instalment payments by type of company and method of calculating the tax liability. Despite these improvements, it should be noted that it is impossible to anticipate the impact on forecasts of unannounced measures, due to their discretionary nature.

ANNEX I. BREAKDOWN OF THE STATISTICAL ANALYSIS OF THE MACROECONOMIC FORECASTS FOR THE PERIOD 2016-2023.

The evaluation of the statistical quality of the macroeconomic forecasts is made on the basis of the analysis of the forecast errors made in comparison with the observed data. Forecast errors are defined as the difference between the predicted value and the observed value for each of the macroeconomic aggregates considered, so that positive/negative errors imply an over/underestimate. The analysis considers as observed data the first annual estimate obtained with the publication of the QNA for the last quarter of the year, without taking into consideration the successive revisions that this body performs of the main macroeconomic indicators.

In addition to analysing forecast errors, a comparative analysis with those made by other analysts and agencies is also carried out, as this provides relevant information on the nature of these errors. For example, the existence of significant errors, common to all analysts, could reflect the influence of phenomena that cannot be anticipated or major revisions in the historical figures of the National Accounts aggregates. In contrast, the possible existence of more significant errors or systematic biases in some of the aggregates compared with the rest of the analysts could indicate the existence of weaknesses in the tools or methodologies used by AIReF.

This approach is based on an analysis of the forecasts made by AIReF since 2015 - the first year available - as well as those made by a number of institutions and private analysts since 1999. Given that not all the agencies and institutions produce their forecasts at the same point in time, there could be differences justified by the set of information available. To try to minimise this effect, we have selected the estimates made at two specific moments that mark the main milestones in the budgetary process: the first coincides with the updating of the Stability Programme, which is performed between March and May each year; the second corresponds to the preparation of the Budgetary Plan and the General State Budget, which are generally drawn up between September and October each year. These two periods are hereinafter referred to as "spring" (S) and "autumn" (A), respectively.

The variables of analysis are the annual growth forecasts of gross domestic product (GDP) and of the main demand-side aggregates in volume terms, as well as employment growth, measured through full-time equivalent employment.

The agencies and institutions considered are all those that make up the Funcas Panel, as well as the European Commission, the Bank of Spain and the Government.

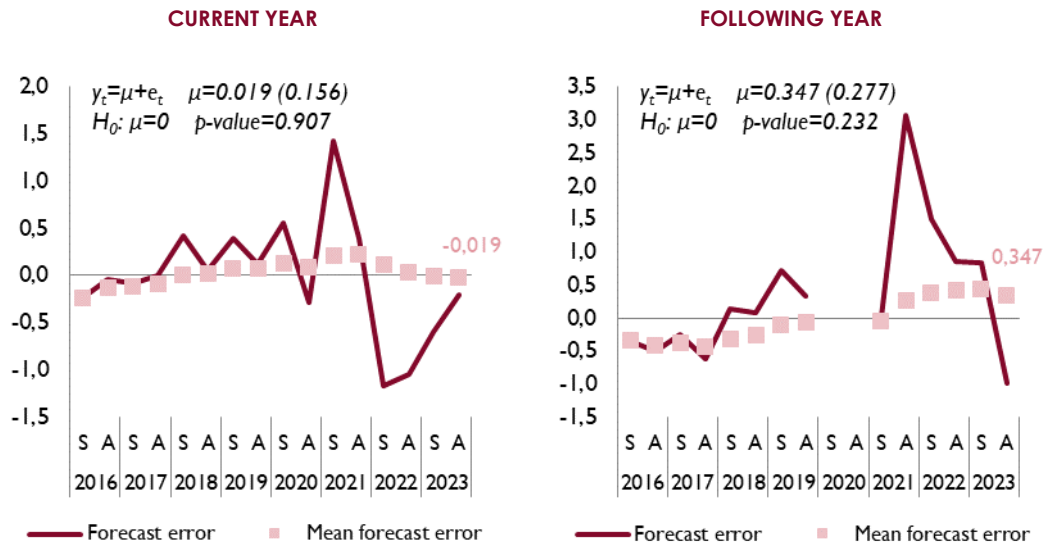
The properties of some of the statistics used could be conditioned by the small sample size, especially when this period incorporates such an intense shock as COVID-19. In order not to distort the analysis of the forecasts for the following year, the errors made in 2020 are not included in the analysis, i.e. they are taken as missing values, due to the impossibility of foreseeing the outbreak of COVID-19 and so as not to alter the quality metrics. This adaptation of the sample available does not alter the main conclusions on the quality of the forecasts and does not mask factors that have affected the estimates following the pandemic.

Analysis of Gross Domestic Product Forecasts

The size of forecast errors in the GDP estimates made in 2023 is reduced. The forecast errors made when estimating the GDP growth rate are maintained at low levels until COVID-19, after which they increase, reflecting greater uncertainty. Lower forecast errors are observed in those estimates where more information is available, i.e. in the autumn estimates compared with the spring estimates and the estimates for the current year compared with those for the following year.

Furthermore, the mean error in the estimates made by AIReF returns to negative territory, although it is not significantly different from zero. Up to 2018, AIReF's estimates for the current year and the following year forecast lower growth than that observed, so that the Mean Error (ME), as an approximation of the bias, was negative, indicating that the forecasts had been more pessimistic than the actual data; this trend is reversed in the period 2019-2022 and resumes in 2023. In any event, this bias is insignificant - if tested by estimating a regression of the forecast errors against a constant - with a p-value greater than 0.90. For the following year, the mean error enters positive territory in 2021, although it is not statistically different from zero either.

FIGURE ANNEX I.1. EVOLUTION OF FORECAST ERRORS AND THE AVERAGE ERROR OF GROSS DOMESTIC PRODUCT ESTIMATES

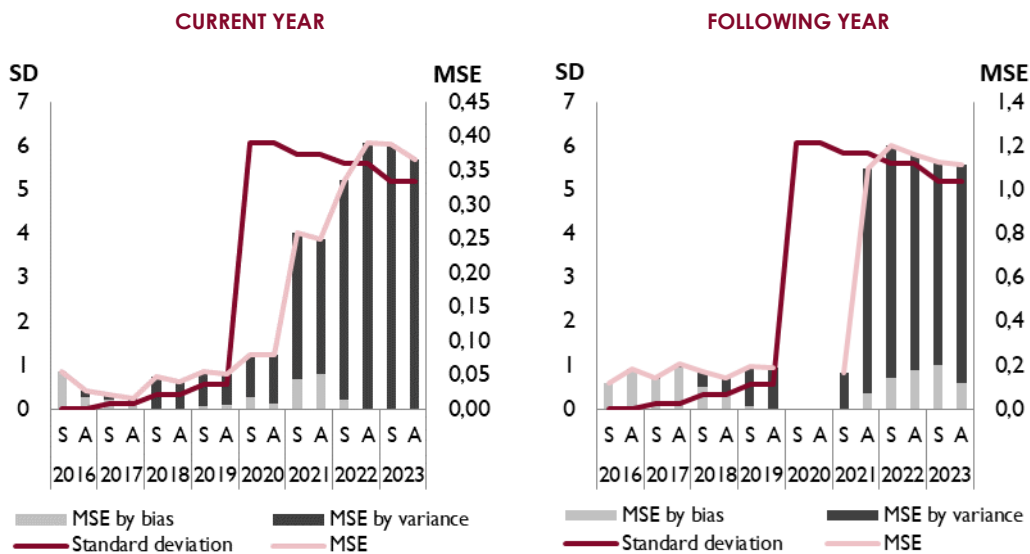


Source: INE and AIReF

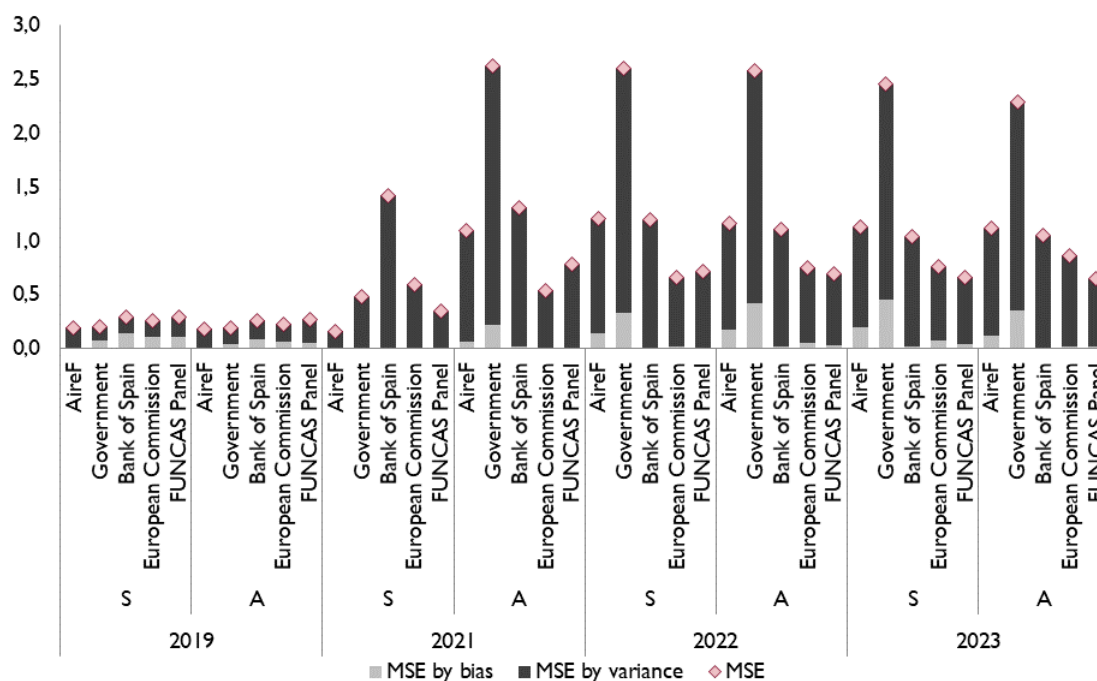
There is also a reduction in the mean squared error in the latest GDP forecasts.

The mean squared error had been increasing as a result of the outbreak of the consecutive shocks observed since 2020, but in the forecasts for the last year this has started to decrease. As shown below, the fact that large errors persist in the current estimates is common to all other forecasting agencies, indicating that the loss of accuracy is due to external factors. These include the increased volatility of macroeconomic indicators and hence of the RTRP series over the last two years (see Annex III), uncertainty about the evolution of the pandemic and the impact of the measures contained in the RTRP.

FIGURE ANNEX I.2. EVOLUTION OF THE ROOT MEAN SQUARED ERROR OF ESTIMATES AND STANDARD DEVIATION OF GROSS DOMESTIC PRODUCT IN VOLUME TERMS

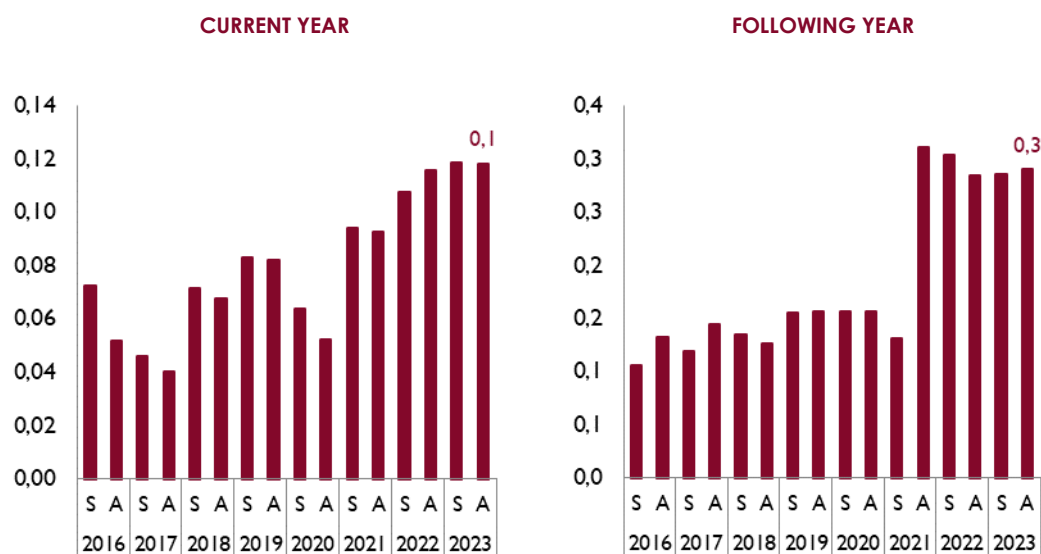


Source: INE and AIReF

FIGURE ANNEX I.3. COMPARISON OF THE AVERAGE SQUARE ERROR OF THE AGENCIES OF GROSS DOMESTIC PRODUCT IN VOLUME TERMS


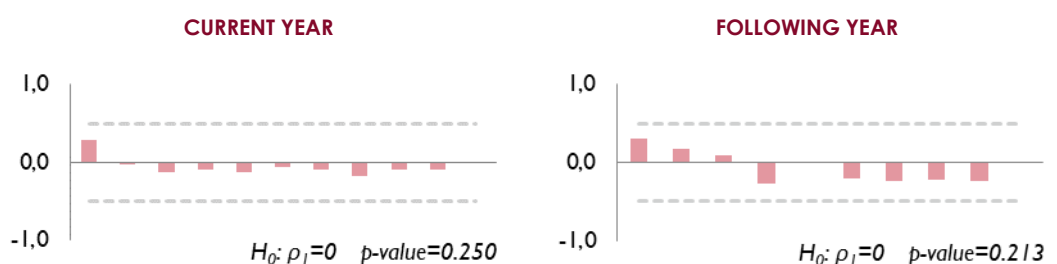
Source: INE and AIReF

AIReF's forecasts substantially exceed the efficiency of a naive estimate. Their's U statistic (TU) is used, defining the naive forecast as the latest available observed value. Values of the statistic lower than unity indicate greater accuracy of the estimate compared with the naive forecast and vice versa, with lower values therefore being a sign of greater efficiency. In the GDP forecasts for the current year, the average value of the statistic is much lower than unity; hence, AIReF's forecasts are clearly better than the naïve forecast. In the estimates for the following year, the statistics show somewhat higher figures, albeit still below unity.

FIGURE ANNEX I.4. EVOLUTION OF THE THEIL'S U-STATISTIC FOR GROSS DOMESTIC PRODUCT ESTIMATES IN VOLUME TERMS


Source: INE and AIReF

The forecast errors made by AIReF are not persistent over time, both for the current year and for the following year. By testing the significance of the first lag of the simple autocorrelation function of the forecast errors, a sufficiently small value of the test statistic is observed. Consequently, the null hypothesis of no correlation at the 20% significance level cannot be rejected for both the current and following year estimates.

FIGURE ANNEX I.5. SIMPLE AUTOCORRELATION FUNCTION OF THE FORECAST ERRORS OF GROSS DOMESTIC PRODUCT IN VOLUME TERMS


Source: INE and AIReF

Analysis of forecasts for demand aggregates

The errors made when estimating the demand aggregates are, in general, of a greater magnitude than those of GDP. However, as seen in the analysis of this aggregate, the outbreak of the pandemic has generated larger deviations in the forecasts with respect to the data observed in 2020-2021, and these are much larger in the estimates for the following year. Likewise, the errors of the autumn forecasts are lower than those of the spring forecasts.

For private consumption, the average forecast error is reduced for both the current year and the following year. The estimates for the following year show

forecast errors that are mostly positive which, although, they enter negative territory in 2023, result in a significantly non-zero bias reflecting a certain optimism (see Figure Annex I.6 for the estimates of private consumption for the current and the following year).

AIRcF's forecasts reflect an absence of significant biases when estimating public consumption for the current year, but their presence is maintained in the forecasts for the following year. The strong positive deviation in 2020 for the estimates for the current year (see figures in Annex I.7 for the estimates of public consumption for the current year and the following year), derived from a forecast increase in expenditure linked to the measures aimed at mitigating the effects of the pandemic that was ultimately greater than that observed in the first INE estimate, shifted the sign of the average error in the estimates for the current year into positive territory, although in the last year it returns to negative values. For the following year, errors persist, mostly with a negative sign, causing the bias in the estimates to be non-zero, which implies a tendency to observe higher public consumption than predicted.

The positive bias of the following year's estimates for gross capital formation is slightly reduced. The average error up to 2020 is slightly positive for the current and following year estimates. In the estimates for the current year, with the outbreak of the pandemic, large negative forecast errors occur and lead to a change of sign in the bias, which has been gradually corrected. However, for the following year, a more favourable evolution than finally observed since the outbreak of COVID-19 is forecast, due to the expected impact of the RTRP that has been postponed, implying downward revisions of its effect in the years 2021, 2022 and 2023. This means that the bias for the current year is not significantly different from zero, but a significant non-zero bias appears for the following year.

The average error for exports and imports of goods and services has been reduced in the latest forecasts for the current year. Meanwhile, for the following year, the average error remains stable for exports, but increases in the case of imports, exacerbating the positive bias in estimating them. This more favourable evolution expected for imports in the following year derives from the relationship of this aggregate with gross fixed capital formation, which has been continuously overestimated by the revisions of the expected impact of the RTRP. Thus, in the case of exports, no bias can be seen in the forecasts for either the current year or the following year, while for imports, there is a significant optimistic bias when estimating the following year.

EVOLUTION OF FORECAST ERRORS AND THE AVERAGE ERROR OF DEMAND AGGREGATES ESTIMATES

FIGURE ANNEX I.6. PRIVATE CONSUMPTION

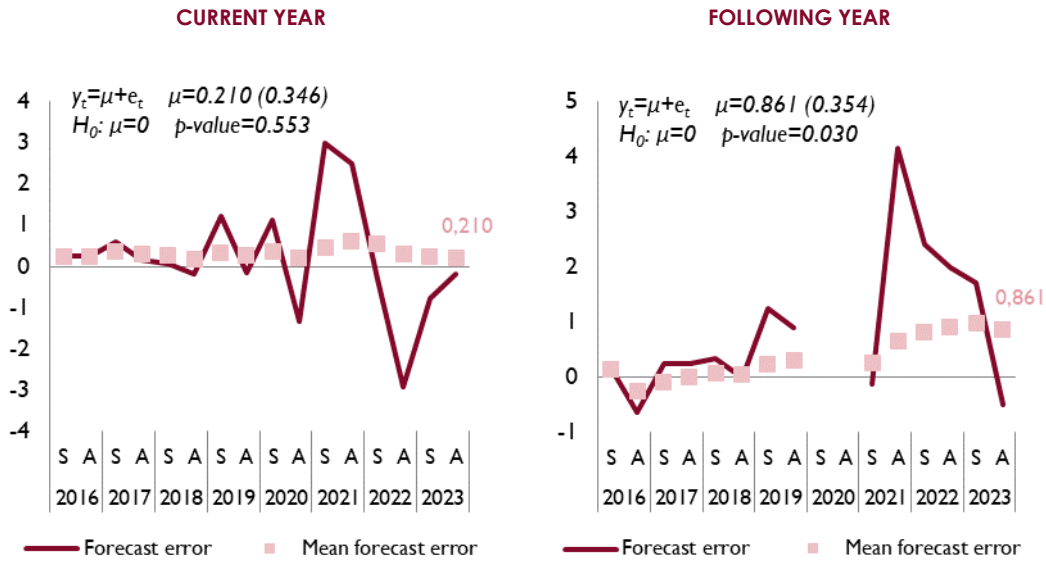


FIGURE ANNEX I.7. PUBLIC CONSUMPTION

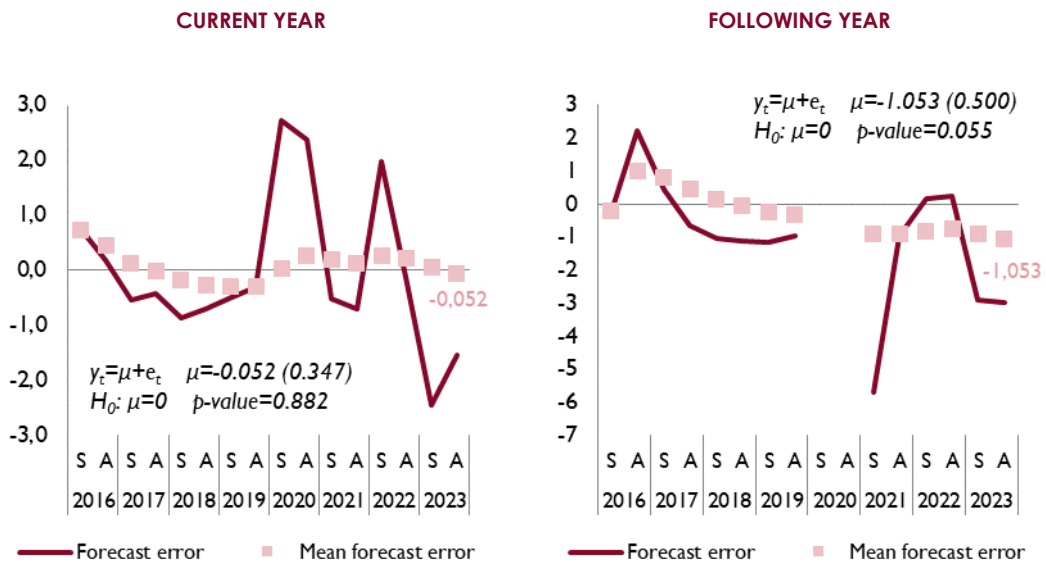


FIGURE ANNEX I.8. GFCF

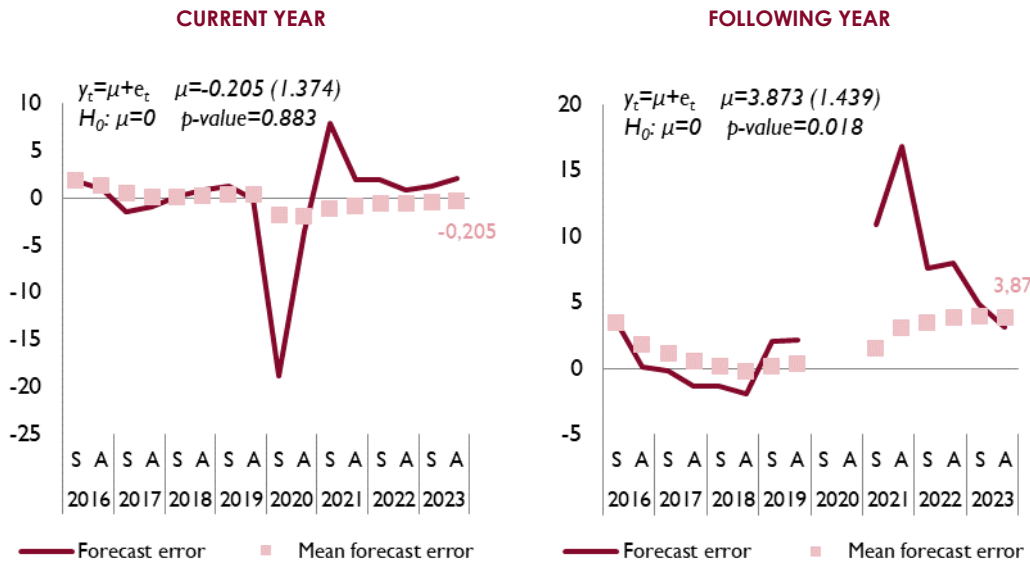


FIGURE ANNEX I.9. EXPORTS OF GOODS AND SERVICES

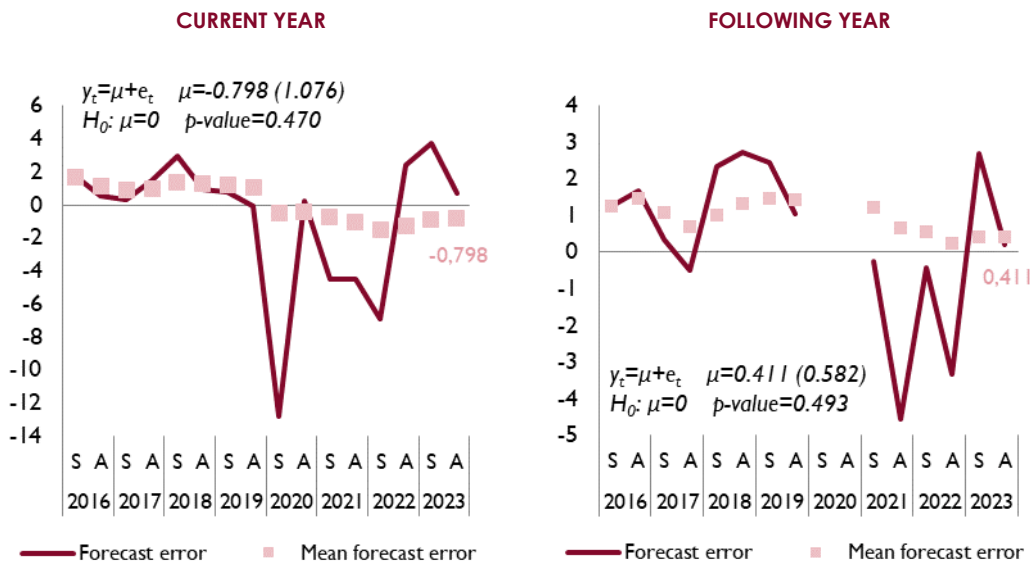
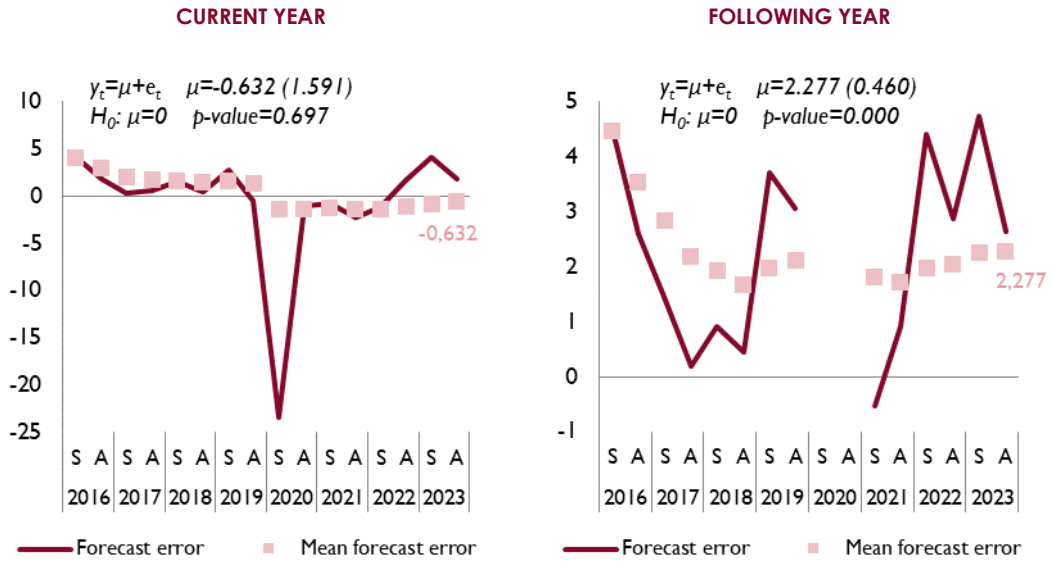


FIGURE ANNEX I.10. IMPORTS OF GOODS AND SERVICES



Source: INE and AIReF

Except for public consumption, the mean squared errors continue or start to decline after reaching all-time highs due to the outbreak of COVID-19. This indicates that improvements in the accuracy of the estimates are taking place despite continuing high levels of uncertainty. Exceptions include, in addition to the estimates for government consumption, the spring forecasts for the following year for private consumption and exports, although this behaviour is common to all agencies reflecting the existence of exogenous factors impacting the evolution of the aggregates, as mentioned above.

EVOLUTION OF THE MEAN SQUARED ERROR OF THE ESTIMATES AND THE STANDARD DEVIATION OF THE DEMAND AGGREGATES

FIGURE ANNEX I.11. PRIVATE CONSUMPTION

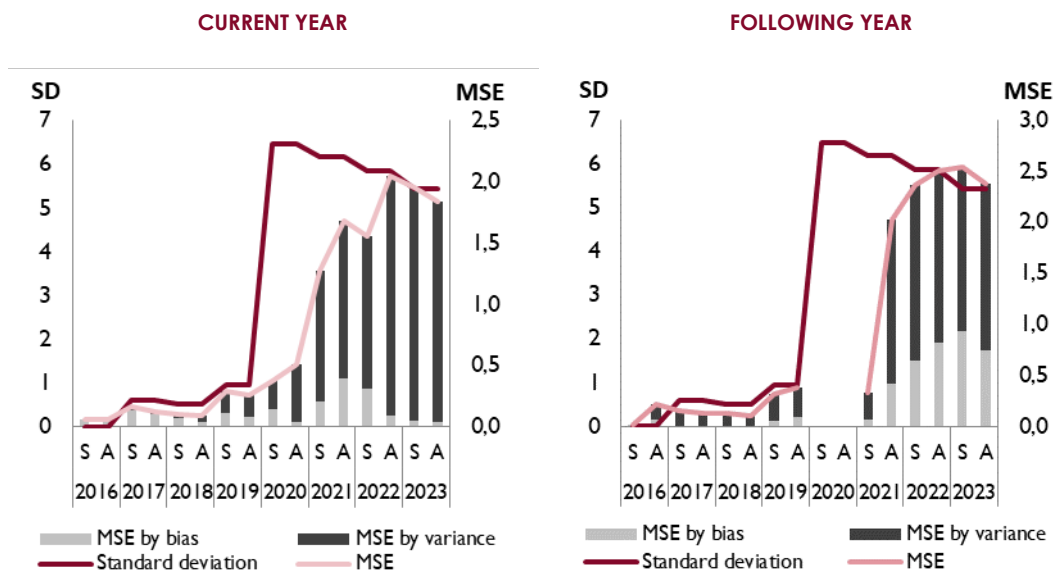


FIGURE ANNEX I.12. PUBLIC CONSUMPTION

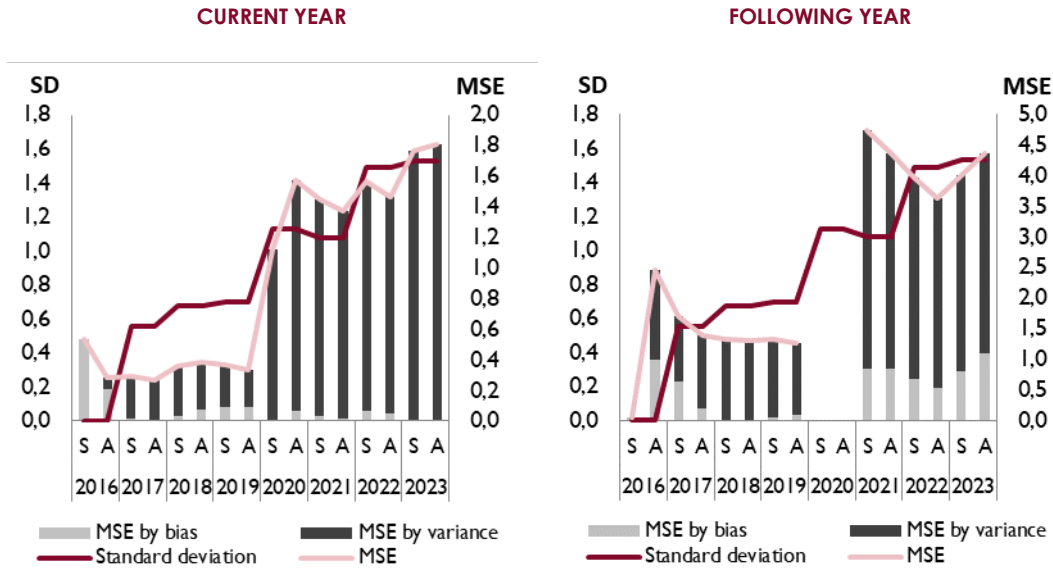


FIGURE ANNEX I.13. GFCF

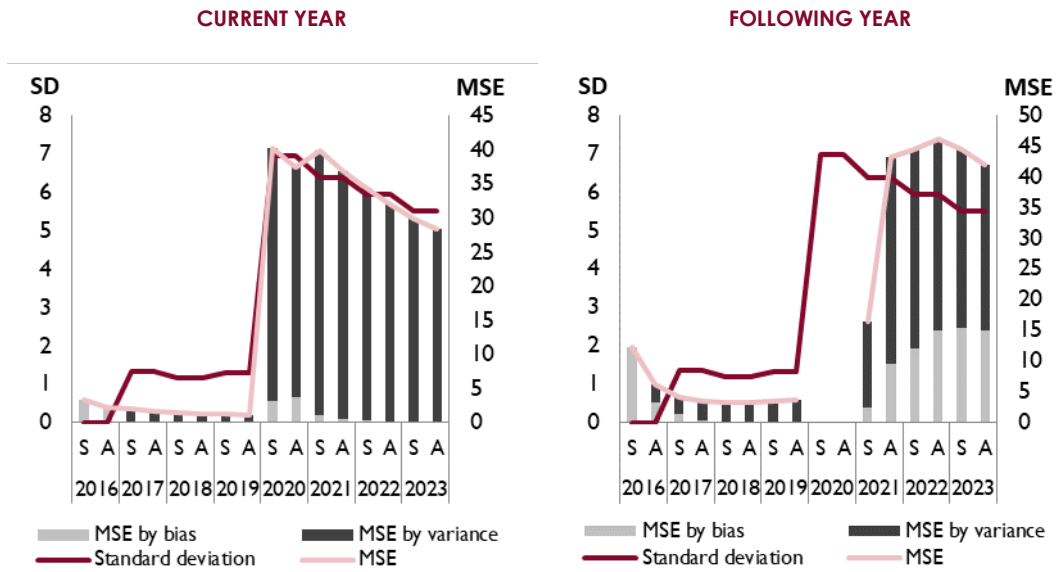


FIGURE ANNEX I.14. EXPORTS OF GOODS AND SERVICES
CURRENT YEAR **FOLLOWING YEAR**

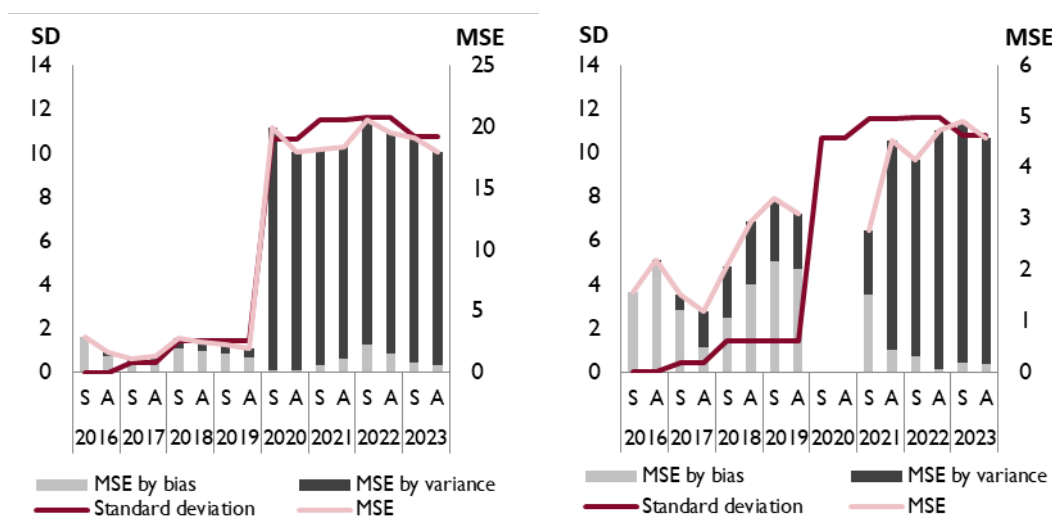
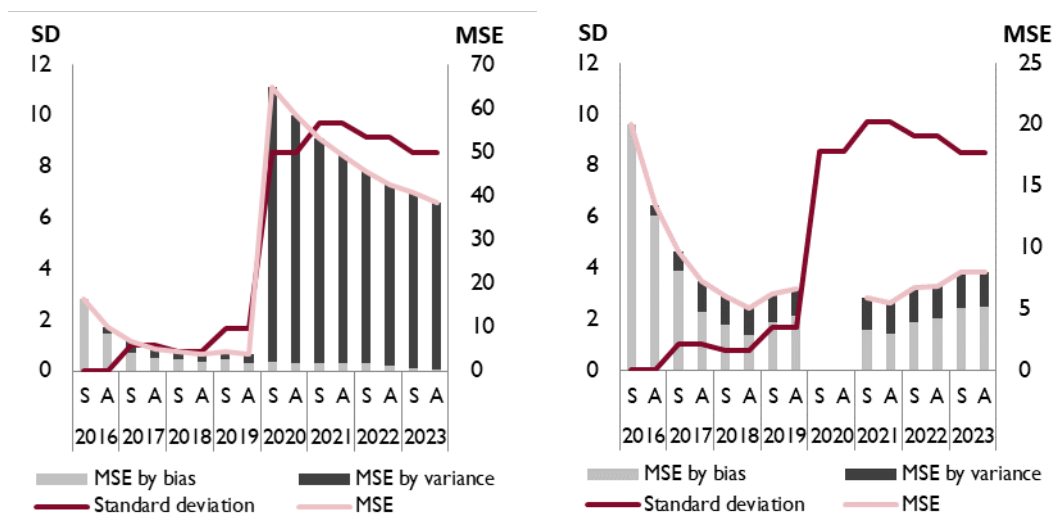


FIGURE ANNEX I.15. IMPORTS OF GOODS AND SERVICES
CURRENT YEAR **FOLLOWING YEAR**

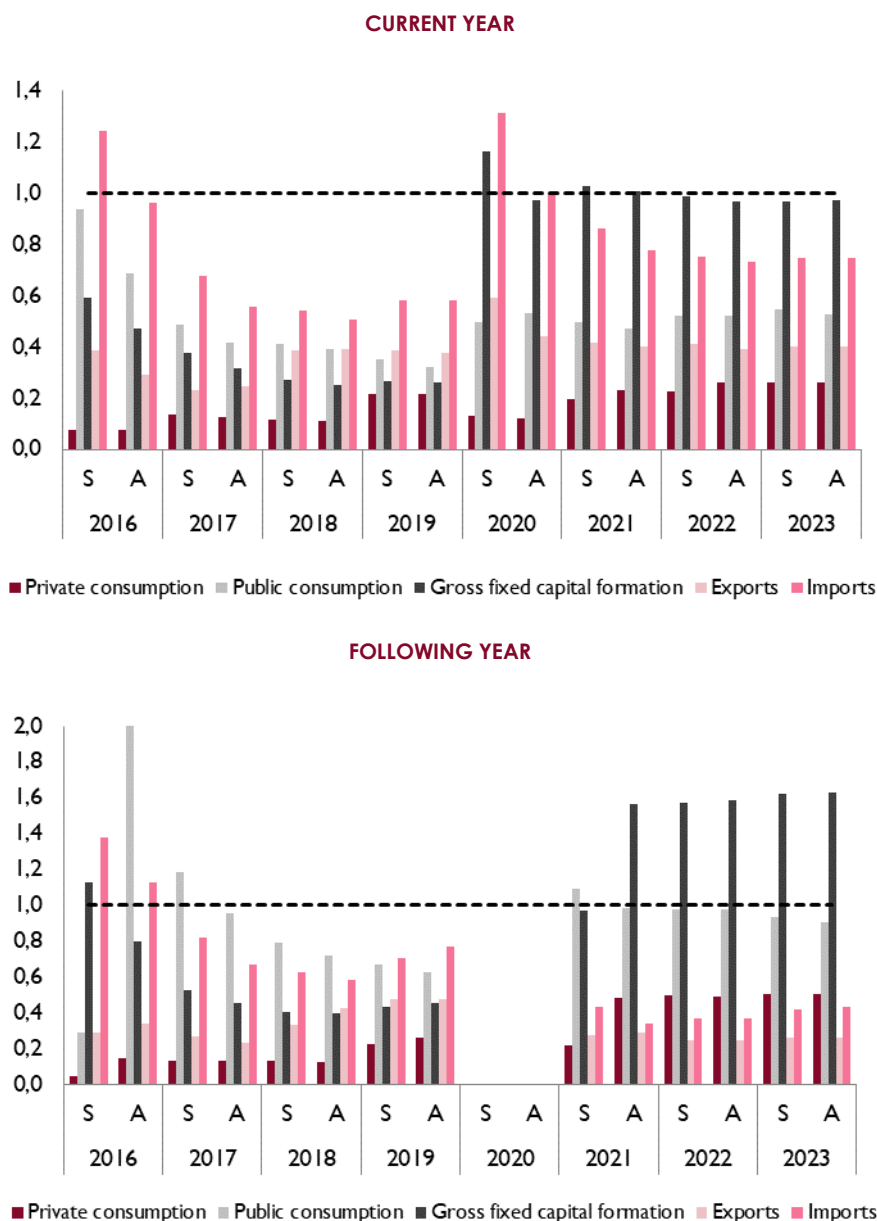


Source: INE and AIReF

The efficiency of the forecasts changes markedly with the coronavirus outbreak and according to the component analysed, but is in any case higher than that of a naive estimate. In 2020, due to the greater uncertainty caused by the health crisis, there was a widespread loss of efficiency, with significant increases in the mean value of Theil's U statistic. Subsequently, previous values are resumed or paths of convergence to them are initiated, with current values below unity, except in the following year's estimates for gross fixed capital formation, where the loss of efficiency linked to COVID-19 was so intense that, together with the uncertainty regarding the impact of the RTRP, the mean value of Theil's U statistic is maintained above unity in the estimates for the following year. It is worth highlighting the improvement in the efficiency

of the forecasts of the foreign sector aggregates for the following year from when AIReF started to draw up the forecast evaluation reports.

FIGURE ANNEX I.16. EVOLUTION OF THEIL'S U-STATISTIC FOR DEMAND AGGREGATES ESTIMATES



Source: INE and AIReF

The forecast errors made by AIReF for both the current year and the following year are not persistent over time. The simple autocorrelation functions for the different variables estimated do not show significant lags, except in the case of the following year's forecasts for gross fixed capital formation, where positive deviations from the observed data tend to significantly increase the probability of overestimating the evolution of the aggregate. However, the persistent nature of these errors is observed in the rest of the agencies that make forecasts, possibly reflecting overestimates of the behaviour of the

aggregate linked to the effect of the RTRP, whose expected execution has shifted over time.

SIMPLE AUTOCORRELATION FUNCTION OF FORECAST ERRORS OF DEMAND AGGREGATES

FIGURE ANNEX I.17. PRIVATE CONSUMPTION



FIGURE ANNEX I.18. PUBLIC CONSUMPTION



FIGURE ANNEX I.19. GFCF

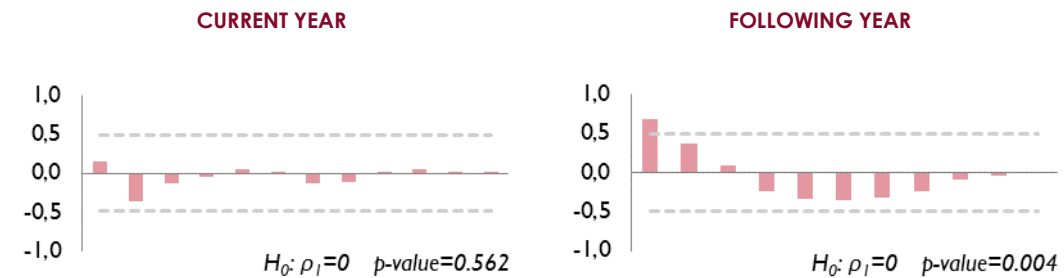
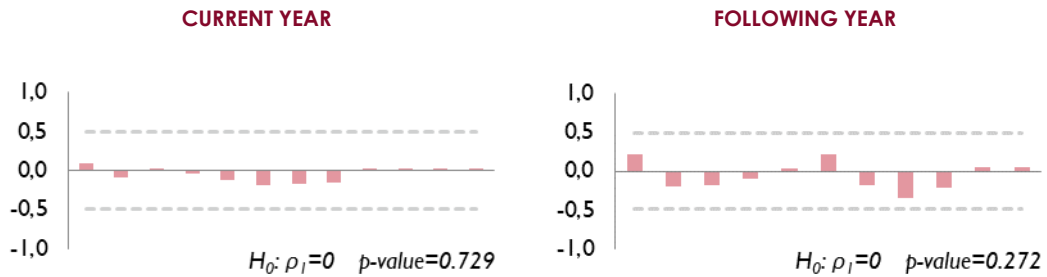


FIGURE ANNEX I.20. EXPORTS OF GOODS AND SERVICES

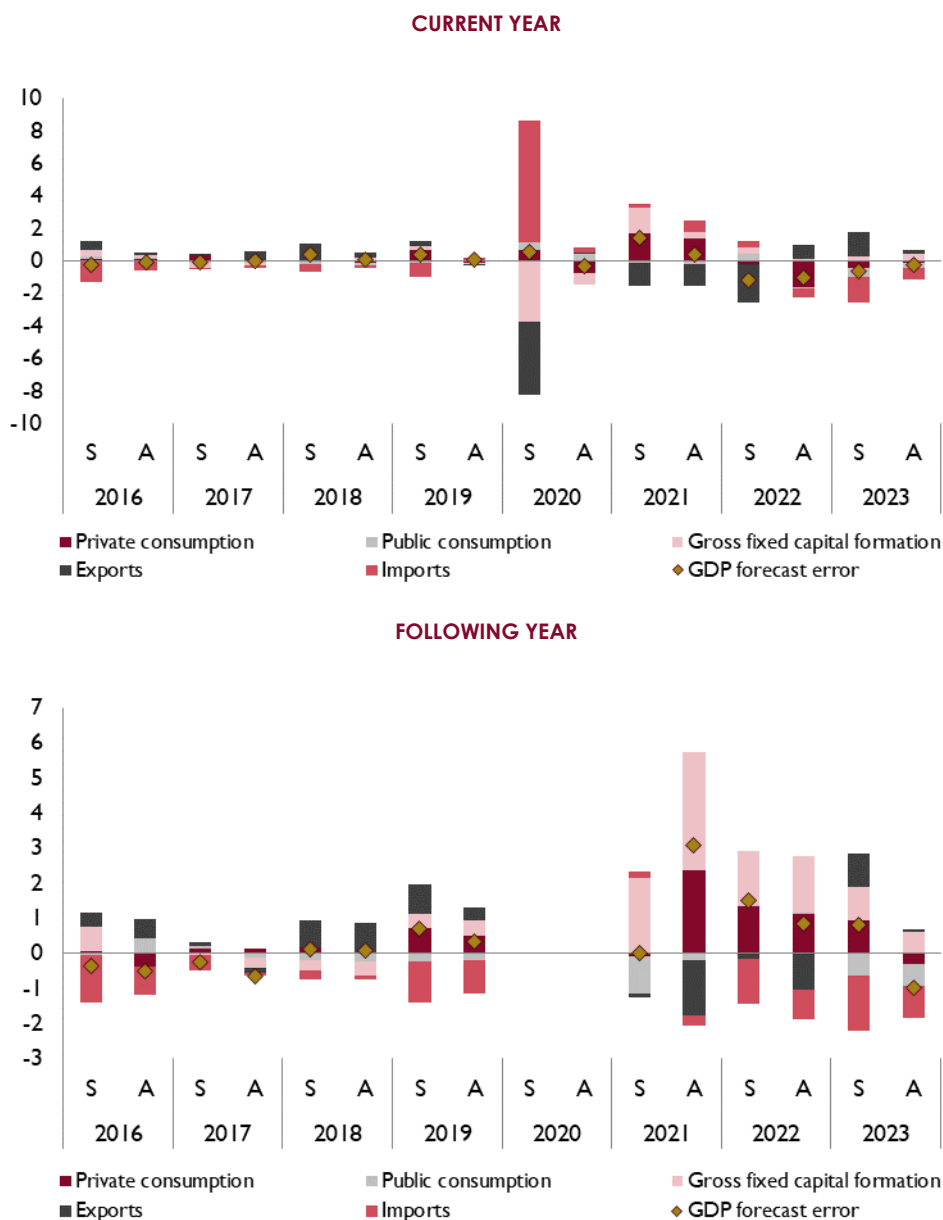


FIGURE ANNEX I.21. IMPORTS OF GOODS AND SERVICES



Source: INE and AIReF

The largest contributions to the error in estimating GDP growth come from the estimates for the foreign trade sector. Since the outbreak of COVID-19, the contributions from private consumption and gross fixed capital formation become more important, although in October 2023 they returned to values similar to pre-pandemic values.

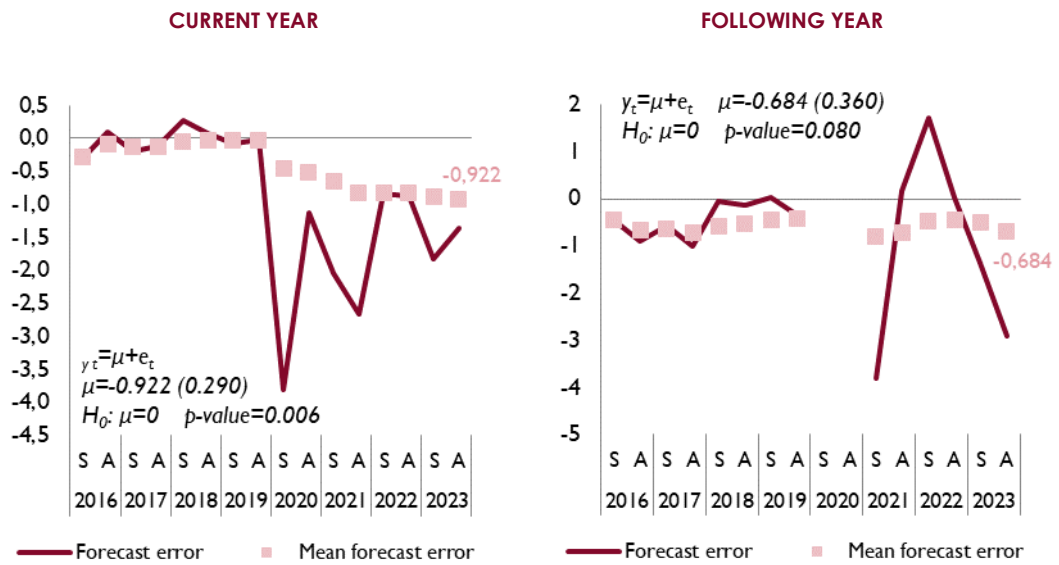
FIGURE ANNEX I.22. EVOLUTION OF CONTRIBUTIONS TO THE ERROR OF DEMAND AGGREGATES


Source: INE and AIReF

Analysis of employment forecasts

Up to 2020, the forecast errors in the current-year estimates of full-time equivalent employment fluctuate around zero, but systematically fall below zero thereafter and in the following year's estimates, with a significant downward bias. This pessimistic trend, both for the current and the following year, has been slightly exacerbated by the latest forecasts.

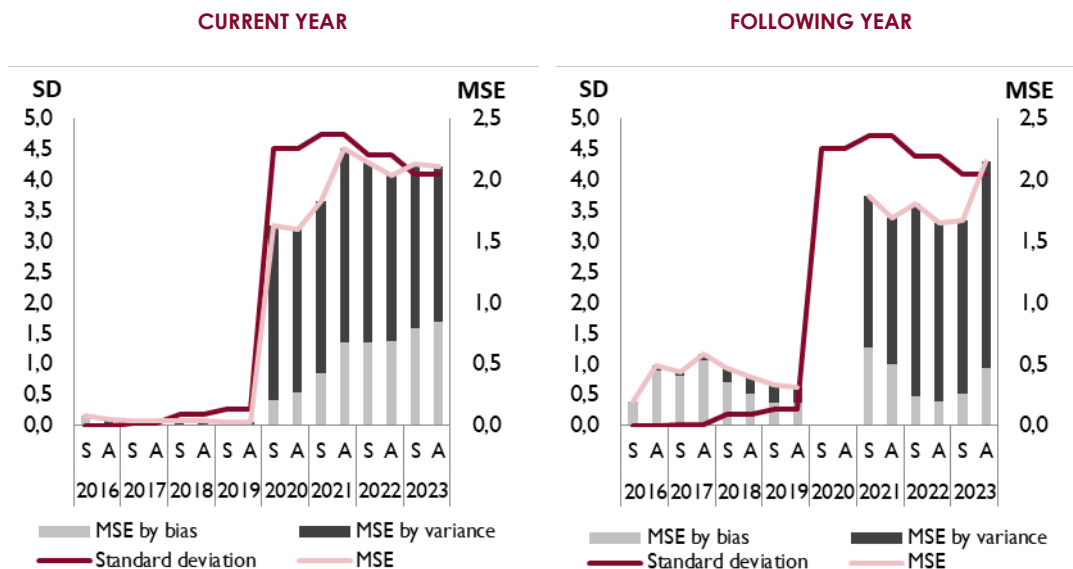
FIGURE ANNEX I.23. EVOLUTION OF FORECAST ERRORS AND AVERAGE ERROR OF FULL-TIME EQUIVALENT EMPLOYMENT ESTIMATES



Source: INE and AIReF

The accuracy of the employment estimates for the current year is sustained, but worsens in the latest forecast for the following year. This deterioration for the following year breaks the downward trend observed after the loss of accuracy linked to the outbreak of the pandemic.

FIGURE ANNEX I.24. EVOLUTION OF THE MEAN SQUARED ERROR OF THE ESTIMATES AND THE STANDARD DEVIATION OF FULL-TIME EQUIVALENT EMPLOYMENT

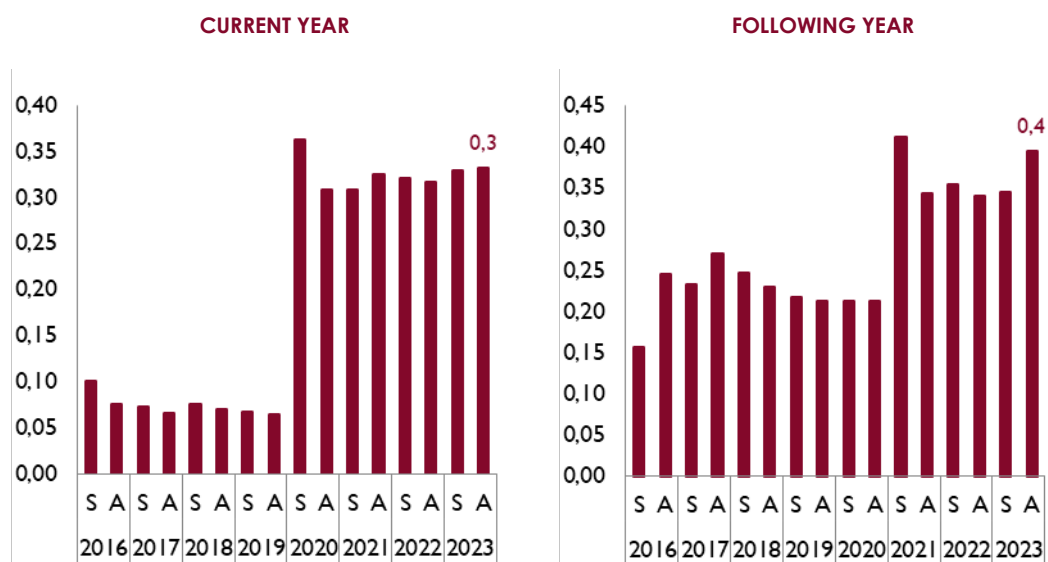


Source: INE and AIReF

AIReF's employment forecasts for the current year are more efficient than a naive forecast. The average values of the Theil statistic in the estimates for the current year and the following year are well below unity, although the

October 2023 forecast for the following year worsens slightly, in line with the aforementioned loss of accuracy in terms of the mean squared error.

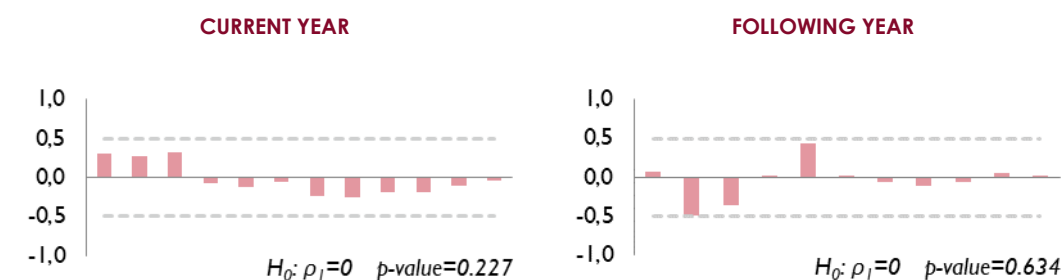
FIGURE ANNEX I.25. EVOLUTION OF THE THEIL'S U-STATISTIC FOR FULL-TIME EQUIVALENT EMPLOYMENT ESTIMATES



Source: INE and AIReF

The errors in the employment forecasts are not persistent. The first lag of the autocorrelation functions of the forecast errors in estimating employment is insignificant in both the current year's and the following year's forecasts.

FIGURE ANNEX I.26. SIMPLE AUTOCORRELATION FUNCTION OF THE FORECAST ERRORS OF FULL-TIME EQUIVALENT EMPLOYMENT



Source: INE and AIReF

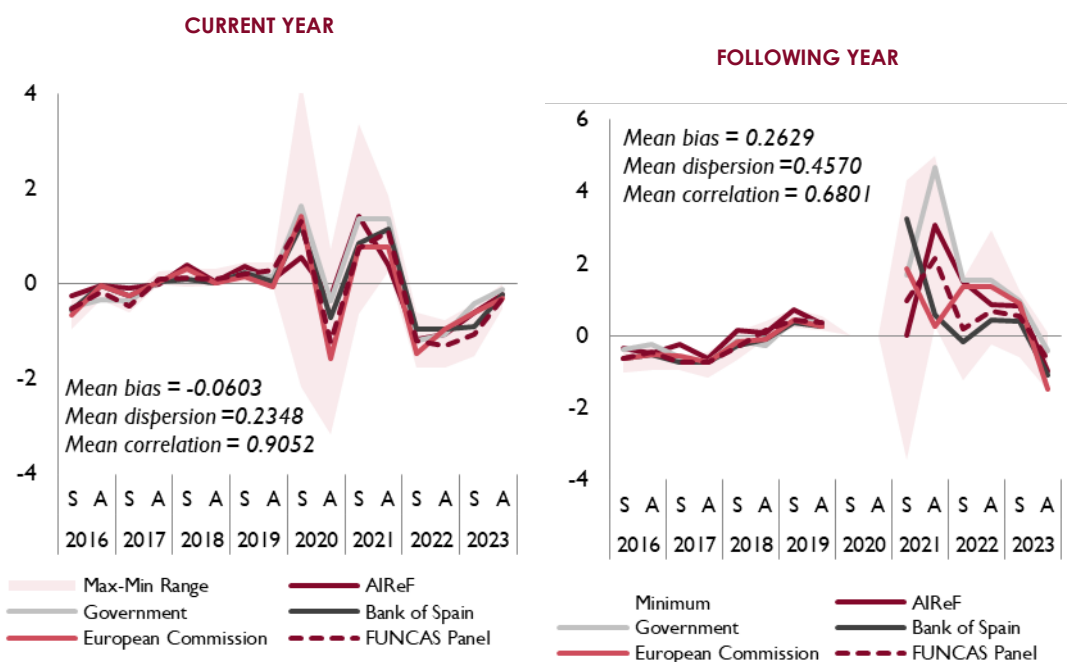
Comparison of forecast errors with the panel of public and private agencies

This section presents a comparative analysis of the forecasts made by AIReF and the various agencies considered.

Comparison of Gross Domestic Product forecast errors in volume terms

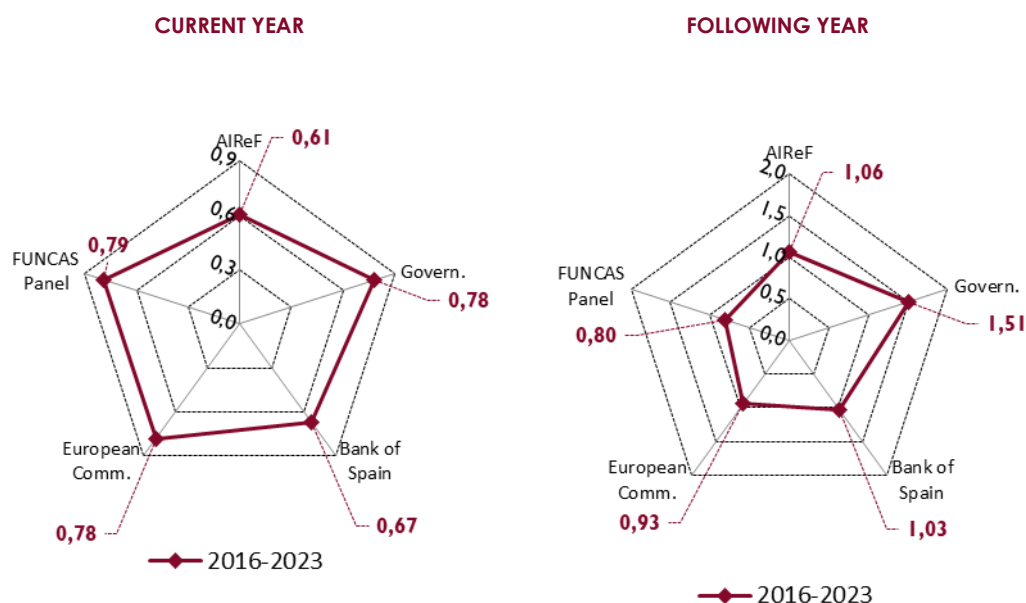
The Gross Domestic Product forecasts of all agencies show similar behaviour, both for the current year and the following year, with biases that are not significantly different from zero. Forecast errors show similar patterns, with clear increases in periods of higher uncertainty, such as during the COVID-19 pandemic. This strong similarity can be seen more clearly when analysing the small dispersion between them and their high correlation, above 90% for the current year forecasts and 65% for the following year forecasts. All the agencies have biases close to zero in the estimates for the current year and positive and larger biases in the estimates for the following year, although they are all statistically non-significant (at a 5% significance level). This similarity means that the null hypothesis of equality between the biases of the different institutions and AIReF is not rejected.

FIGURE ANNEX I.27. COMPARATIVE FORECAST ERRORS IN GROSS DOMESTIC PRODUCT ESTIMATES IN VOLUME TERMS



Source: INE, Ministry of Economy, Trade and Enterprise, Bank of Spain, FUNCAS and AIReF.

Compared with other agencies, AIReF's forecasts for the current year's GDP continue to be the most accurate. AIReF's estimates for the current year continue to be those with the lowest mean squared error; however, for the following year they are among the most optimistic, along with those of the Government, although, at a confidence level of 79% we could reject the hypothesis that the Government and AIReF forecasts are the same.

FIGURE ANNEX I.28. COMPARISON OF THE ROOT MEAN SQUARED ERROR OF GROSS DOMESTIC PRODUCT ESTIMATES IN VOLUME TERMS


Source: INE, Ministry of Economy, Trade and Enterprise, Bank of Spain, FUNCAS and AIReF

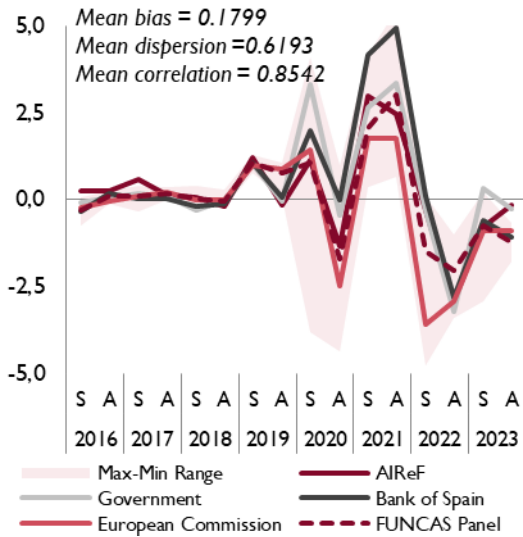
Comparison of forecast errors for demand aggregates in volume terms

The current year forecasts for the demand-side components of GDP show a greater degree of disparity between agencies, more marked in those components with greater variability. The greatest differences between the forecasting agencies are found for the evolution of exports in the current year, with mean forecast error correlations of the agencies considered exceeding 0.65, and in the estimates of private consumption and the foreign sector for the following year, with correlations of more than half a point. There are no significant biases in the estimates for the current year and no significant differences between the average error made by the agencies or AIReF, except for public consumption with respect to the Bank of Spain. For the following year, there is an increase in the size of the mean error made by the different agencies when estimating the demand components, with no significant biases identified, apart from a few specific exceptions and, in general, when estimating gross fixed capital formation where all the agencies show a significant upward bias. Given that the increase is similar across agencies, the tests between the biases of the different agencies do not reject the null hypothesis of equality at the 5% significance level (see Annex II).

COMPARATIVE FORECAST ERRORS OF THE DEMAND AGGREGATES ESTIMATES IN VOLUME TERMS

FIGURE ANNEX I.29. PRIVATE CONSUMPTION

CURRENT YEAR



FOLLOWING YEAR

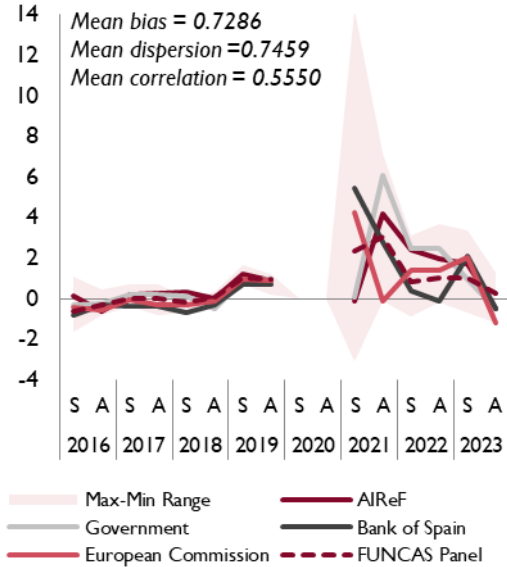
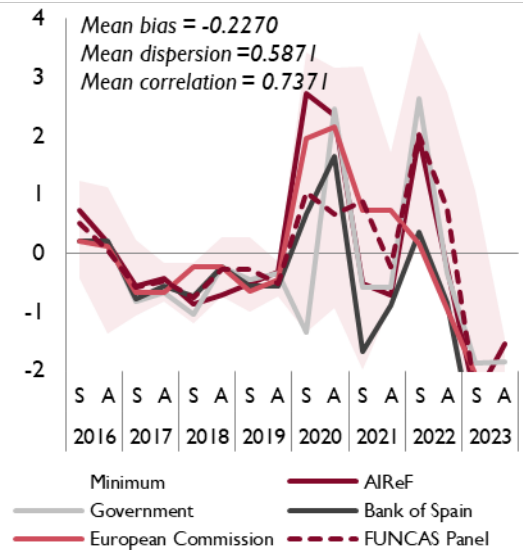


FIGURE ANNEX I.30. PUBLIC CONSUMPTION

CURRENT YEAR



FOLLOWING YEAR

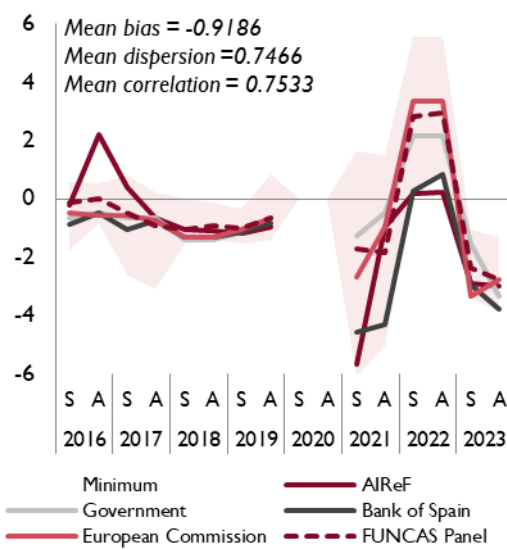


FIGURE ANNEX I.31. GFCF

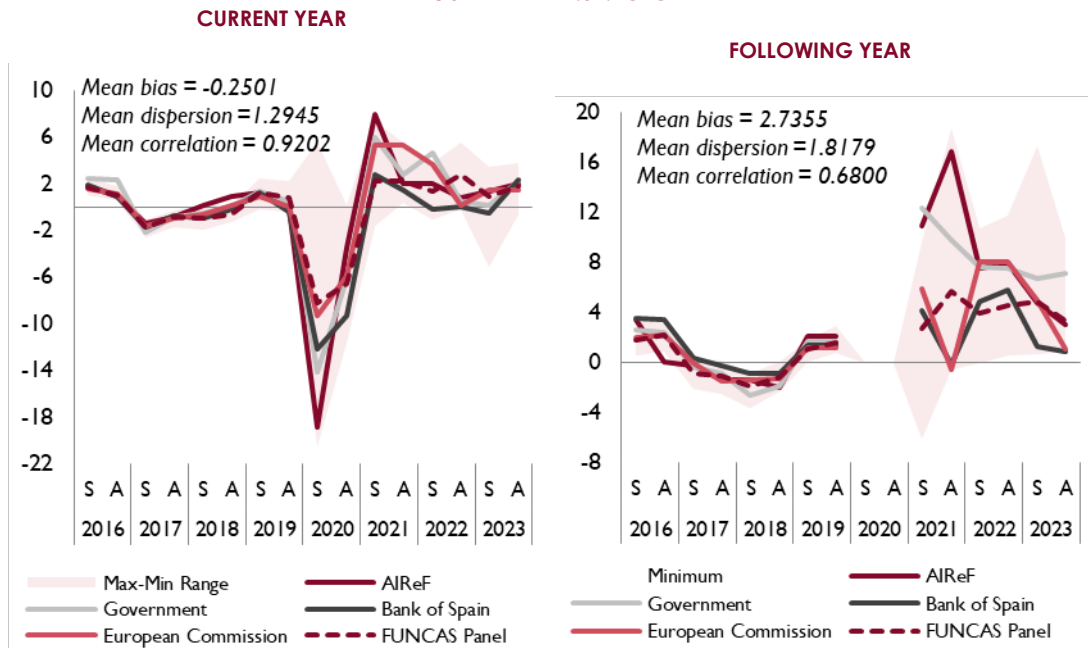


FIGURE ANNEX I.32. EXPORTS OF GOODS AND SERVICES

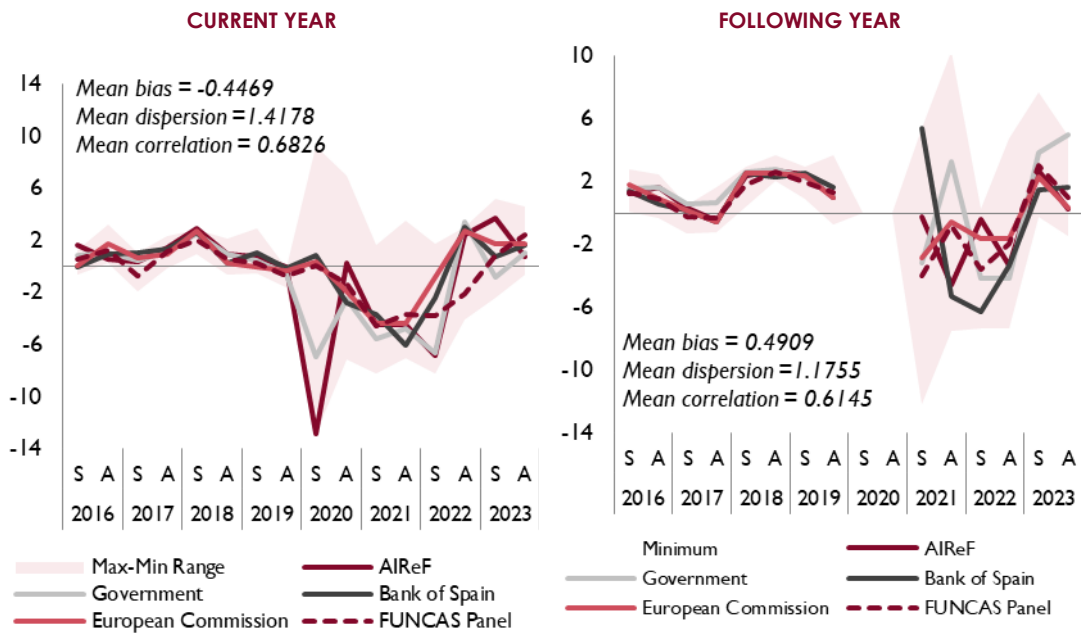
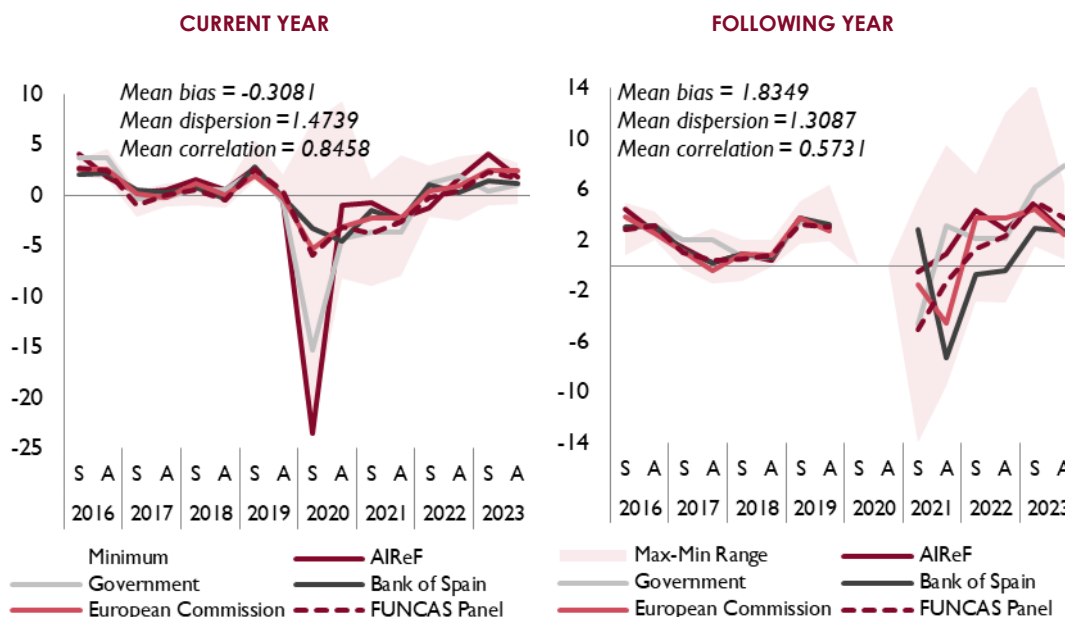


FIGURE ANNEX I.33. IMPORTS OF GOODS AND SERVICES



Source: INE, Ministry of Economy, Trade and Enterprise, Bank of Spain, FUNCAS and AIReF

There are no significant differences in the forecasting capacity of the different agencies in terms of accuracy. For the current year, the lowest accuracy of AIReF's estimates comes from the variables relating to the foreign trade sector and gross fixed capital formation, whereas, for the following year, only AIReF's forecasts for gross fixed capital formation show a lower degree of accuracy. However, in neither case are these differences sufficiently large to accept the hypothesis of equal predictive power.

COMPARISON OF THE ROOT MEAN SQUARE ERROR IN THE ESTIMATES OF THE DEMAND AGGREGATES IN VOLUME TERMS

FIGURE ANNEX I.34. PRIVATE CONSUMPTION

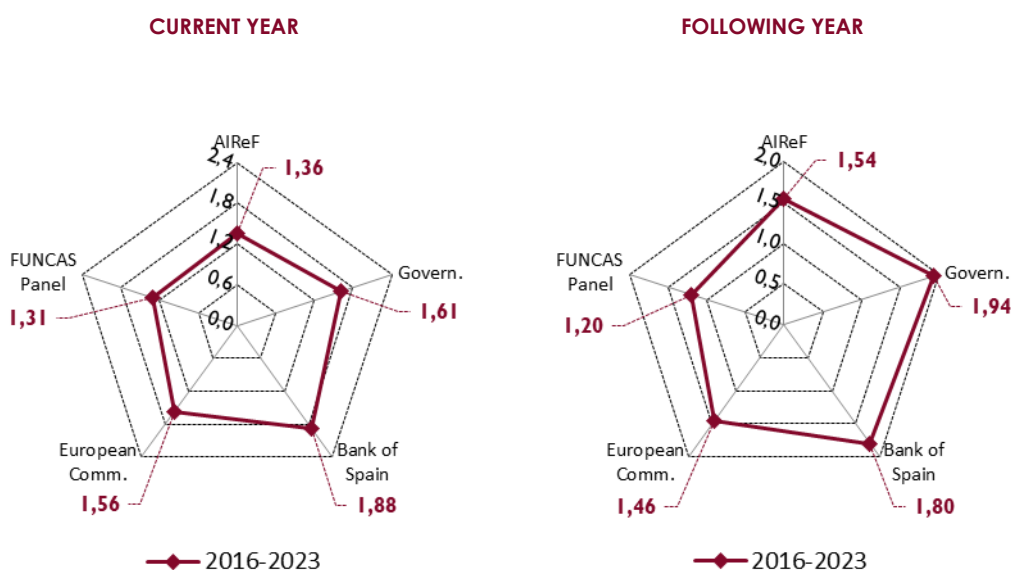


FIGURE ANNEX I.35. PUBLIC CONSUMPTION

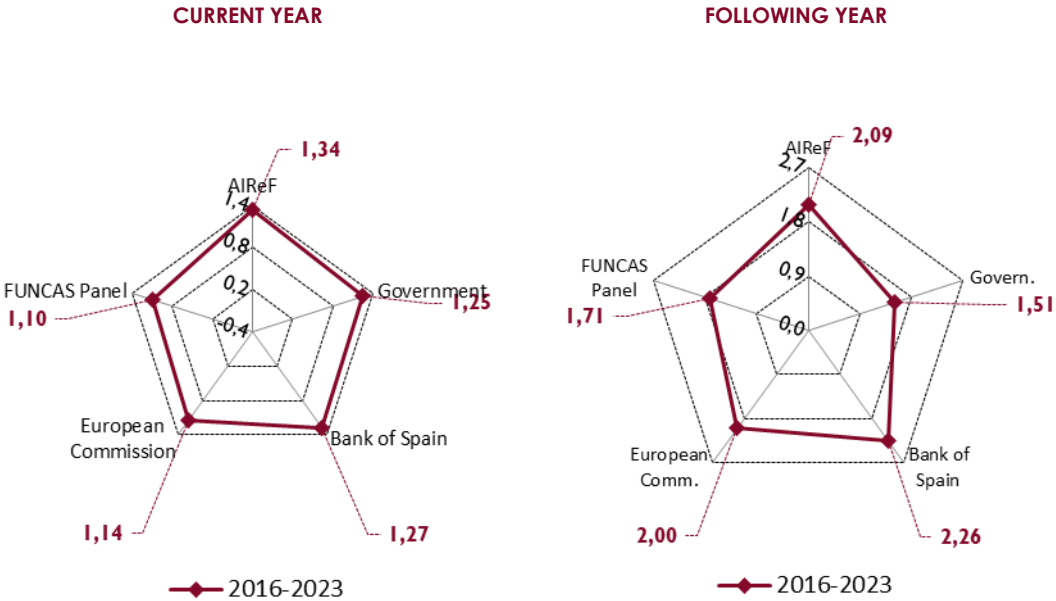


FIGURE ANNEX I.36. GFCF

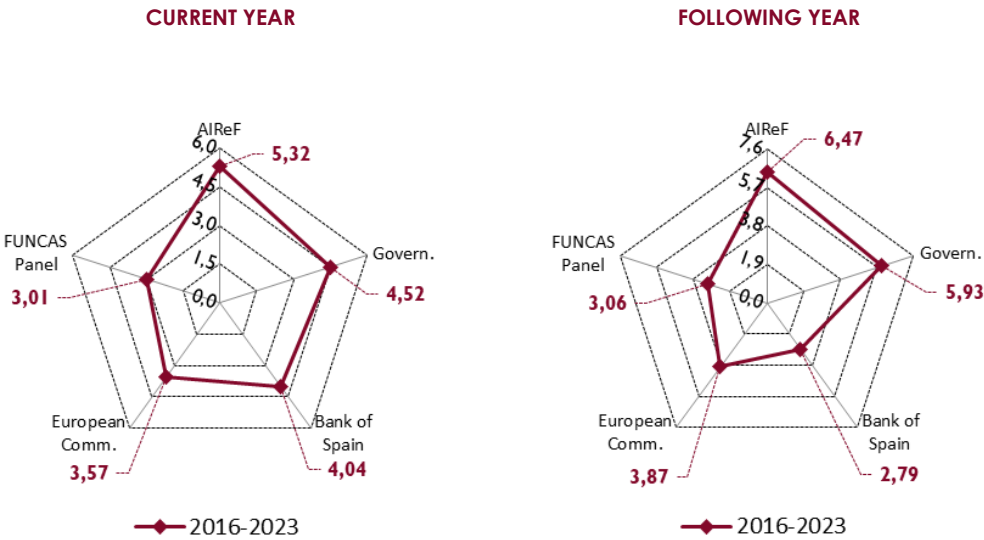
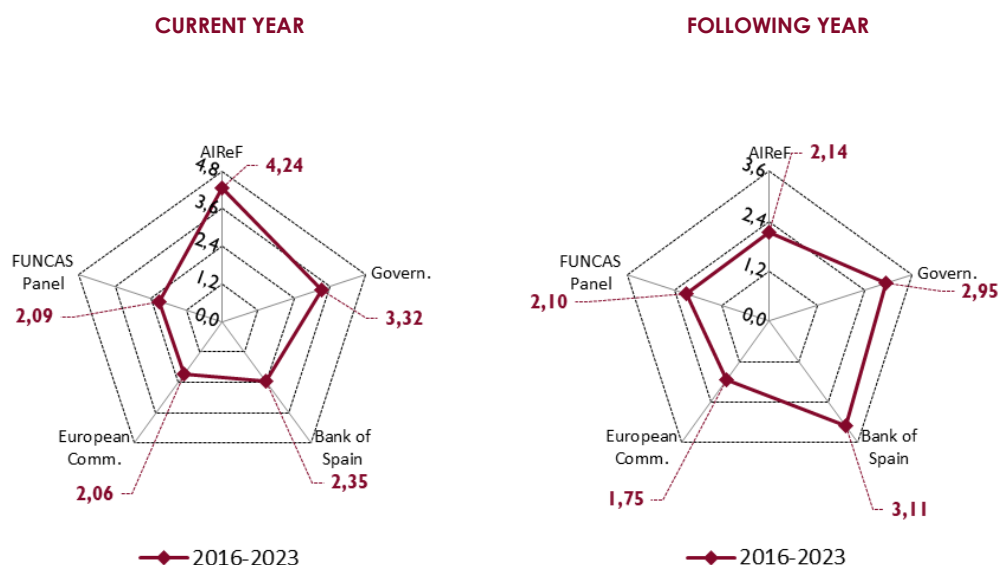
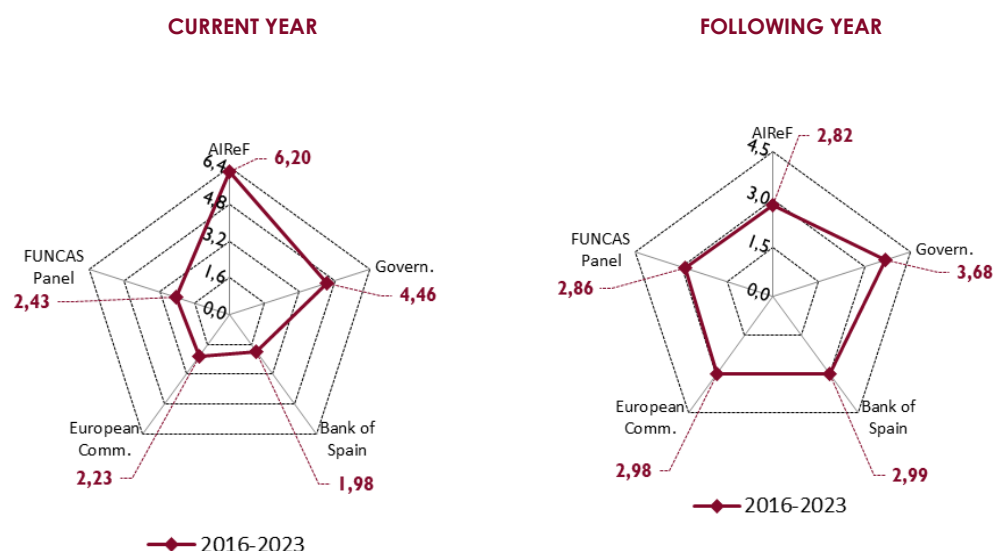


FIGURE ANNEX I.37. EXPORTS OF GOODS AND SERVICES

FIGURE ANNEX I.38. IMPORTS OF GOODS AND SERVICES


Source: INE, Ministry of Economy, Trade and Enterprise, Bank of Spain, FUNCAS and AIReF

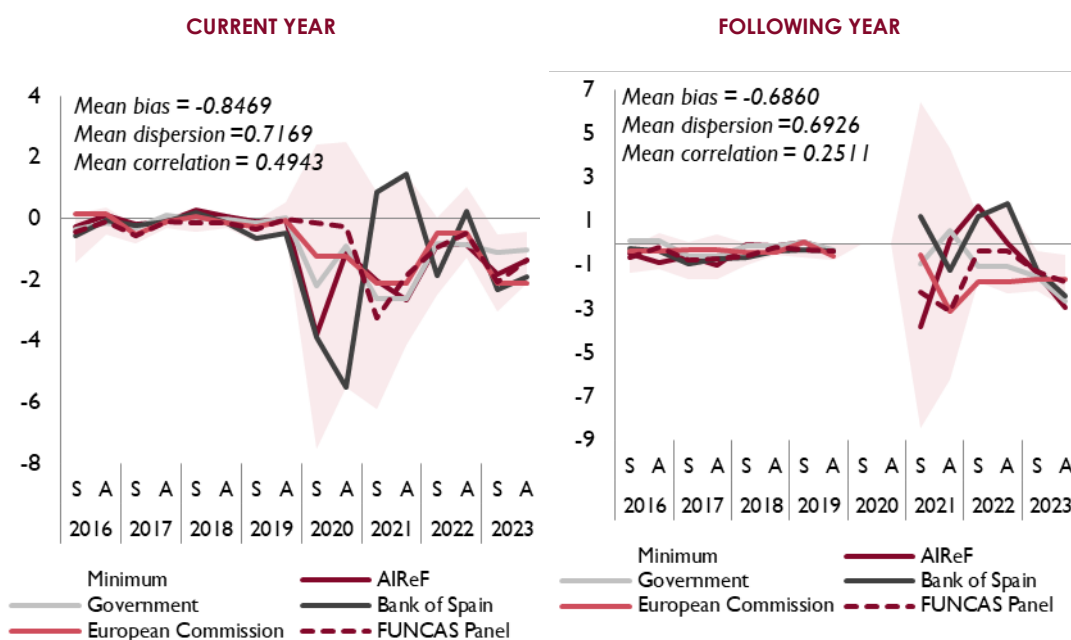
The different agencies' forecasts for the demand aggregates are on target and more efficient than a naïve estimate. A certain degree of persistence (past errors tend to be associated with future errors) can be detected in the current year's forecast errors for exports and imports for all the agencies except the Government and AIReF. In the estimates for the following year, this trend is mitigated, but it is correct for gross fixed capital formation, for which persistence is detected in most of the agencies.

Comparison of forecast errors for full-time equivalent employment

The prediction errors made in estimating the evolution of full-time equivalent employment differ across agencies, with moderate correlations between them in the estimates for the current year but reduced for the following year.

For the current year, the different evolution forecast for 2020, strongly conditioned by pandemic constraints, causes the correlation to decrease, while for the following year, the strong differences in both the shape and the level of the estimated paths reduce it further. There is a common tendency for all agencies to underestimate the evolution of employment in the current year estimates, without rejecting the hypothesis of equality between the biases of the agencies. For the following year, significant downward biases are still discernible by some institutions, such as the European Commission or the Funcas Panel, although in no case is the hypothesis of equality between the different institutions rejected.

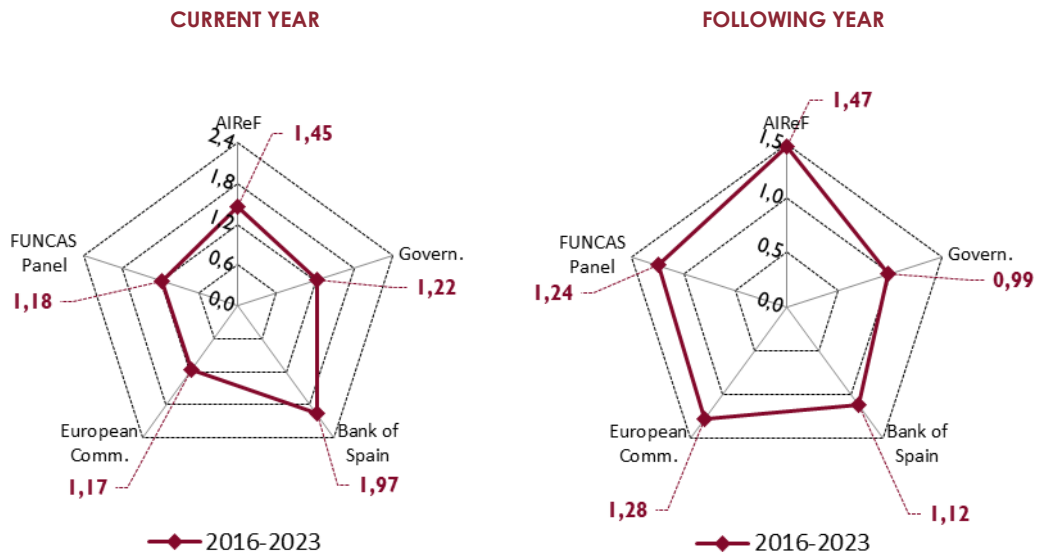
FIGURE ANNEX I.39. COMPARATIVE FORECAST ERRORS IN ESTIMATES OF FULL-TIME EQUIVALENT EMPLOYMENT IN THE CURRENT YEAR AND THE FOLLOWING YEAR



Source: INE, Ministry of Economy, Trade and Enterprise, Bank of Spain, FUNCAS and AIReF

AIReF's employment estimates show a mean squared error similar to that of other agencies. The differences in predictive power are not statistically significant. The mean Theil's U statistic of the employment estimates made by the different agencies is similar and less than unity, and all the agencies are capable of forecasting the direction in the rate of change of employment in the current year. However, there are differences in the persistence over time of past errors, so that, in the current and following year estimates, positive deviations are not rejected as increasing the probability of continuing to overestimate employment in the European Commission's 5% significance level forecasts.

FIGURE ANNEX I.40. COMPARATIVE ROOT MEAN SQUARED ERROR OF FULL-TIME EQUIVALENT EMPLOYMENT ESTIMATES



Source: INE, Ministry of Economy, Trade and Enterprise, Bank of Spain, FUNCAS and AIReF

ANNEX II. QUALITY MEASUREMENTS AND CONTRASTS

| | Current year | | | | | | | | | | | Following year | | | | | | | | | | | | |
|-------------------------------|---------------------|----------------|--------------|------|---------------------------|-----------------|---------------|--------------|--------------|---------------|--------------|----------------|----------------|--------------|------|---------------------------|-----------------|---------------|--------------|--------------|---------------|-------------|-------------|--------------|
| | N | Bias [p-value] | MAE | RMSE | MD ¹ [p-value] | MD ² | UT | AD [p-value] | PE [p-value] | ρ [Q p-value] | T [p-value] | N | Bias [p-value] | MAE | RMSE | MD ¹ [p-value] | MD ² | UT | AD [p-value] | PE [p-value] | ρ [Q p-value] | T [p-value] | | |
| Gross Domestic Product | AIReF | 16 | -0.02 [0.91] | 0.44 | 0.61 | | | 0.12 | 4.13 [0.00] | 3.88 [0.00] | 0.29 [0.25] | | 16 | 0.35 [0.23] | 0.73 | 1.06 | | | 0.29 | | | | 0.31 [0.21] | |
| | Government | 16 | 0.04 [0.84] | 0.58 | 0.78 | -1.38 [0.19] | Do Not Reject | 0.15 | 4.13 [0.00] | 3.88 [0.00] | 0.14 [0.57] | -0.60 [0.55] | 16 | 0.60 [0.14] | 1.00 | 1.51 | -1.32 [0.21] | Do Not Reject | 0.42 | | | | 0.52 [0.03] | -1.44 [0.17] |
| | Bank of Spain | 16 | -0.05 [0.78] | 0.52 | 0.67 | -0.60 [0.56] | Do Not Reject | 0.13 | 4.13 [0.00] | 3.88 [0.00] | 0.06 [0.80] | 0.34 [0.74] | 16 | 0.07 [0.81] | 0.68 | 1.03 | 0.06 [0.95] | Do Not Reject | 0.28 | | | | 0.25 [0.39] | 0.84 [0.41] |
| | European Commission | 16 | -0.15 [0.47] | 0.58 | 0.78 | -1.15 [0.27] | Do Not Reject | 0.15 | 4.13 [0.00] | 3.88 [0.00] | -0.22 [0.37] | 1.12 [0.28] | 16 | 0.16 [0.55] | 0.76 | 0.93 | 0.33 [0.75] | Do Not Reject | 0.26 | | | | 0.30 [0.24] | 0.75 [0.47] |
| | FUNCAS Panel | 16 | -0.13 [0.52] | 0.64 | 0.79 | -1.46 [0.16] | Do Not Reject | 0.15 | 4.13 [0.00] | 3.88 [0.00] | 0.06 [0.80] | 1.04 [0.31] | 16 | 0.14 [0.54] | 0.65 | 0.80 | 1.23 [0.24] | Do Not Reject | 0.22 | | | | 0.47 [0.07] | 1.45 [0.17] |
| Private Consumption | AIReF | 16 | 0.21 [0.55] | 0.93 | 1.36 | | | 0.26 | 4.13 [0.00] | 3.89 [0.00] | 0.12 [0.62] | | 16 | 0.86 [0.03] | 1.04 | 1.54 | | | 0.50 | | | | 0.27 [0.27] | |
| | Government | 16 | 0.40 [0.33] | 0.98 | 1.61 | -1.05 [0.31] | Do Not Reject | 0.31 | 4.13 [0.00] | 3.89 [0.00] | 0.05 [0.83] | -1.08 [0.30] | 16 | 0.92 [0.07] | 1.14 | 1.94 | -0.98 [0.35] | Do Not Reject | 0.63 | | | | 0.26 [0.29] | -0.38 [0.71] |
| | Bank of Spain | 16 | 0.47 [0.34] | 1.1 | 1.88 | -1.36 [0.19] | Do Not Reject | 0.36 | 4.13 [0.00] | 3.89 [0.00] | 0.35 [0.16] | -1.22 [0.24] | 16 | 0.62 [0.21] | 1.12 | 1.80 | -0.36 [0.72] | Do Not Reject | 0.58 | | | | 0.34 [0.18] | 0.49 [0.63] |
| | European Commission | 16 | -0.24 [0.56] | 1.13 | 1.56 | -0.63 [0.54] | Do Not Reject | 0.30 | 4.13 [0.00] | 3.89 [0.00] | 0.11 [0.67] | 1.91 [0.08] | 16 | 0.57 [0.15] | 1.00 | 1.46 | 0.12 [0.90] | Do Not Reject | 0.48 | | | | 0.03 [0.96] | 0.63 [0.54] |
| | FUNCAS Panel | 16 | 0.06 [0.87] | 0.99 | 1.31 | 0.23 [0.82] | Do Not Reject | 0.25 | 4.13 [0.00] | 3.89 [0.00] | 0.12 [0.62] | 1.02 [0.32] | 16 | 0.67 [0.03] | 0.84 | 1.20 | 1.15 [0.27] | Do Not Reject | 0.39 | | | | 0.60 [0.02] | 0.72 [0.48] |
| Public Consumption | AIReF | 16 | -0.05 [0.88] | 1.05 | 1.34 | | | 0.53 | 2.82 [0.00] | 1.99 [0.02] | 0.31 [0.21] | | 16 | -1.05 [0.06] | 1.48 | 2.09 | | | 0.91 | 3.04 [0.00] | 1.82 [0.03] | | 0.22 [0.35] | |
| | Government | 16 | -0.28 [0.39] | 0.97 | 1.25 | 0.53 [0.61] | Do Not Reject | 0.49 | 2.82 [0.00] | 1.99 [0.02] | -0.07 [0.79] | 0.85 [0.41] | 16 | -0.67 [0.10] | 1.29 | 1.51 | 0.89 [0.39] | Do Not Reject | 0.66 | | | | 0.36 [0.15] | -0.85 [0.41] |
| | Bank of Spain | 16 | -0.58 [0.07] | 0.97 | 1.27 | 0.27 [0.79] | Do Not Reject | 0.50 | 4.13 [0.00] | 2.92 [0.00] | 0.30 [0.24] | 3.16 [0.01] | 16 | -1.60 [0.00] | 1.76 | 2.26 | -0.46 [0.66] | Do Not Reject | 0.98 | 0.47 [0.32] | 0.09 [0.47] | 0.21 [0.27] | 1.66 [0.12] | |
| | European Commission | 16 | -0.12 [0.70] | 0.88 | 1.14 | 1.38 [0.19] | Do Not Reject | 0.45 | 4.13 [0.00] | 2.92 [0.00] | 0.62 [0.01] | 0.32 [0.75] | 16 | -0.70 [0.20] | 1.66 | 2.00 | 0.16 [0.88] | Do Not Reject | 0.87 | | | | 0.23 [0.36] | -0.79 [0.45] |
| | FUNCAS Panel | 16 | -0.11 [0.71] | 0.85 | 1.10 | 1.11 [0.28] | Do Not Reject | 0.43 | | | 0.32 [0.20] | 0.27 [0.79] | 16 | -0.58 [0.22] | 1.40 | 1.71 | 0.61 [0.55] | Do Not Reject | 0.74 | | | | 0.21 [0.39] | -1.10 [0.29] |
| Gross Fixed Capital Formation | AIReF | 16 | -0.21 [0.88] | 2.87 | 5.32 | | | 0.97 | 4.13 [0.00] | 3.85 [0.00] | 0.15 [0.56] | | 16 | 3.87 [0.02] | 4.58 | 6.47 | | | 1.63 | | | | 0.68 [0.00] | |
| | Government | 16 | -0.06 [0.96] | 2.92 | 4.52 | 0.78 [0.45] | Do Not Reject | 0.83 | 4.13 [0.00] | 3.85 [0.00] | 0.24 [0.33] | -0.33 [0.75] | 16 | 3.88 [0.01] | 4.68 | 5.93 | 0.47 [0.65] | Do Not Reject | 1.49 | | | | 0.71 [0.00] | 0.00 [1.00] |
| | Bank of Spain | 16 | -0.96 [0.36] | 2.29 | 4.04 | 0.84 [0.41] | Do Not Reject | 0.74 | 4.13 [0.00] | 3.85 [0.00] | 0.31 [0.21] | 1.13 [0.27] | 16 | 1.82 [0.01] | 2.12 | 2.79 | 1.65 [0.12] | Do Not Reject | 0.70 | | | | 0.26 [0.27] | 1.55 [0.14] |
| | European Commission | 16 | 0.16 [0.87] | 2.47 | 3.57 | 0.92 [0.37] | Do Not Reject | 0.65 | 4.13 [0.00] | 3.85 [0.00] | 0.37 [0.14] | -0.52 [0.61] | 16 | 2.17 [0.03] | 2.83 | 3.87 | 1.30 [0.22] | Do Not Reject | 0.97 | | | | 0.38 [0.10] | 1.32 [0.21] |
| | FUNCAS Panel | 16 | -0.18 [0.82] | 2.19 | 3.01 | 1.06 [0.31] | Do Not Reject | 0.55 | 4.13 [0.00] | 3.85 [0.00] | 0.34 [0.17] | -0.03 [0.97] | 16 | 1.94 [0.01] | 2.65 | 3.06 | 1.72 [0.11] | Do Not Reject | 0.77 | | | | 0.78 [0.00] | 1.98 [0.07] |
| Exports | AIReF | 16 | -0.80 [0.47] | 2.79 | 4.24 | | | 0.40 | 4.13 [0.00] | 3.50 [0.00] | 0.14 [0.57] | | 16 | 0.41 [0.49] | 1.70 | 2.14 | | | 0.26 | | | | 0.18 [0.46] | |
| | Government | 16 | -0.98 [0.25] | 2.48 | 3.32 | 0.95 [0.36] | Do Not Reject | 0.31 | 4.13 [0.00] | 3.50 [0.00] | 0.34 [0.17] | 0.35 [0.73] | 16 | 1.01 [0.21] | 2.63 | 2.95 | -1.81 [0.09] | Do Not Reject | 0.35 | | | | 0.06 [0.79] | -0.79 [0.44] |
| | Bank of Spain | 16 | -0.07 [0.91] | 1.79 | 2.35 | 1.19 [0.25] | Do Not Reject | 0.22 | 4.13 [0.00] | 3.50 [0.00] | 0.53 [0.03] | -0.75 [0.47] | 16 | 0.31 [0.72] | 2.51 | 3.11 | -1.51 [0.15] | Do Not Reject | 0.37 | | | | 0.34 [0.24] | 0.15 [0.88] |
| | European Commission | 16 | 0.10 [0.85] | 1.56 | 2.06 | 1.32 [0.21] | Do Not Reject | 0.20 | 4.13 [0.00] | 3.50 [0.00] | 0.61 [0.02] | -0.95 [0.36] | 16 | 0.49 [0.31] | 1.51 | 1.75 | 0.87 [0.40] | Do Not Reject | 0.21 | | | | 0.31 [0.16] | -0.21 [0.84] |
| | FUNCAS Panel | 16 | -0.48 [0.38] | 1.63 | 2.09 | 1.33 [0.20] | Do Not Reject | 0.20 | 4.13 [0.00] | 3.50 [0.00] | 0.63 [0.01] | -0.34 [0.74] | 16 | 0.23 [0.70] | 1.78 | 2.10 | 0.07 [0.95] | Do Not Reject | 0.25 | | | | 0.29 [0.14] | 0.38 [0.71] |
| Imports | AIReF | 16 | -0.63 [0.70] | 3.02 | 6.20 | | | 0.75 | 4.13 [0.00] | 3.43 [0.00] | 0.09 [0.73] | | 16 | 2.28 [0.00] | 2.35 | 2.82 | | | 0.43 | | | | 0.22 [0.27] | |
| | Government | 16 | -0.76 [0.51] | 2.73 | 4.46 | 0.91 [0.38] | Do Not Reject | 0.54 | 4.13 [0.00] | 3.43 [0.00] | 0.33 [0.19] | 0.19 [0.85] | 16 | 2.49 [0.01] | 3.15 | 3.68 | -1.24 [0.24] | Do Not Reject | 0.56 | | | | 0.12 [0.52] | -0.36 [0.73] |
| | Bank of Spain | 16 | 0.02 [0.97] | 1.57 | 1.98 | 1.02 [0.33] | Do Not Reject | 0.24 | 4.13 [0.00] | 3.43 [0.00] | 0.48 [0.05] | -0.48 [0.64] | 16 | 1.18 [0.15] | 2.38 | 2.99 | -0.23 [0.82] | Do Not Reject | 0.46 | | | | 0.15 [0.63] | 1.45 [0.17] |
| | European Commission | 16 | 0.08 [0.89] | 1.76 | 2.23 | 1.02 [0.32] | Do Not Reject | 0.27 | 4.13 [0.00] | 3.43 [0.00] | 0.55 [0.03] | -0.60 [0.56] | 16 | 1.71 [0.03] | 2.63 | 2.98 | -0.56 [0.58] | Do Not Reject | 0.45 | | | | 0.26 [0.23] | 1.43 [0.18] |
| | FUNCAS Panel | 16 | -0.25 [0.70] | 1.88 | 2.43 | 1.00 [0.33] | Do Not Reject | 0.29 | 4.13 [0.00] | 3.43 [0.00] | 0.48 [0.05] | -0.33 [0.75] | 16 | 1.52 [0.04] | 2.43 | 2.86 | -0.10 [0.92] | Do Not Reject | 0.44 | | | | 0.30 [0.09] | 1.79 [0.10] |
| Employment | AIReF | 16 | -0.92 [0.01] | 0.98 | 1.45 | | | 0.33 | 4.13 [0.00] | 3.77 [0.00] | 0.30 [0.23] | | 16 | -0.68 [0.08] | 0.96 | 1.47 | | | 0.40 | | | | 0.08 [0.63] | |
| | Government | 16 | -0.82 [0.00] | 0.84 | 1.22 | 0.98 [0.34] | Do Not Reject | 0.28 | 4.13 [0.00] | 3.77 [0.00] | 0.47 [0.06] | -0.81 [0.43] | 16 | -0.58 [0.02] | 0.70 | 0.99 | 1.22 [0.25] | Do Not Reject | 0.27 | | | | 0.31 [0.20] | -0.32 [0.75] |
| | Bank of Spain | 16 | -0.94 [0.05] | 1.28 | 1.97 | -0.94 [0.36] | Do Not Reject | 0.45 | 4.13 [0.00] | 3.77 [0.00] | 0.17 [0.49] | 0.03 [0.98] | 16 | -0.31 [0.31] | 0.93 | 1.12 | 0.92 [0.37] | Do Not Reject | 0.30 | | | | 0.04 [0.85] | -0.91 [0.38] |
| | European Commission | 16 | -0.79 [0.00] | 0.84 | 1.17 | 0.86 [0.40] | Do Not Reject | 0.27 | 4.13 [0.00] | 3.77 [0.00] | 0.54 [0.03] | -0.73 [0.48] | 16 | -0.94 [0.00] | 0.95 | 1.28 | 0.38 [0.71] | Do Not Reject | 0.34 | | | | 0.52 [0.04] | 0.56 [0.59] |
| | FUNCAS Panel | 16 | -0.76 [0.00] | 0.76 | 1.18 | 0.70 [0.49] | Do Not Reject | 0.27 | 4.13 [0.00] | 3.77 [0.00] | 0.36 [0.15] | -0.60 [0.56] | 16 | -0.91 [0.00] | 0.91 | 1.24 | 0.56 [0.58] | Do Not Reject | 0.34 | | | | 0.28 [0.15] | 0.70 [0.50] |

ANNEX III. INDICATORS OF DEMAND-SIDE AGGREGATE VOLATILITY

STANDARD DEVIATION OF THE QUARTER-ON-QUARTER RATE OF CHANGE IN VOLUME TERMS OVER THE FIRST SEVEN CNTR ESTIMATES FOR EACH QUARTER

FIGURE ANNEX III.1. HOUSEHOLD FINAL CONSUMPTION SPENDING

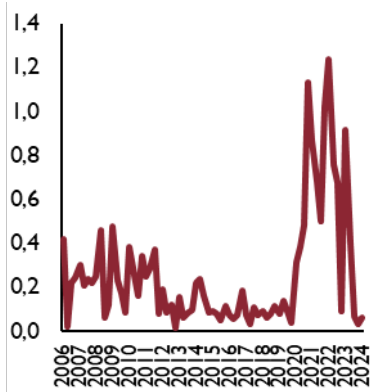


FIGURE ANNEX III.2. SPENDING ON CONSUMPTION BY THE PUBLIC ADMINISTRATIONS.

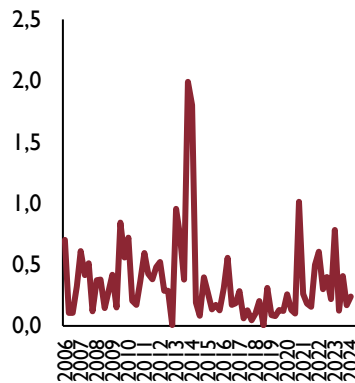


FIGURE ANNEX III.3. GROSS FIXED CAPITAL FORMATION

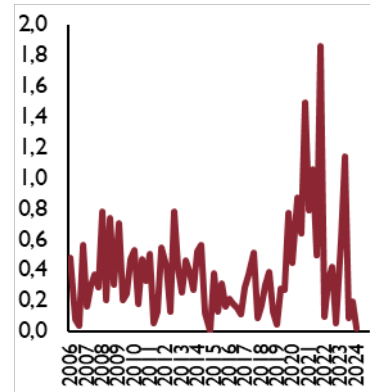


FIGURE ANNEX III.4. STOCK CHANGES AND ACQUISITIONS LESS DISPOSALS OF VALUABLES

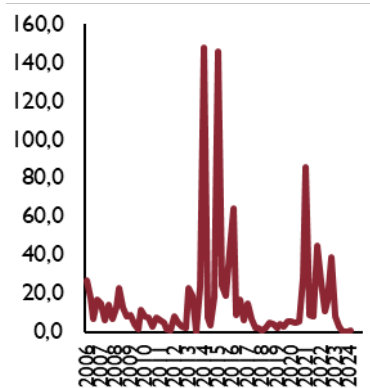


FIGURE ANNEX III.5. EXPORTS OF GOODS AND SERVICES

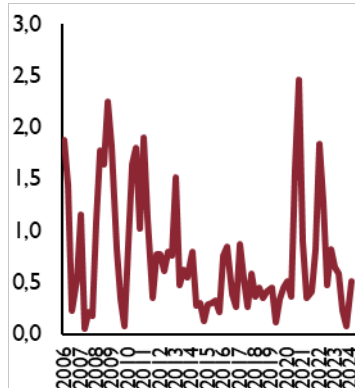
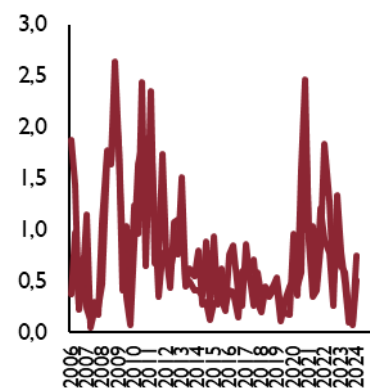


FIGURE ANNEX III.6. IMPORTS OF GOODS AND SERVICES



Source: INE

ANNEX IV. FISCAL FORECASTS 2021-2023 AND THEIR ERRORS

For a further breakdown of the methodology used and forecast errors from previous years, see [Technical Document 2/2022](#).

Revisions 2023

AIReF's reports for this fiscal year were issued without any changes to its traditional publication schedule. The first two revisions, which expressed a view on the fiscal results for 2023, took place in 2022, while the subsequent four revisions took place in 2021.

TABLE ANNEX IV. REVISIONS TO THE AIREF 2023 FORECAST

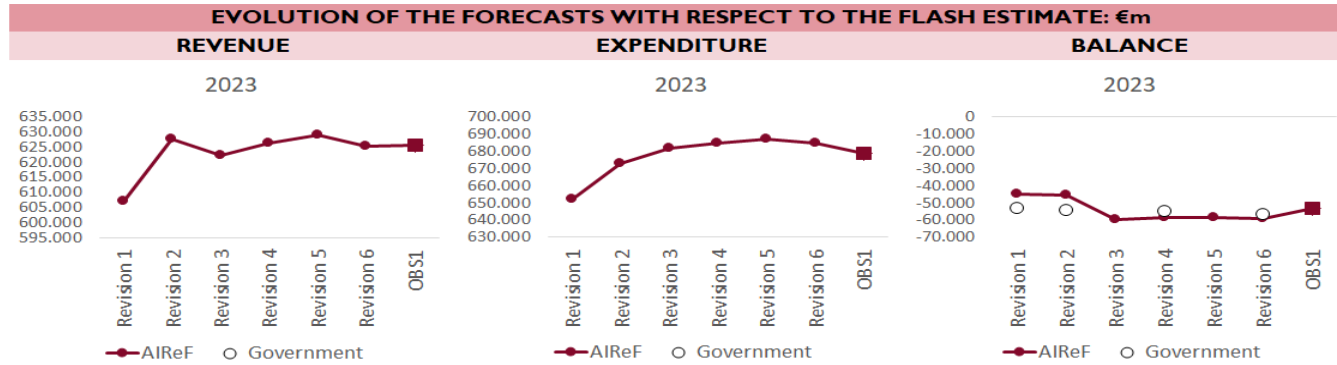
| Revision No. | Statute Art. | 2023 | | |
|-------------------------------|--------------|--------------------------|------------------|-----------------------------|
| | | Published report | Publication date | Days to know flash estimate |
| 1 | Art. 15 | 2022-2025 SPU | 12/05/2022 | 700 |
| 2 | Art. 17 | 2023 Budgetary Plan | 25/10/2022 | 534 |
| 3 | Art. 18 | Initial Bud. 2023 | 05/04/2023 | 372 |
| 4 | Art. 15 | 2023-2026 SPU | 11/05/2023 | 336 |
| 5 | Art. 19 | Budgetary execution 2023 | 06/07/2023 | 280 |
| 6 | Art. 17 | 2024 Budgetary Plan | 26/10/2023 | 168 |
| Flash estimate ⁽¹⁾ | | Initial Bud. 2024 | 11/04/2024 | - |

(1) First publication of the IGAE on the close of the accounting year

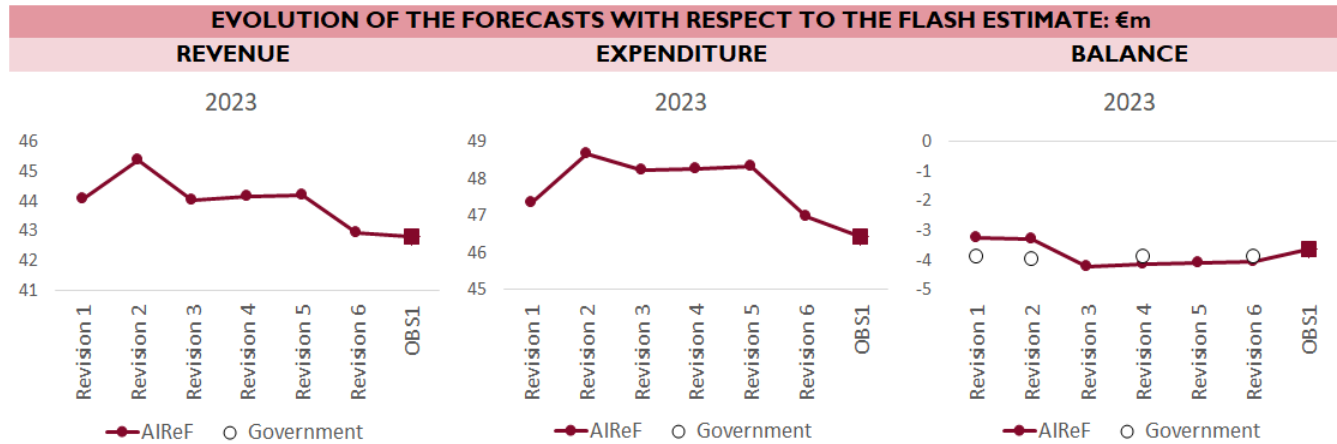
Source: AIReF

ANNEX V. EVOLUTION OF THE FORECASTS COMPARED WITH THE FLASH ESTIMATE:

In million €

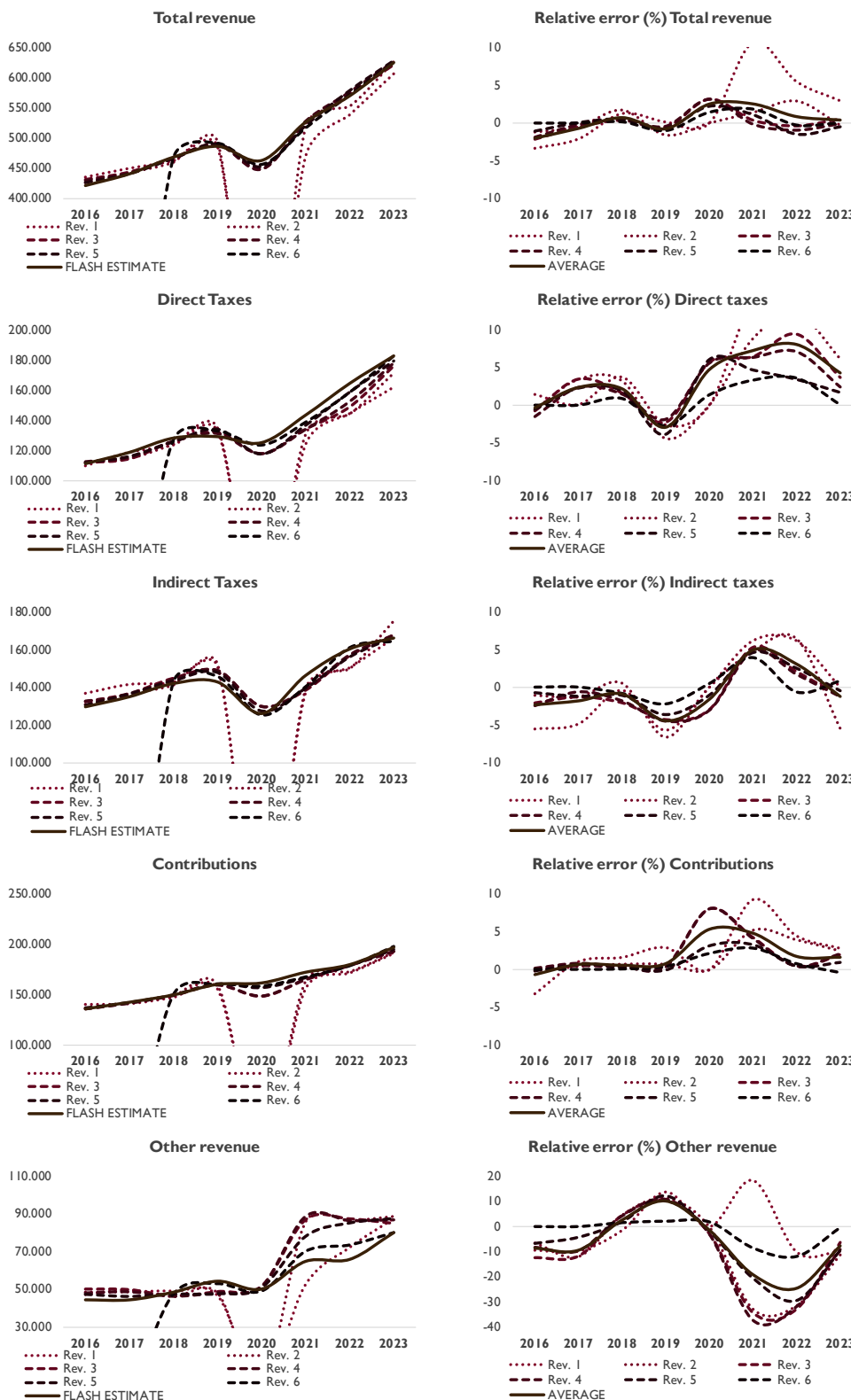


% GDP



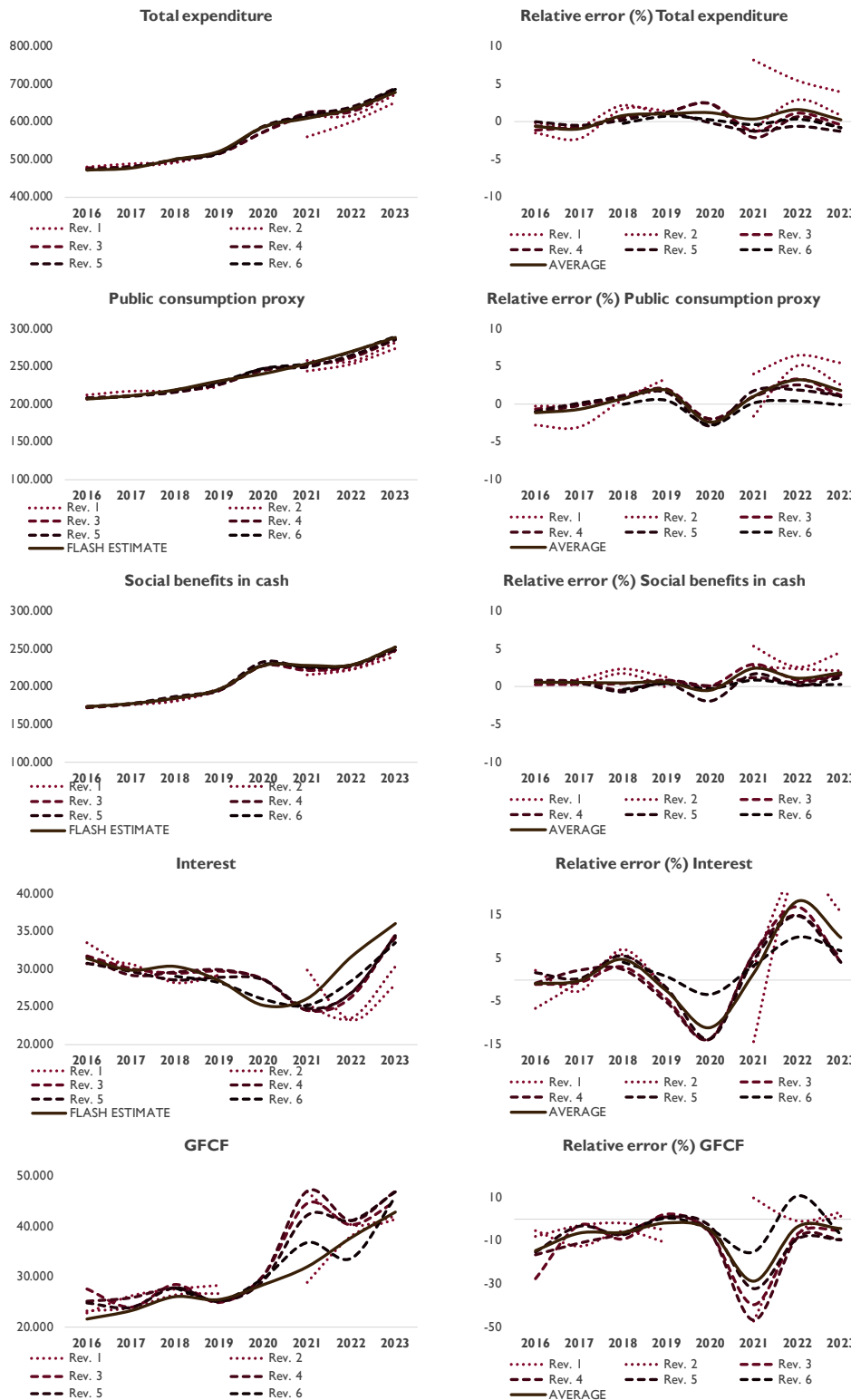
ANNEX VI. FORECASTS AND FORECAST ERRORS: REVENUE

FORECASTS AND FORECAST ERRORS REVENUE



ANNEX VII. FORECASTS AND FORECAST ERRORS: EXPENDITURE

FORECASTS AND FORECAST ERRORS EXPENDITURE



**FORECASTS AND FORECAST ERRORS
EXPENDITURE**

