



Independent Authority  
for Fiscal Responsibility

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# Report on the Macroeconomic Forecasts in the 2018 Draft General State Budgets

The mission of AIReF, the Independent Authority for Fiscal Responsibility, is to ensure strict compliance with the principles of budgetary stability and financial sustainability contained in article 135 of the Spanish Constitution.

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## Executive Summary

**The Independent Authority for Fiscal Responsibility (AIReF), on the basis of exogenous assumptions and defined policies, endorses the Government's macroeconomic forecast.** AIReF deems the Government's macroeconomic scenario accompanying the 2018 Draft General State Budgets to be prudent overall.

**The forecasts underlying the 2018 Draft General State Budget (GSB) contain a significant upward revision of the projected growth for 2018 in October (from 2.3% to 2.7%), in line with the main analysts and institutions following the Spanish economy.** The most recent short-term data available at the start of the first quarter of 2018 show signs of acceleration for the Spanish economy. The upward correction at the aggregate level is supported by the greater dynamism of the main trade partners, alongside a less intense than expected materialisation of the institutional uncertainty shock, with its impact essentially limited to October. In addition to these factors, the potential impact of the expansive fiscal policy measures envisaged in the 2018 GSB could result in greater household disposable income and, therefore, greater consumer demand. In relation to this, since the October publication of the Report on the Macroeconomic Forecasts in the 2018 Draft Budgetary Plan (DBP), expectations regarding the Spanish economy have improved, leading to upward revisions in the 2018 growth forecasts.

**The 2018 growth forecast is considered prudent and its composition is considered plausible, notably including both public and private consumption trends.** Domestic demand continues to be the main driver of growth in 2018, mainly due to positive trends in investment, both productive and in construction. Private consumption is at the bottom of both the panellists' forecasts and when compared with AIReF's internal models. It could exceed the forecast in the central scenario, taking into account the budgetary measures included in the GSB, the sound financial position of households and the improved climate of trust in the improving labour market. The external sector is consolidating its moderate positive contribution, confirming the changing growth pattern of the Spanish economy with respect to the previous cycle. Finally, the private consumption forecast has been revised upwards in light of the new measures included in the GSB, but lies outside the interquartile range of private forecasts, which is especially relevant in light of the bias previously identified in this item in the ex-post analysis. When compared with the AIReF models, the official forecast is within the 2018 forecast range, near the middle.

**The basic assumptions on the external environment that support the macroeconomic scenario of the 2018 Draft GSB are considered feasible, with fairly balanced risks.** On the one hand, in the short term, there could be an acceleration of growth of the main trade partners. On the other hand, in the medium term, there are risk factors that stem from a correction in the prices of the financial assets that were overvalued due to excessive market exposure to accommodative monetary conditions that have suppressed interest rate differentials. In addition, the implementation of protectionist policies by some of the major players in global trade,

along with geopolitical tensions in oil-producing countries, are also risks to consider beyond 2018.

**At the domestic level, the worst scenarios that could have emerged in October as a result of the institutional crisis in Catalonia seem to have dissipated.** The Spanish economy as a whole has behaved better than expected at the start of the year, aided by the moderation in political and institutional uncertainty. In the case of Catalonia, sustained growth is expected for 2018, although less dynamic. Whereas the Region had a positive growth differential with respect to the rest of the Spanish economy, it is now growing at a slightly lower rate. Despite the observed rapid normalisation, it is not possible to rule out new episodes of friction that would have a significant impact on the economy in.

**The ex-post analysis of forecasts for previous years does not identify any substantial bias for the 2014-2017 period, although it shows widespread deterioration in forecast accuracy.** Large unjustified biases were identified in the public consumption forecast for 2015-2017. In the case of the forecasts for the following year, during the 2014-2017 period the proportion of large biases increased from 20% in 2014 to 70% in 2017. Of these, biases unjustified by an ex-post result have grown steadily from zero to 44%.

**On the basis of its analysis, AIReF deems limited the progress made by the Government concerning transparency and the dissemination of information.** In this regard, AIReF reiterates two recommendations made to the Ministry of Economy, Industry and Competitiveness (MINEICO) in previous reports. First, to accompany the macroeconomic outlook with a “no policy change” scenario, and a separate quantification of the economic impact of the adopted or envisaged measures, in order to better understand the forecasts and specify the connection between the macroeconomic outlook and the budgetary scenario at all times. Second, to adopt and publish the measures needed to correct the important biases observed in the autumn public consumption forecasts.

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# 1. Introduction

**In its report on the Macroeconomic Forecasts accompanying the 2018 Draft Budgetary Plan (DBP), presented by the Government in October 2017, AIReF endorsed the macroeconomic outlook, deeming the 2018 forecasts to be prudent overall.** The basic assumptions underlying the official macroeconomic scenario are considered feasible in relation to the most recent international forecasts and the latest commodity and debt market trends, reflecting balanced risks stemming from the external environment. As a result of the political and institutional uncertainty in Catalonia, growth forecasts included in the DBP anticipated a downward correction for 2018, which was considered prudent in accordance with the AIReF analysis.

**Approval of the 2018 Draft General State Budget (GSB) implies the requirement for AIReF to submit a further report, after an interval of five months, on the Government's official 2018 forecasts.** The exceptional circumstances in the 2018 budgetary cycle for 2018 caused the GSB to be carried over, as envisaged in article 134.4 of the Spanish Constitution, for the second consecutive year. Finally, the 2018 Draft GSB will be presented before the Cortes Generales early in April 2018. As provided for in the Organic Law establishing AIReF, the macroeconomic forecasts accompanying the 2018 Draft GSB should include a report by the Authority stating whether or not it endorses said forecasts. This report fulfils this requirement.

**The macroeconomic forecasts are analysed from a two-fold approach, analysing ex-post the biases shown in previous years' forecasts and assessing ex-ante the realism of the forecasts in the 2018 Draft GSB.** As in previous editions, this report consists of two main sections. First, a detailed analysis of the 2018 forecasts (Section 2), including a balance of risks, both domestic, by updating the institutional uncertainty shock, and those stemming from the international environment. Second, an assessment of the previous years' forecasts, checking for biases (Section 3). Finally, Section 4 provides an overview of the findings and conclusions drawn from this analysis, and Section 5 offers two recommendations.

## 2. Macroeconomic forecasts for 2018

### 2.1. Forecast analysis criteria

**The aim of subjecting Government forecasts to analysis ex-ante is to assess whether they are realistic, and whether they define the most likely macroeconomic scenario or one that is more prudent.** To do so they are compared against the forecasts made by other private and public institutions and with confidence intervals from AIReF's own tools. The methods, parameters and assumptions underpinning the forecasts are examined, as far as the available information allows, and use of the most up-to-date information is verified.

**An analysis is conducted to establish how realistic the forecasts are for each variable, using models that establish a statistical relationship between the different variables and with behavioural equation models that relate each variable to their fundamental determinants.** These partial results on the plausibility of the forecast for each variable are subsequently integrated into a macroeconomic scenario, guaranteeing the internal consistency of the set of related variables in the Spanish National Accounts, as well as any risks that exist in that scenario.

**An overall assessment of the results of these comparative checks, alongside an evaluation of the balance of risks considered, will determine whether or not the macroeconomic scenario contained in the Draft GSB is deemed the most likely or a more prudent scenario.** A more prudent scenario would envisage the materialisation of some of the risks identified in the central scenario that are detrimental to economic activity and to the correction of existing imbalances.

### 2.2. General remarks

**The Government's 2018 macroeconomic forecasts use the most up-to-date short-term information from economic indicators and the most recent national accounting data available on the date of submitting the scenario,** including the latest quarterly national accounting update, published in early March. This is the main change in the macroeconomic outlook update, serving as the basis for the 2018 DBP Update.<sup>1</sup>

**As reflected in previous reports, in terms of transparency the information accompanying the official macroeconomic forecasts is considered insufficient.** The information received by AIReF does not provide for an explicit separation between the 2018 macroeconomic outlook with no policy change and the outlook with

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<sup>1</sup> The macroeconomic scenario that will accompany the 2018 GSB was communicated to AIReF on 15 March 2018. As has been communicated to AIReF it does not incorporate the 2017 closure of the quarterly non-financial accounts of the Public Administrations nor the quarterly non-financial accounts of the Institutional Sectors (published on 26 and 28 March, respectively).

the measures incorporated in the budget, with a detailed, separate assessment of the macroeconomic impact of the budgetary measures on the forecasting horizon. Regarding the methodologies, assumptions and relevant parameters underpinning the forecasts, AIReF believes that the Government should continue to progress in terms of transparency, understanding and ability to reproduce forecasts.<sup>2</sup> Finally, the integration of the main outlook variables with the granularity befitting the simplified national accounting framework should not be published, nor should the connections between the main macroeconomic scenario variables, and between these and the budgetary scenario, be explicitly stated.

## 2.3. Risk balance

### 2.3.1. Domestic elements: institutional uncertainty in Catalonia

**In October 2017, there was a generalised downward revision of the 2018 growth forecasts for the Spanish economy, mainly due to the impact of the institutional uncertainty in Catalonia.** Despite the improvement in the external environment and the good early signs for the short-term indicators at the end of 2017, the updates included in the scenario that accompanied the 2018 DBP last October predicted a downward correction in the 2018 GDP growth forecast, from the 2.6% predicted in July to 2.3%. This reduction of about 0.3% GDP is justified by the inclusion of the negative impact on domestic demand of an uncertainty shock resulting from the political situation in Catalonia. In accordance with the AIReF analysis, this impact was in line with a relatively transient shock, expected to last about three months. This outlook was considered prudent, in particular given the complexity of the estimate and the absence of directly comparable episodes. In addition, AIReF noted the existence of additional risks stemming from a longer duration of the shock, as well as from the idiosyncratic deterioration of the Catalonia economic activity, with possible negative spillover effects on the rest of Spain.

**Since the publication of the Report on the Macroeconomic Forecasts of the 2018 Draft Budgetary Plan last Autumn, expectations surrounding the Spanish economy have improved, leading to an upward revision in the growth forecasts for this year.** The latest short-term data available at the beginning of the first quarter

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<sup>2</sup> Article 4.5 of the Directive 2011/85/EU requires member states to publish the relevant methodologies, assumptions and parameters underpinning their macroeconomic and budgetary forecasts. The 2018 DBP identifies two factor models used for short-term forecasts, the FASE and the ADEL. However, to date only one specification and econometric estimation is known for the former, published in 2012. In addition, the variables and estimated coefficients in the error correction equations used for contrast are also unknown. Finally, the results obtained on the economic impact of the fiscal measures estimated with the REMS model have not been published nor communicated, although there is public information available.

of the year show signs of acceleration for the Spanish economy.<sup>3</sup> The real-time GDP forecast indicates quarterly growth of 0.8% for the first two quarters, creating a significant carry over effect for the inertial GDP trend for the year as a whole.<sup>4</sup> We must also note the potential impact of the expansionary fiscal policy measures envisaged in the 2018 GSB, which could result in a higher household disposable income and, therefore, in greater consumer demand. In this regard, the forecasts underlying the 2018 Draft GSB contain a significant upward revision of the Government's 2018 growth forecast from last October (from 2.3% to 2.7%), in parallel with the main analysts and institutions following the Spanish economy.

**While the Spanish economy has performed better than expected at the start of the year, Catalonia's economic performance of has been less dynamic. Instead of having a positive growth differential with respect to the rest of the Spanish economy for 2018, it now has a lower rate of growth.** The upward correction at the aggregate level is supported by the greater dynamism of the main trade partners, alongside a less intense institutional uncertainty shock than expected, with its impact essentially limited to October, with rapid normalisation. However, with the information available to date it is not possible to single out the individual impact of these two factors on the positive surprises included in the most recent short-term information.<sup>5</sup> At the regional level, the shock on Catalan economic activity seems to have had a negative impact in line with expectations. Its behaviour has worsened in relation to the rest of Spain. As shown in Table 1, the 2018 growth forecasts for Catalonia have deteriorated compared to the rest of Spain. While the growth forecast for Catalonia was 0.36 % higher than in the rest of Spain in October, it now sits at 0.18 % below the rest of the country.<sup>6</sup>

TABLE I. FORECASTS FOR 2018 (% ANNUAL VAR)

	Spain (without Catalonia)	Catalonia	Spread
October 2017	2.75	3.11	0.36
March 2018	3.03	2.86	-0.18
Revision	0.28	-0.25	-0.54

Source: AIReF

<sup>3</sup> See the [Spanish Economy Thermometer](#), published by AIReF on its web page listing the surprises recorded in the economic growth forecasts.

<sup>4</sup> The forecasts made by the real-time GDP forecast model developed by AIReF (MIPReD) can be found on [our website](#).

<sup>5</sup> [MIPred-CAT](#), the Catalan GDP forecast model developed by AIReF, confirmed a concentration of negative surprises in the October data, which revised the Catalan fourth quarter GDP forecast by over 0.4%. Subsequently, the November and December data showed changing trends, partially reversing the October decline.

<sup>6</sup> Calculations with the [METCAP](#) model developed by AIReF, which uses the latest short-term regional information and maintains a quarterly national reference that ensures the consistency of the individual regional estimates.



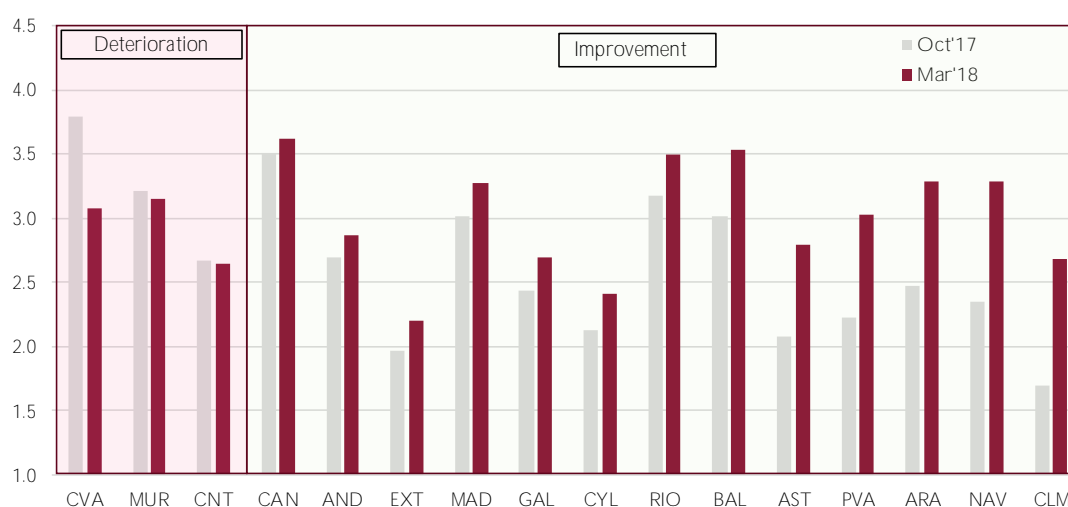
**The existence of positive spillover effects would provide a possible justification of the divergence between the behaviour of Catalonia and the rest of Spain.**

Contrary to initial expectations, the negative spillover effects from lower Catalan activity (mainly through the exchange of goods and services) may have coexisted with some activity replacement with a dynamic effect on the rest of the Regions. In contrast, Figure 1 shows the 2018 growth forecast for each Region with respect to the whole Spanish economy estimated in October 2017 and March 2018, respectively. Although the revision of the forecast can be explained by additional factors, there seems to be general improvement in regional growth, with the exception of three Regions. It should be noted that these Regions are more economically linked to Catalonia, where it might be expected that the negative spillover would have had stronger effects. In the rest of the Regions, the spillover effects were neutral or even positive, which, alongside the improvement in the external environment, could explain the upward revision of the growth prospects.

**Finally, at the domestic level, the worst scenarios that could have emerged in October as a result of the institutional crisis in Catalonia seem to have dissipated.** The Spanish economy as a whole has behaved better than expected at the start of the year, aided by the moderation in political and institutional uncertainty. In the case of Catalonia, high growth rates are forecasted for 2018, although less dynamic than expected a few months ago. Whereas the Region had a positive growth differential with respect to the rest of the Spanish economy, it is now growing at a slightly lower rate. Despite the observed rapid normalisation, it is not possible to rule out new episodes of friction that would have a significant impact on Catalonia's economic activity; therefore, continuous monitoring is still justified.

FIGURE I. 2018 REGIONAL GDP GROWTH FORECAST, OCTOBER 2017-MARCH 2018

Regional GDP growth forecast (Oct'17 - Mar'18)



Source: AIReF

## **2.3.2.** The international environment

**The basic assumptions underpinning the macroeconomic scenario for the Draft GSB for 2018 are deemed feasible.** These assumptions are plausible in the light of the most recent forecasts from international organisations and the latest commodity and debt market trends (see Charts C.1 and C.3 in the Annex). Since the Report of the 2018 DBP last October, the assumptions have been revised upwards in most cases, which partially explains a more favourable growth forecast. Global growth has been revised upward, in particular for the main trade partners in the euro zone. Therefore, the momentum seen in exports is expected to continue. However, this impetus will be partially offset by the strength of the euro. Regarding the stabilisation predicted in the 2018 DBP, a 22.5% increase in the price of crude oil is forecast, which will lead to higher prices (lowering real household disposable income) and imports in nominal terms. Finally, the assumptions related to the interest rate curve have been revised downward by 0.2% for the long term, boding well for investment.

**The Government forecasts solid growth in global and euro zone GDP, in accordance with the main international organisations.** Global activity continues to grow vigorously. After the observed growth of 4.1% in 2017, the Government expects a slowdown to 3.6%, 0.3% higher than expected in the 2018 DBP, and 0.5% below the ECB. According to the IMF, this upward revision is due in part to the corporate tax cuts in the United States. The momentum is distributed evenly at the global level, with notable upward surprises in Asia and Europe. In fact, the Government has updated its euro zone GDP growth forecast by 0.7% this year, in line with the latest forecasts from the ECB. This continued expansion is mainly explained by the strong drive from external demand and the external sector. Strong exports benefit from the current expansion of global trade, which continues at rates close to 5%. Drivers of domestic demand include an accommodative monetary policy, the acceleration in credit to the private sector, the increase in household net wealth and the improvement in labour market conditions. As a result, the Government surmises that the Spanish export markets will grow 4.5% in 2018, 0.4% more than predicted in the October DBP.

**The global growth risk scenario is balanced in the short term, while it could be less than expected in the medium term.** In the short term, global growth could be higher than expected if credit trends continue above projections in response to continued accommodative monetary policies. On the other hand, growing risks appear in the medium term, stemming from the correction of the prices of financial assets that were overvalued due to excessive market exposure to accommodative monetary conditions with suppressed interest rate differentials.<sup>7</sup> In addition, the implementation of protectionist policies by some of the major players in global trade

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<sup>7</sup> The latest decisions of the Federal Reserve on interest rate increases and the recent growth in stock market indices would support these assumptions.

along with geopolitical tensions in oil-producing countries are also risks to consider beyond 2018.

**The Government and the main forecasting centres expect the euro to stabilise after its appreciation against the dollar in recent months.** As a result, the ECB projects the euro's nominal effective exchange rate to appreciate 4.5% in 2018, which could partially offset the stimulus from external demand.

**The Government's assumptions regarding the performance of government debt securities are at levels comparable to market expectations.** The interest rate trend for Government debt at 10 years forecast in the macroeconomic scenario in the 2018 GSB stands at 1.6% in 2018, in line with the yields implicit in the futures markets and 0.5% below the 2018 DBP forecast. The three-month Euribor is expected to maintain its current level of -0.3%. Rates are expected to continue at low levels in the medium term, in the absence of inflationary pressure. At its meeting in January 2018, the ECB announced that it will begin withdrawing stimuli in the first half of the year. However, it is expected that the rates will remain at historic lows even after the removal of the quantitative expansion measures.

**The oil price trajectory is in line with futures markets and the forecasts from the main international organisations.** The improved global economic prospects, the weakness of the dollar, last November's extension of the agreement between the OPEC and Russia to limit production along with geopolitical tensions in the Middle East have all driven the price of crude oil upwards. In the past 12 months, the price of a Brent barrel in dollars has grown 35%, standing very close to \$70 per barrel in mid-March. The markets are expected to close the year at around \$67 with a gradual decline thereafter.

## 2.4. GDP and the composition of demand

This section focuses on the differences between the previous scenario issued by the Government in October for the 2018 DBP and the information submitted for the current 2018 Draft GSB. This comparison is shown in Chart C.2 of the annex.

**The 2017 real GDP growth forecast envisaged in the Government's October report practically coincides with the year-end figures published by the National Statistics Institute (INE), although there are differences in the final composition of growth.** The Spanish economy grew by 3.1% in real terms in 2017. While the contribution from domestic demand was slightly above forecast (2.8% compared to 2.4%), it was offset by a lower contribution from the external sector (0.3% compared to 0.7%). Broken down into components, the greatest deviation occurred in Gross Capital Formation (1.4%), especially at the hand of productive investment, whose observed growth of 6.1% was significantly greater than the expected figure of 4.8%. In turn, within the external sector, the largest forecasting errors are concentrated in exports, which evolved by 1.1%, more contained than expected, although clearly influenced by the significant downward revision in the series conducted by INE at the end of 2017.

**The official forecast for 2018 has been revised upwards 0.4%, up to a growth rate of 2.7%, based on a more dynamic environment, a lesser impact of the Catalan institutional shock than expected and the expansionary fiscal measures included in the 2018 GSB.** Since the publication of the Report on the 2018 DBP forecasts, the Government has improved its real growth forecast from 2.3% to 2.7%. The good progress in the recovery of the European economy, low interest rates and the favourable competitive position of companies have all played a factor in this upward revision. In addition, the Government has revised the October quantification of the impact of the institutional uncertainty shock downward. Finally, while the 2018 DBP presented a “no policy change” scenario, the GSB included expansionary measures for both expenditure and revenue. The chief analysts on the forecasting panel have implemented a notable upward revision of GDP growth for 2018, shifting the interquartile interval from [2.5%-2.7%] to [2.7%-2.8%]. In this way, the official forecast has shifted to the lower end of the panellists’ interval (see chart panel G.2). In addition, these forecasts also appear prudent in light of the models used by AIReF, standing below the 40th distribution percentile (see the chart panel G.1).

**Among the components of domestic demand, the rise in private consumption remains at a more contained growth rate** (2% compared to 2.4% in 2017). Although the Government has revised private consumption growth upwards a few tenths of a percentage point since October, its outlook seems moderate, standing below the interquartile interval of the panellists and at the lower end of the AIReF interval. Contained consumption could be linked to the bottoming-out of the savings rate, which is expected to begin its recovery from historic lows. In light of this moderate outlook, the advanced process of deleveraging households, their sound financial position, and advantageous credit supply conditions are the driving forces for private consumption and investment in 2018. There will also be a favourable impact of the announced expansionary fiscal measures on household income, with a significant expected macroeconomic impact (up to 0.2%) on GDP growth through private consumption demand. The budgetary measures with significant macroeconomic impact communicated to the AIReF on the date of this report are the following: (i) the Government-Union agreement for the public official pay raise (1.75% in 2018) and an increase in the replacement rate; (ii) a personal income tax reduction for the lowest income bracket (below 14,000€); and (iii) the update of minimum pensions above the Pension Revaluation Index (PRI) of 0.25%.

**Within the composition of growth, the acceleration of investment is the main factor contributing to the 0.4% upward revision in the contribution of domestic demand.** Last October the Government placed the progress of gross fixed capital formation (GFCF) at 3.4% for 2018. In contrast, the estimate that underlies the draft budget is 4.7%, 1.3 % above the October forecast. This upward revision in investment is also seen in the panellists’ forecasts. In light of AIReF’s own forecasts, the Government’s predicted variation rates are considered prudent. The sound financial position of the business sector, alongside the very favourable financial conditions, support the dynamism in the investment figures. In particular, investment in construction is the GFCF component that has seen the greatest upward revision

(+1.5%), with an expected variation rate of 5% for 2018. The recovery of the real estate market can be perceived clearly, with double-digit growth in the acquisition of new housing at the end of 2017, price increases close to 10% in some Regions and the recovery of the credit market for new housing.

**Public consumption has been revised upward slightly with respect to the inertial scenario set forth in the 2018 DBP, although factors have been identified that could elevate its growth further.** The Government has increased its 2018 public consumption forecast from 0.7% to 1.1%, justified by the recent approval of the Agreement to improve public employment and labour conditions that includes expansive measures in terms of the replacement rate of civil servants. The same trend is expected for the public consumption deflator, which is adjusted from 0.7% in the DBP to 1.1%. While a wage freeze was envisaged in the 2018 DBP scenario, the 2018 Draft GSB included the impact of the pay rise for public sector staff of 1.75% (the minimum envisaged by the above Agreement). Although no information is available regarding the components of public consumption, compensation of employees historically represents close to 60% of the aggregate, therefore the change from 0% (pay freeze) to 1.75% (approved by the Agreement) could almost certainly have an impact on the deflator of over 0.4%, which implies the possibility of an even greater final increase. In addition, the evolution of this component essentially depends on the behaviour of the Regions and Local Governments. Therefore, in order for this aggregate to be maintained at the forecasted levels, it will be key for these subsectors to make these changes, as well as the correct application of the spending rule. In the absence of greater information about the subheadings that support this aggregate figure, it should be noted that the Government forecast for this item falls outside the interquartile range of the FUNCAS panel. However, when compared with the AIReF models, the official forecast is within the 2018 forecast range, close to the mid-point.

**The external sector's contribution to growth has been corrected downward with respect to previous forecasts, but more moderately than in relation to domestic demand.** In addition, the export and import growth expected by the Government is considered likely in light of the AIReF models. Comparing the 2018 GSB forecasts with the data observed in 2017, exports approximately maintained their growth in 2018, mainly based in the expansionary stance that is expected for Spanish export markets, although within the context of the expected appreciation of the exchange rate. These forecasts are in line with those made by private analysts, although at the upper end of the interquartile range, and in line with forecasts from international organisations. For its part, the growth in imports has not been amended with regard to the 2018 DBP forecasts, but has lost some momentum when compared with the 2017 data. Similarly, these forecasts are consistent with those from both private analysts and international organisations. This behaviour would be in line with the expected slowdown in domestic demand and in particular with productive investment, which would have a moderating effect on imports. As such, external demand would continue to support growth in 2018, in line with 2017, and within the range of AIReF forecasts.

**The Government's 2018 employment forecasts have remained stable and are in line with the consensus and within the AIReF forecast interval.** It should be noted that, in spite of the upward revision of the GDP growth forecast by 0.4% for 2018, the Government has maintained an employment growth rate of 2.5% for this year, as projected in autumn of 2017. This implies that the Government has revised the GDP and employment growth differential in relation to the scenario adopted last October. Its forecasts are now more in line with the available evidence and the AIReF forecast interval, and are based on employment-intensive growth, but with a moderately positive apparent productivity. In light of this employment dynamic and the trends in the active population, the unemployment rate forecast by the Government (15.5%) is considered likely. This is consistent with the excess supply in the labour market, taking into account the absence of wage inflation pressures and the low cost of job creation since 2012 (high employment-to-GDP elasticity).<sup>8</sup>

**Concerning prices, the Government has revised the final consumption deflator of the Public Administrations (PAs) upwards, but maintains its compensation per employee forecast, which is considered implausible.** The increase in the consumption deflator of the PAs (from 0.7% in autumn to the 1.1% now expected by the Government for 2018) is linked to the public official wage agreement signed between the Ministry of Finance and Public Function and the trade unions CCOO, UGT and CSI-F. The fact that the employee compensation forecast has been maintained at 1.1% for 2018 means that the Government not only expects that there will be a movement towards the private sector, but that the latter will compensate for this increase. This implies a downward revision of the 2018 employee compensation forecast for the private sector with regard to the forecasts included in the 2018 DBP. This contrasts with the empirical evidence that suggests strong two-way links between public and private wages in Spain; even more so when unions and companies have been called upon to emulate this agreement in the private sector. Finally, the Government has revised the private consumption deflator downward by 0.2%, placing it at 1.4% for 2018. This revision is close to the mean forecast by experts and is in line with contained consumer prices, under the assumption of a certain weakness in the underlying component, along with a more stable environment for oil prices following the price increases at the start of the year. Considered in conjunction with the expected employee compensation trends mentioned above, the downward revision in the private consumption deflator implies a loss of workers' purchasing power.

**In budgetary terms, the moderate 2018 GDP trends submitted by the Government should be translated into cyclical gains through equally contained revenue and a lesser denominator effect.** The communication of the macroeconomic outlook accompanying the 2018 GSB had no information on the

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<sup>8</sup> For a detailed analysis of the evolution of the labour market since the 2012 reform, see the AIReF Working Paper 1/2018: ["Some Unpleasant Labor Arithmetics: A tale of the Spanish 2012 Labor Market Reform"](#)



associated revenue scenario.<sup>9</sup> It is expected, however, that the outlook (located at the bottom of the intervals) concerning growth and the employee compensation trends for 2018 will have a direct effect on the tax bases of the main taxes, the expected proceeds of which should be consistent with the evolution of their macro determinants. In addition, the expansionary fiscal measures announced have an opposite effect on deficit through an increase in both expenditure and revenue, although the final quantification should include possible secondary effects.

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<sup>9</sup> The macroeconomic scenario accompanying the 2018 GSB was communicated to AIReF on 15 March 2018.

## 3. Macroeconomic forecasts for the 2014 to 2017 period

### 3.1. Forecast comparison criteria

**This section examines the forecasting biases in the main items of the macroeconomic scenario presented by the Government over the last 4 years.**<sup>10</sup>

Similar to what happened with the macroeconomic scenarios accompanying the 2017 GSB, this scenario was drafted in March of this year. Therefore, the data used in the comparison are taken from the panel of forecasts published by FUNCAS in March for the years 2014 to 2017.

**This analysis is conducted solely in relation to forecasts included in the FUNCAS panel, excluding other private forecasts and those conducted by the European Commission, the Bank of Spain, the OECD or the IMF.**<sup>11</sup> The FUNCAS panel forecasts have the advantage of being the last to be published before the macroeconomic forecasts are made (i.e. mid-March each year). Furthermore, all the panel forecasts are published simultaneously, making comparisons against Government forecasts easier. Thus, they become a clear reference in terms of independence and predictive outcome for the main macroeconomic variables. Moreover, though international organisations' forecasts may include a wider range of variables for comparison, the available information for drafting them is not necessarily the most recently updated and should therefore be analysed separately from private institutions' forecasts of the FUNCAS panel.

**Any bias in the Government forecast that is large, unjustified and repeated during the last four years will be considered to be a significant bias.** The bias in a variable is defined as the difference between two forecasts for that variable. In order to gauge whether a bias has been *significant*, the Government forecasts (G) are compared against other recent forecasts by private institutions, published in the FUNCAS consensus forecast (C), and against the observed result (R).<sup>12</sup> A bias is considered *large* when the Government forecast falls outside the interquartile range

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<sup>10</sup> Article 14.4 of the Organic Law establishing AIReF requires this report to include an assessment of whether the macroeconomic forecasts display any considerable bias over a period of four consecutive years, according to COUNCIL DIRECTIVE 2011/85/EU, of 8 November 2011, on the requirements applicable to Member States' budgetary frameworks.

<sup>11</sup> For the purposes of analysing and controlling robustness, the data provided by other private institutions (i.e. those contained in the monthly Consensus Forecast publication) are also analysed. However, due to the small number of items included with respect to the FUNCAS panel, the data is not considered for the purposes of calculating the mean or the interquartile ranges.

<sup>12</sup> For the purposes of calculating the absolute forecast error, the real or observed value for year  $t$  is that corresponding to the first publication of the Annual National Accounts, which is around March or April of the year  $t+1$  (i.e. calculations are performed in real time).



of the distribution of the panel forecasts.<sup>13</sup> Government forecasts' deviation from the consensus forecast will be deemed unjustified when the absolute forecast error is larger than that of the consensus forecast; i.e. if  $|G-R| > |C-R|$ . To this effect, no analysis is made of the reasons that may explain the differences observed.<sup>14</sup>

## 3.2. Ex-post assessment of the 2014-2017 forecasts

**Prior AReF analyses of the Government's spring forecasts have identified large biases unjustified by an ex-post result, both for the current year and the next.** Previous reports have identified optimistic biases in fiscal consolidation during 2011 and 2012.<sup>15</sup> In particular, large biases have been identified in two or three consecutive years in public consumption, the unemployment rate and the public deficit-to-GDP ratio, both for the current year and the following during the 2013-2016 period.<sup>16</sup> For the whole 2011-2017 period, considering the forecasts for the current year and the following together, approximately half of the official spring forecasts have large biases. Of that total, about 50% were found to be unjustified ex-post.

**Over half of the large biases were found in private and public consumption, the unemployment rate and the public deficit-to-GDP ratio. The amount of large biases in the GDP forecasts and in foreign trade is limited.** During the 2014-2017 period, two-thirds of the large and unjustified biases in forecasts for the following year were in consumption (both private and public), the unemployment rate and the public deficit-to-GDP ratio, with large biases occurring in each of these items for the last three consecutive years. In the case of public consumption, said biases have always been unjustified by the ex-post result.<sup>17</sup> In regard to GDP and the external sector, a limited number of large biases have been identified, most of which have been justified ex-post.

**During the past 4 years, the number of large biases that are later unjustified by the observed result has considerably increased, in particular in forecasts for the following year.** The signs of deterioration in forecasting accuracy identified in the previous report on macroeconomic conditions accompanying the 2017 Draft GSB

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<sup>13</sup> The interquartile range is a dispersion measure defined as the difference between the first and third quartile, thus encompassing 50% of observations close to the mean.

<sup>14</sup> A detailed description of the methodology can be found in the [Report on the Macroeconomic Forecasts of the 2015 Draft General State Budgets](#)

<sup>15</sup> [Report on the Macroeconomic Forecasts for the Kingdom of Spain's 2015-2018 Draft Stability Programme Update \(SPU\)](#)

<sup>16</sup> [Report on the Macroeconomic Forecasts in the 2017 Draft General State Budgets](#)

<sup>17</sup> In general, large biases are identified with figures rounded to one decimal place. In the case of public consumption, if the comparison is made to two decimal places, large and unjustified biases are identified throughout the period under review from 2014 to 2017, which would lead to a significant bias, as has already been identified for that heading in the autumn forecast.

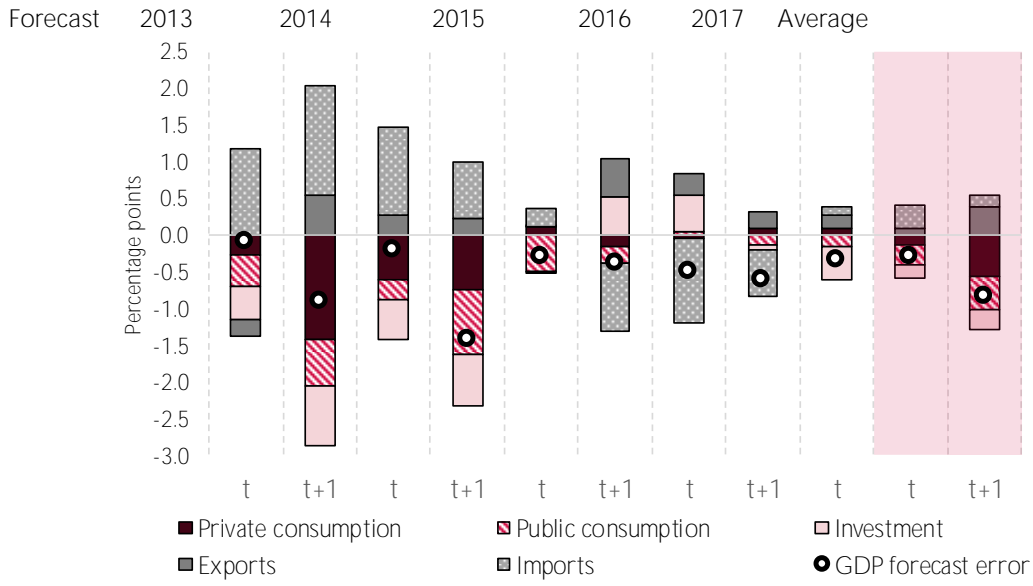
seem to have affected the year-end analysis for 2017 for the first time.<sup>18</sup> In the case of the forecasts for the following year, during the 2014-2017 period the proportion of large biases increased from 20% in 2014 up to 70% in 2017. Of these, those unjustified ex-post have increased steadily from zero up to 44%. For its part, large biases in forecasts for the current year have remained consistent year after year between 40% and 50% of the total observations, while around a 20% are considered unjustified.

**The downward (prudent) bias of the economic growth forecasts could be almost fully corrected for the current year and reduced by 60% for the following year if there are no forecasting errors in public consumption.** The Government's GDP growth forecasts were systematically lower than the observed value (on average 0.3% down for the current year and 0.8% for the following year) during the 2014-2017 period (see Figure 2). The average contribution of public consumption forecast errors and GDP growth forecast errors were, on average, 0.3% (90% of the GDP growth forecast error) and 0.6% (60% of the GDP growth forecast error), for the current year and following year, respectively. Unlike the rest of macroeconomic scenario components, public consumption forecasts largely depend on a regulatory component, where the Government has a clear comparative advantage over the rest of the FUNCAS panel forecasts which do not have information on the tax measures planned by the Government, usually included in the Draft GSB. Although one would therefore expect the Government to exploit this information to improve its public consumption forecasts, evidence from recent years seems to indicate otherwise. Together with the (optimistic) large and unjustified biases observed during the past three years, the Government's public consumption forecast is the variable with the greatest average error of all GDP components, both for the current year and the following year. In fact, the variability of the error (measured through its variation coefficient) is one of the smallest of all items, and unlike the largest, does not increase with the increasing forecast horizon. Figure 3 shows the decrease in the GDP forecast error if the public consumption forecast error is removed.

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<sup>18</sup> [Report on the Macroeconomic Forecasts in the 2017 Draft General State Budgets](#)

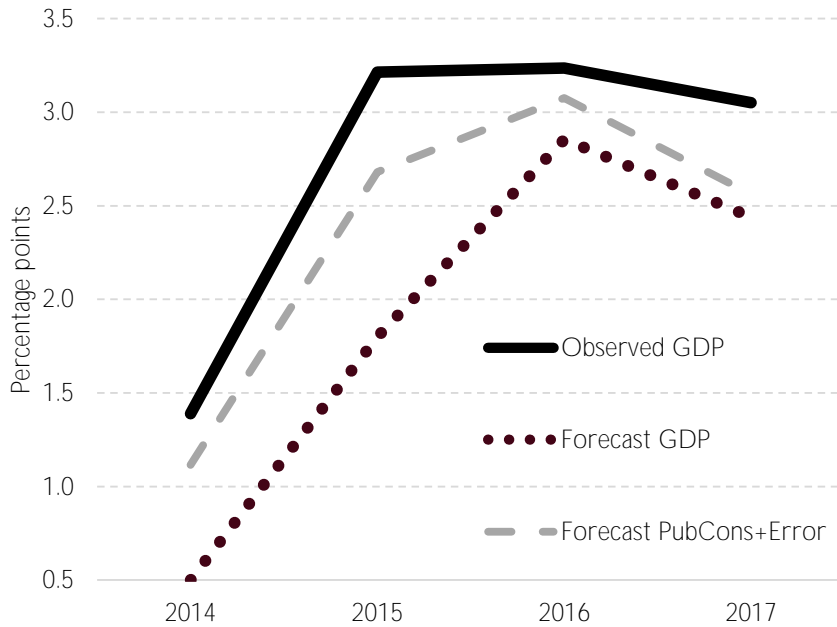
CONTRIBUTIONS TO THE OFFICIAL GDP FORECAST ERRORS



Source: INE, MINEICO and AIReF estimates

Note: Percentage variation. The forecast error is defined as the difference between the forecast and the real value (in percentage points).

ERRORS IN THE GOVERNMENT'S SPRING PUBLIC CONSUMPTION FORECAST FOR T+1 AND GDP GROWTH



Source: INE, MINEICO and AIReF estimates

Note: The forecast error is defined as the difference between the forecast and the real value.

## 4. Conclusions and endorsement

**On the basis of the exogenous assumptions and defined policies, AIReF endorses the Government's macroeconomic forecast.** AIReF deems prudent the Government macroeconomic scenario accompanying the 2018 Draft GSB. The basic assumptions underpinning the macroeconomic scenario in the 2018 GSB are considered feasible and reflect balanced risks. Regarding the external environment, it is possible that global growth will accelerate even more than expected. Moreover, there are risks that stem from a correction in the prices of overvalued financial assets and overly suppressed interest rates, which may damage confidence and growth in the medium term. In addition, protectionist policies, geopolitical tensions and institutional uncertainty in some countries (in particular the uncertainty surrounding Brexit) are also risks to consider beyond 2018. At the domestic level forecasts may be exceeded, essentially due to the Government's underestimation of the positive impact of the budgetary measures included in the GSB and the sound financial position of households. On the other hand, growth forecasts may not be met if the political-institutional instability in Catalonia were to deteriorate or become chronic.

**The 2018 growth forecast is deemed prudent, and plausible in what concerns to its composition, notably including moderate trends in both public and private consumption.** Domestic demand continues to be the main driver of growth in 2018, with a slight upturn in its contribution to GDP growth, mainly due to the positive trends seen in investment, both productive and in construction. Private consumption forecasts are located at the lower end of both panellists' forecasts and when compared with AIReF's internal models. On the other hand, the public consumption forecast has been revised upwards in light of the new measures included, and communicated to the AIReF, in the GSB, lying outside the interquartile range of the FUNCAS panel forecasts. When compared with AIReF models, the official forecast is also at the lower end of the confidence intervals, indicating a greater likelihood of forecasts being exceeded. These circumstances are particularly relevant in light of the optimistic bias identified in previous reports. In turn, external demand is consolidating its moderate positive contribution, confirming the changing growth pattern of the Spanish economy with respect to the previous cycle.

**For its part, the ex-post analysis of the spring forecasts of previous years does not identify a substantial bias for the 2014-2017 period, although they do reveal a widespread deterioration in forecast accuracy.** Large unjustified biases were identified in the public consumption forecast for the 2015-2017 period. In the case of the forecasts for the following year, during the 2014-2017 period the proportion of large biases increased from 20% in 2014 up to 70% in 2017. Of these, biases unjustified by an ex-post result have grown steadily from zero up to 44%.

The President of AIReF

A handwritten signature in black ink, appearing to read 'JL Escrivá', with a horizontal line underneath the name.

José Luis Escrivá

## 5. Recommendations

On the basis of its analysis, AIREF deems limited the progress made by the Government concerning transparency and the dissemination of information.

In this regard, AIREF **reiterates two recommendations** made to the Ministry of Economy, Industry and Competitiveness (MINEICO) in previous reports:

1. **Accompany the macroeconomic outlook with a “no policy change” scenario, and a separate quantification of the economic impact of the adopted or envisaged measures, in order to better understand the forecasts and to make the connection between the macroeconomic outlook and the budget scenario explicit at all times.**

### Background

This recommendation is already contained in the Report on the Macroeconomic Forecasts of the 2017 Draft GSB, and concerns the areas of methodology and transparency.<sup>19</sup>

MINEICO responded to this recommendation with a commitment of partial compliance, stating that once the quantification of the impact of the measures taken or envisaged provided by the Ministry of Finance and Public Function (MINHAFP) is available, it would propose including real and nominal GDP growth forecasts in a “no policy change” scenario in future GSB drafts.<sup>20</sup>

In this sense, AIREF welcomed the proposal, but insisted on the need to have a complete inertial macroeconomic scenario, accompanied by the quantified impact of the measures to facilitate the analysis of the scenario and the transmission channels of the measures, thus ensuring consistency between the macroeconomic and budgetary scenarios.

### Reasons for reiteration: in compliance

In this report on the macroeconomic forecasts of the 2018 Draft GSB, MINEICO has not provided a “no-policy change” macroeconomic scenario, nor a reduced version (limited to real and nominal GDP growth), nor the estimated economic impact of the fiscal measures included by the Government, in breach of the commitment made in its response to AIREF.

For this reason, AIREF insists on its recommendation in the same terms, since it is not in a position to make the connection between the macroeconomic forecasts and

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<sup>19</sup> [Report on the Macroeconomic Forecasts of the 2017 Draft General State Budgets](#)

<sup>20</sup> [Follow-up to the AIREF recommendations by MINEICO](#)

the budgetary scenario explicit, as it does not have information on the budget variables beyond the evolution of aggregate public consumption.

**2. Adoption of measures to correct the forecast biases. Adopt and publish the measures necessary to correct the significant biases observed in the autumn public consumption forecasts.**

### Background

This recommendation responds to the requirements of Directive 2011/85/EU on the evaluation of forecasts. It is described in the Report on the Macroeconomic Forecasts of the 2018 DBP, where it identified large, unjustified and continuous biases in the official public consumption forecasts over the past 4 years.<sup>21</sup>

The response provided by MINEICO proposed that if the central Government forecast of public consumption growth in real terms were outside the consensus interquartile range, it would be adjusted so that it would be at the end of the interquartile range closest to the original Government forecast.<sup>22</sup>

### Reason for reiteration: insufficient actions taken

Public consumption is the variable underlying the connection between the macroeconomic and budgetary forecasts. In a period of budgetary consolidation, biases underestimating public consumption are directly transferred to the GDP forecasts (underestimating them) and inversely to the net lending/borrowing of the PAs, which tends to be overestimated.

The solution proposed by the MINEICO is not deemed to be sufficient, as it focuses on the formal criteria of the definition of bias in order to avoid being classified as “significant” at the rating, without solving the problem.

It should be recalled, moreover, that public consumption is the variable of the macroeconomic conditions with the greatest discretionary component. Therefore, adjusting it to the interquartile range of the private analysts’ panel does not involve any informational gain a priori, precisely in the variable in which the Government has an advantage.

AIReF identifies two areas that could be exploited to comply with the recommendation. First, greater transparency with regard to the models and assumptions of the forecasts for the various components of public consumption (both in terms of volume and prices). Second, greater use of budgetary information from the different subsectors available when completing the macroeconomic forecasts.<sup>23</sup>

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<sup>21</sup> [Report on the Macroeconomic Forecasts of the 2018 Draft General State Budgets.](#)

<sup>22</sup> [Follow-up to the AIReF recommendations by MINEICO](#)

<sup>23</sup> Essentially the information contained in chapters 1 and 2 of the draft budgets for the various subsectors.

## 6. ANNEX: TABLES AND CHARTS

### C.1) Basic assumptions for the 2017-2018 scenario

	2017	2018 (F)	Change (I)
Short-term interest rates (Euribor at three months)	-0.3	-0.3	-0.1
Long-term interest rates (Government debt at 10 years, Spain)	1.7	1.6	-0.5
Exchange rate (USD/EUR)	1.13	1.23	0.05
Global GDP growth, excluding the euro zone	3.8	4.1	0.5
GDP growth in the euro zone	2.5	2.4	0.7
Spanish export markets	4.4	4.5	0.4
Oil prices (Brent, USD/barrel)	54.2	66.4	13.2

(F) Forecast.

(I) The difference with respect to the Government's 2018 Draft Budgetary Plan

Sources: European Central Bank, the European Commission and the Ministry of Economy, Industry and Competitiveness.



## C.2) Government macroeconomic forecasts

	2017	$\Delta$ 18 DBP	2018	$\Delta$ 18 DBP
<b>GDP</b>	3.1	-0.1	2.7	0.4
GDP at current prices: billions of euros	1,163.7		1,213.2	
GDP at current prices: % variation	4.0	-0.3	4.3	0.3
<b>DEMAND COMPONENTS (% real variation)</b>				
Domestic final consumption expenditure	2.2	0.1	1.8	0.3
- Private final consumption expenditure (a)	2.4	-0.1	2.0	0.3
- Final consumption expenditure by PAs	1.6	0.7	1.1	0.4
Gross capital formation	5.5	1.4	4.5	1.2
- Gross fixed capital formation	5.0	0.8	4.7	1.2
Fixed assets				
Construction	4.6	0.7	5.0	1.5
Capital goods and cultivate assets	6.1	1.3	4.9	1.1
- Changes in inventories (contribution in %)	0.1	0.1	0.0	0.0
Domestic demand (contribution to GDP growth)	2.8	0.4	2.3	0.5
Exports of goods and services	5.0	-1.1	4.8	-0.3
Imports of goods and services	4.7	0.3	4.1	0.0
External balance (contribution to GDP growth)	0.3	-0.5	0.4	-0.1
<b>PRICES (% variation)</b>				
GDP deflator	1.0	-0.2	1.5	-0.1
Private final consumption expenditure deflator	1.8	-0.2	1.4	-0.2
<b>LABOUR COSTS AND EMPLOYMENT (% var)</b>				
Compensation per employee (labour cost)	3.3	-0.8	3.8	0.1
Total employment (b)	2.8	-0.1	2.5	0.1
Productivity per employee (b)	0.2	0.0	0.2	0.2
Unit labour cost (ULC)	-0.1	-0.9	0.9	-0.2
<b>Memorandum items (Labour Force Survey data)</b>				
Unemployment: % active population	17.2	0.1	15.5	0.0
Net lending (+)/ borrowing (-) towards the rest of the world	1.9	0.0	1.8	0.1

2018 Forecast

(A) Households and ISFLSHs

(B) Full-time equivalent employment

SOURCE: INE, and Ministry of Economy, Industry and Competitiveness

### C.3) Forecasts by international organisations

		2017	2018 (F)	Change (1)
ECB (March 2018)	Global GDP (excluding eurozone)	3.8	4.1	0.3
	Eurozone GDP	2.5	2.4	0.6
	Global trade (imports of goods and services excluding the eurozone)	5.6	4.9	1.1
	Brent oil prices (USD per barrel)	54.4	65.0	12.4
	Three-month Euribor (%)	-0.3	-0.3	0.0
	Interest rates on Government debt in the eurozone at 10 years (%)	1.0	1.3	0.0
	Exchange rate USD/EUR (level)	1.13	1.23	0.05
	Nominal effective exchange rate for the euro	2.2	4.5	1.9
IMF (WEO Update January 2018)	Global GDP	3.7	3.9	0.2
	Eurozone GDP	2.4	2.2	0.3
	Trade in goods and services	4.1	4.3	0.3
	Oil prices (USD per barrel)	50.3	56.0	5.8
	Three-month Libor rate (%)	-0.3	-0.3	-0.5
European Commission (February 2018)	Global GDP	3.8	4.1	0.5
	Eurozone GDP	2.4	2.3	0.5
	EU GDP	2.4	2.3	0.4
	Global imports of goods and services	4.6	4.5	0.7
OECD (February 2018, Economic Outlook)	OECD GDP	2.4	2.4	0.3
	Eurozone GDP	2.4	2.2	0.4
	Trade in goods and services	5.4	4.3	0.5
Market expectations (March 2018)	Long-term interest rates (Government debt at 10 years, Spain)	1.6	1.6	-0.2
	Brent oil prices (USD per barrel)	52.5	67.1	11.5

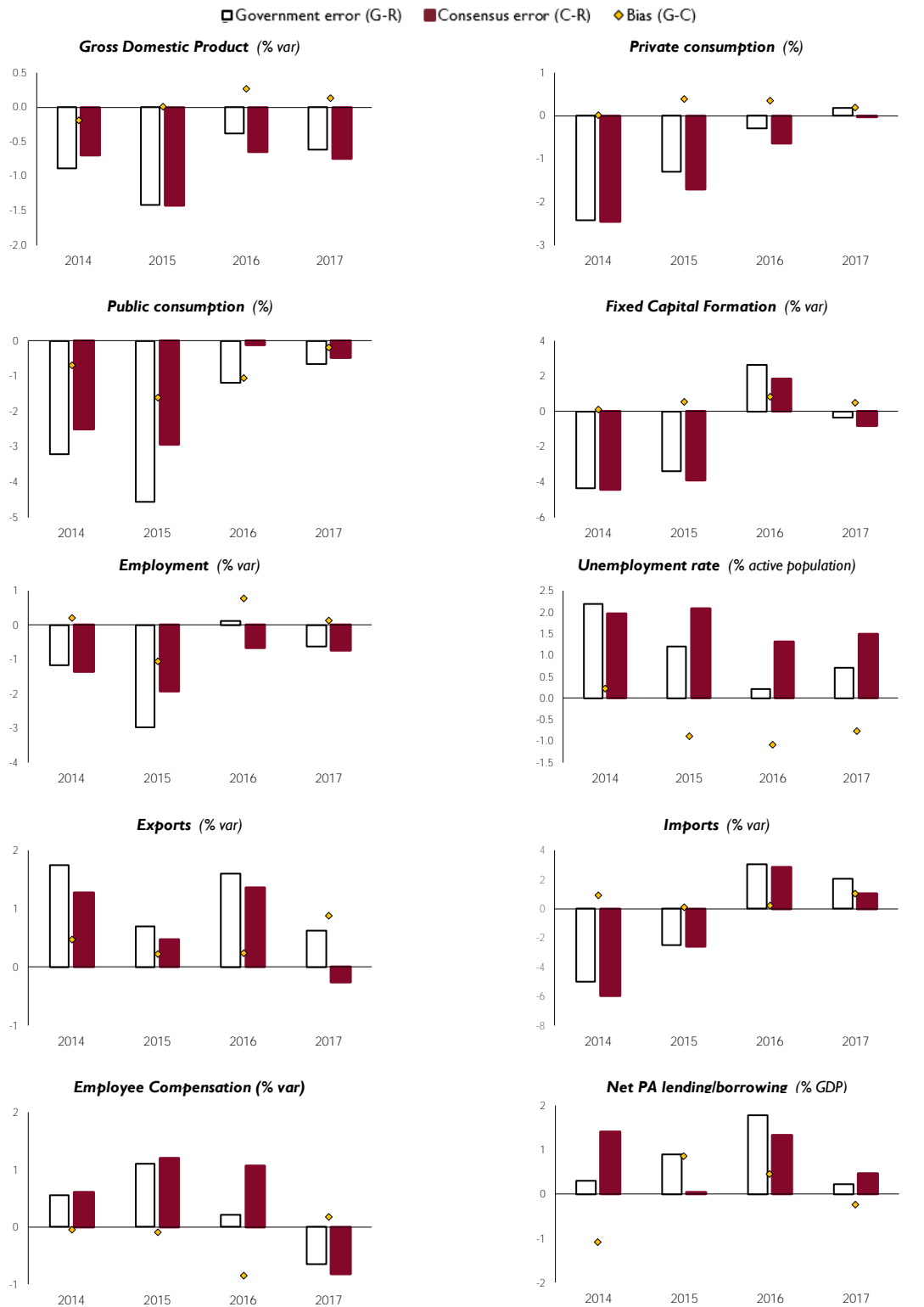
(1) Difference as compared to the AIReF report on the 2018 Draft Budgetary Plan

## C.4) Forecasts bias 2014-2017

	<i>Previous year forecasts for current year</i>		<i>Current year forecasts for the current year</i>		<i>All forecasts</i>	
	<i>% Large</i>	<i>% Large And Unjust.</i>	<i>% Large</i>	<i>% Large And Unjust.</i>	<i>% Large</i>	<i>% Large And Unjust.</i>
<b>GDP</b>	25	-	50	-	38	-
<b>Private consumption</b>	75	33	75	-	75	17
<b>Public consumption</b>	75	100	25	100	50	100
<b>GFCF</b>	50	50	75	67	63	60
<b>Exports</b>	25	100	25	-	25	50
<b>Imports</b>	50	50	50	50	50	50
<b>Unemployment</b>	75	-	75	-	75	-
<b>Deficit-to-GDP ratio</b>	75	67	50	50	63	60

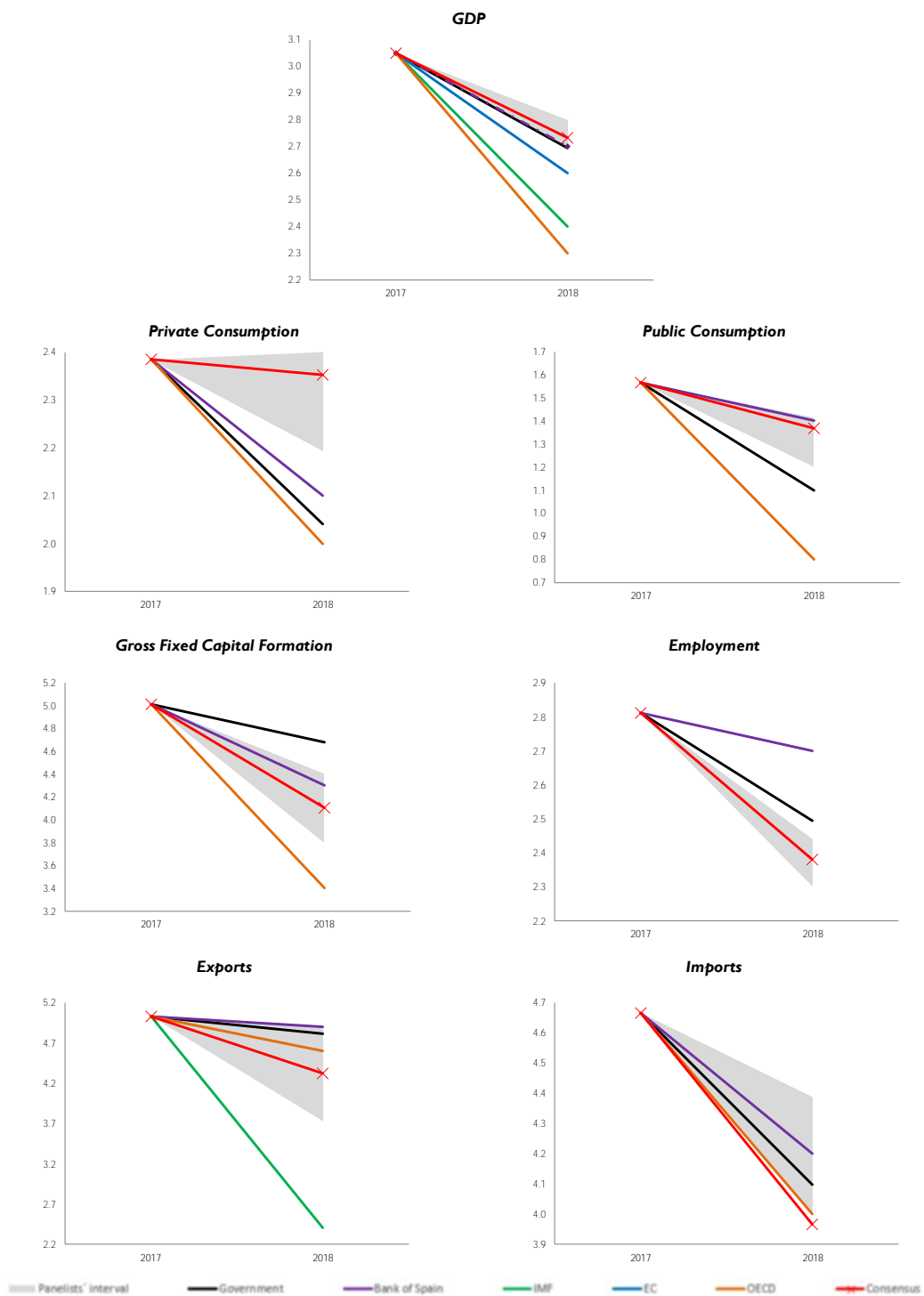
Source: INE, MINEICO, FUNCAS and AIREF estimates.

## G.1) Errors and biases in the previous year's spring forecast



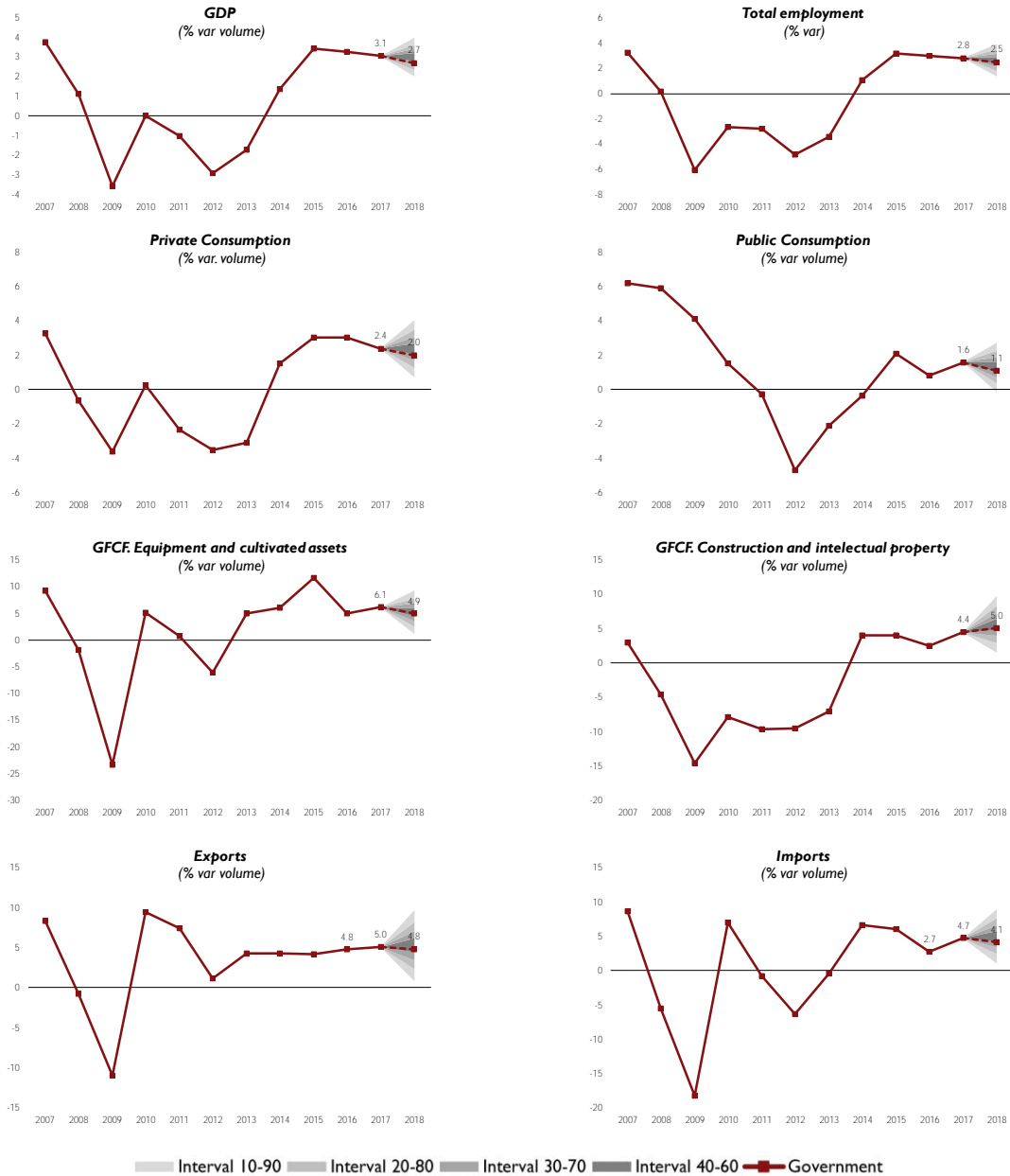
Sources: Own processing based on INE, MINEICO, FUNCAS and AIREF estimates.

## G.2) Forecasts for the Spanish economy 2017-2018



Sources: Own processing based on INE, FUNCAS, MINEICO and AIReF estimates.

### G.3) Government forecasts and AIReF uncertainty ranges



Sources: Own processing with data from INE, MINEICO and AIReF estimates.

## 7. METHODOLOGY ANNEX

A range of econometric tools have been used to prepare the Report on Macroeconomic Forecasts covering a relatively broad methodological spectrum. This note provides a summary of their main characteristics with the aim of describing the methodology supporting the report.

The first section presents the uniequational structural models and their design methods. These models served as a basis upon which to examine the consistency of official forecasts in relation to the behaviour of their macroeconomic determinants. The technique applied uses quarterly data and is based on error correction models.

The second section describes the reduced-form multivariate model employed. This model shows the dynamics for the main aggregates for real activity in the macroeconomic outlook and allows quarterly confidence intervals for the envisaged trends in these aggregates, with very little a priori conditioning. The methodology is based on the autoregressive vector models with exogenous variables and also uses quarterly data.

The third and last section briefly details the dynamic factor models used for short-term (2 quarters) forecasts of GDP, its deflator and its demand components, which facilitates the reflection of the impact of the most recent short-term information on said aggregates.

### 7.1. Uniequational structural models

Several behavioural equations have been used based on the representation of error correction in order to provide a quantitative assessment founded on a structural formula suggested by economic theory. A simplified presentation using Excel spreadsheets is available on the AIReF website for use by analysts.

The general principle in this approach is, first, to define a behavioural relationship between a given variable and its determinants, as suggested in economic theory. This theoretical relationship is quantified by means of a linear relationship characterising the long-term behaviour between the variable that is being described and its conditioning factors. This equation defines what is known as the “equilibrium relationship”, acting as point of attraction toward which the variable under analysis should converge, but this is not always the case period to period. This deviation or error between the value compatible with the theoretical bases and that observed mainly reflect shocks that distort long-term relations between the variable and its basis.

The short-term dynamic, usually characterised by the trend in the quarterly growth rate, results from combining two elements. The first of these is the partial correction of the error arising in the long-term relationship. This adjustment quantifies the rhythm in which the variable closes the gap with the level compatible with its basis in the long term. The second is a purely statistical, short-term dynamic that is complementary to

the first and that defines the empirical relationship between the growth rates for the variable being described and the rates that apply to its determinants.

This equation, known as error correction, is supported by the econometric method known as co-integration analysis, which conducts comparative checks on any stable, well-defined long-term relationships for the quantification, in a second step, of the short-term dynamic.

Below is a brief description of the equations used herein: in all the equations, the frequency of observation was quarterly, the data were adjusted to seasonality and the calendar, and the sampling interval ranged from 1995:Q1 to the latest quarter observed.

### **7.1.1.** Final household consumption

The equation describing the demand for final household expenditure considers that the trend depends on the gross real income available to households, their financial and real estate (taken separately) wealth, the unemployment rate, and the value of real credit available for consumer goods.

### **7.1.2.** Investment in fixed capital: capital assets

Companies are expected to determine their investment in capital goods according to the evolution of aggregate demand, the anticipated profitability of their investment projects, the price of the labour factor, the user cost of capital (based on long-term interest rates) and the use of the productive capacity. Aggregate demand is approximated by volume by means of the Gross Domestic Product. The expected profitability measure is determined from Tobin's Q, estimated as the quotient of the IBEX-35 over the productive capital stock. The price for the labour factor will be given by the compensation per employee.

### **7.1.3.** Fixed capital investment in construction

The determinants of gross fixed capital formation in construction included in this equation are the real financial wealth of the household sector, the unemployment rate, the flow of credit for purchase and refurbishing of housing, the relative prices of freehold property, deflated by the final household consumer price index and the confidence indicator for the construction sector.

### **7.1.4.** Exports of goods and services

The volume of exports in goods and services is set to depend on a variable that approximates external demand for goods and services, and on prices relative to



exports of products that are substitutes for said goods, produced and exported by the rest of OECD countries.

The variable that approximates the external demand for goods and services is global trade in goods by volume, provided by the Dutch Central Planning Bureau (CPB). In addition, the competitiveness trend index is taken as a variable for relative prices, calculated through a comparison of domestic consumer price indices with those of the OECD, adjusted for changes in nominal exchange rates.

### **7.1.5.** Imports of goods and services

Demand for imports of goods and services is set to depend on the capacity for expenditure by the units residing within the economic domain, and on prices of imported goods in relation to their domestic substitutes. Thus, imported goods and services compete with those produced internally in the overall expenditure.

As the variable representing the demand for imported goods and services, an index is designed that weights each component in the final demand (Consumption, Investment and Exports) according to the share of imports. The indicator applied for relative prices is the quotient of the deflator of imports of goods and services over the deflator of domestic demand.

## **7.2.** Reduced-form multivariate model

The Bayesian Vector of Autoregressions (BVAR) with exogenous variables was used for the assessment of the projections given in the macroeconomic outlook.

This type of model offers both flexibility and objectivity. Flexibility is achieved through allowing a high degree of adaptability to the dynamic observed. Objectivity is assured since, having determined the set of variables to model, estimates for the model parameters are conducted according to statistical, objective and replicable criteria.

The Bayesian component in the model has been incorporated to improve its predictive performance, and captures purely statistical interactions of the variables with the dynamics, in part or in all of the series analysed. Likewise, behavioural traits of the economy in the medium term are specifically included in this extra-sample information component.

In the BVAR model with exogenous variables, the level of any variable at a given moment is expressed by the linear combination of four parameters: lagged values of the variable itself (dynamic), offset values for the remaining variables involved in the model (crossed dynamic), contemporary values of exogenous variables, and a purely random innovation that captures any other aspect that is not attributable to the variables taken into account in the system.

The weight of each component is determined empirically by finding the best sampling fit and the Bayesian elements offset the effects of overfitting that may exist due to the high number of parameters being estimated.

Projecting the aforementioned BVAR model forward gives both specific prediction values and their associated confidence intervals. In particular, the confidence intervals quantify the degree of uncertainty attributable to the predictions of different variables for different horizons.

The endogenous variables included in this model are: the GDP deflator, the GDP volume index, the full-time employment equivalent, real credit (financing to business and households deflated by the core CPI) and net incomes with cyclical sensitivity (defined as the sum of taxes on production and imports, current taxes on income and wealth and social contributions, from which unemployment benefits are deducted) as a percentage of GDP. The exogenous variables considered are: the exchange rate of the euro, the dollar price of oil, the EU GDP, interest rates (loans requested by companies of up to 1 million euros) and a constant term.

An additional BVAR model is also used to represent the joint dynamic of five series that describe the breakdown of GDP from the viewpoint of demand. The variables studied are: final consumption by households and not-for-profit institutions at the service of households (ISFLSH); consumption by Public Administrations; gross fixed capital formation; exports of goods and services and imports of goods and services.

### **7.3. Dynamic Factor Models**

For short-term (2 quarters) predictions of GDP and its main demand components (private consumption, public consumption, investment in equipment, investment in construction, exports and imports of goods and services), dynamic factor models are used, synthesised on the model known as MIPReD. The joint estimates for GDP and its components provides a more comprehensive and detailed perspective of the economy, allowing the composition of growth to be identified, its external and domestic origins. These in turn lead to determining the composition of Final Consumption and Investment in Domestic Demand.

Technically, estimates are made in two stages:

In the first, GDP and each of its components are predicted independently, following the dynamic factor model methodology for real time forecasting. Forecasts are based on a combination of short-term information, issued at different frequencies (quarterly and monthly), using the respective dynamic factorial models. This combination allows forecasts to be updated as new information becomes available for the indicators in the model, providing a real-time or permanently updated view of the aggregate status of Spanish economy.

The methodology used in each of the models consists of the following stages:

1. Seasonal and calendar adjustments for all indicators in the system.
2. For quantitative indicators, the variation rates are calculated for the immediately preceding period, in order to obtain a short-term growth marker. Qualitative indicators are not transformed, as these offer an immediate (directional) interpretation of growth.

3. All qualitative or quantitative indicators are typified, rendering their mean as zero and their variance as one.
4. The series thus obtained are combined into a dynamic factor model, breaking down their temporal evolution into a part attributed to elements that are common to all and another part that is specific to each.
5. The dynamic factorial model is represented in the state space, combining a transition equation (that describes the system dynamic) and a measure equation (that defines the connection between the observed series and their underlying factors).
6. Estimates for the parameters in the model are made maximising their feasibility. Such maximisation takes into account both the presence of series with a different sampling frequency (monthly or quarterly) and asymmetrical series lengths among those included in the panel of data, either because they do not all commence at the same time or because they do not all end in the same period.
7. Having estimated the dynamic factor model, its representation in the state space permits, by means of Kalman filtering, both the forward projection of the series comprised in the model and the calculation of the typical deviations from said projections, thus obtaining a measure of the uncertainty surrounding them.
8. One of the series used is the aggregate, for which forecasts are obtained simultaneously to those of the remainder of indicators. In this manner, the internal consistency of forecasts is assured.
9. Whenever new data becomes available for any of the indicators in the model, the above steps are repeated, reviewing all forecasts depending on the direction (upward/downward) and magnitude of the change. This continuous updating process defines the real-time nature of the system.

In the second stage, individual forecasts are reconciled with those for GDP, by means of the balancing method proposed by Van Der Ploeg (1982), in which individual forecasts are combined with the accounting restriction that establishes that GDP growth should be equal to the aggregation of contributions to its growth from its components. Final forecasts are the result of adjustments to the individual forecasts according to the discrepancies observed between the sum of the corresponding contributions to GDP growth, and GDP growth foreseen in its own model, bearing in mind the historical correlation among the series for contributions to growth. The initial forecasts are thus modified, taking into account their discrepancies when incorporating accounting restrictions. These discrepancies are weighted according to their precision, that is, inversely to the uncertainty associated with initial estimates.

This procedure has several desirable properties:

1. The greater the variance in the initial forecast, the greater the magnitude of the revisions, as an absolute value. In other words, the greater the uncertainty regarding the initial forecast, the greater the amount in the modification it may be subject to.
2. If a given preliminary estimate is considered to be known with absolute precision, no adjustments are made in the corresponding forecast.

3. When the historical correlation between two components is positive, their revisions are made in the same direction: both upward or both downward. If, on the contrary, they correlate negatively, adjustments will take opposite directions: one upward and the other downward, or vice-versa.

## 7.4. References

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