Report on the Macroeconomic Forecasts in the 2018 Draft Budgetary Plan

Executive Summary

The Independent Authority for Fiscal Responsibility (AIReF) endorses the Government's macroeconomic forecast for the 2018 Draft Budgetary Plan. AIReF deems the Government's macroeconomic scenario to be realistic overall. The basic assumptions underlying the Government's macroeconomic scenario are considered feasible and reflect balanced risks stemming from the external environment. On the one hand, said growth forecasts for the main trading partners have improved and the tailwinds provided by the expansive monetary policy measures are expected to be maintained in the short term. On the other hand, there are downside risks stemming from the possible impact on Spanish exports of an increase in energy costs due to the higher price of crude oil and the trend in the euro exchange rate in foreign markets (in particular its strengthening against the dollar).

The growth forecasts included in the Draft Budgetary Plan incorporate an upward revision in 2017, but anticipate a significant downward correction for 2018 due to the political and institutional uncertainty in Catalonia, the impact of which can be estimated at 0.3-0.4 percentage points of GDP. In the second half of 2017, the information anticipated by the most recent short-term indicators affirms the rate observed in the first months of the year, with quarterly rates close to 0.8%, and implies an annual rate of above 3%. This dynamism, along with an improvement in the external environment, a monetary policy delaying the withdrawal of stimulus, a more dynamic euro zone and contained global risk, favour relatively high growth of around 2.7% in the absence of disturbances and economic policy measures. This is slightly above the previous official forecasts of the Stability Programme Update in April (2.5%) and the approval of the Spending Ceiling in July (2.6%). However, the update included in the 2018 Draft Budgetary Plan scenario anticipates a downward correction to 2.3%, a result of incorporating the negative impact of the uncertainty shock surrounding the current political situation in Catalonia on domestic demand, with an estimated impact of 0.3-0.4 percentage points of GDP.

Making macroeconomic forecasts in a politically unstable environment such as the present one is particularly complex and entails methodological challenges that result in greater forecast uncertainty than in normal conditions. The evaluation of the uncertainty shock has two dimensions: a common component that affects the Spanish economy as a whole, and an idiosyncratic component of the Catalan economic activity. Although different transmission channels can be expected, quantification involves numerous methodological difficulties. First, high frequency short-term evidence does not yet provide information on the magnitude, extent or duration of the disturbance. In addition, the idiosyncratic component of Catalonia's economic activity entails an added difficulty in the absence of directly comparable historical episodes – due to the synchrony of cycles between the Spanish regions – or relevant comparisons in the economic literature. Assuming the genuine difficulties

of an impact exercise with the current uncertainty scenario, this report includes a specific sensitivity exercise to evaluate the effect of the common uncertainty component, based on the most recent economic literature. We must also consider the additional effect of the idiosyncratic component, which the most recent information indicates will be relevant.

The analysis of the impact of the common component of the uncertainty shock for 2018 implies a significant downward correction of the inertial path of GDP, as well as an associated deterioration of public finances. The impact of the common component of the uncertainty shock in 2018 is tentatively estimated to be between 0.4 and 1.2 percentage points of GDP, depending on the degree of permanence of the stressed scenario. In turn, this effect would lead to a deterioration of the budget balance (between 0.2 and 0.5 percentage points) through lower revenues and the denominator effect of GDP. This deterioration in public finances would jeopardise the attainment of the deficit projected in the 2018 Draft Budgetary Plan (2.3% of GDP, 0.1 percentage points above the target set), reducing its feasibility. In addition, the idiosyncratic component associated with the disruption in Catalan activity has an additional negative impact through adverse spillover effects on the rest of the regions, given its deep integration into the rest of the Spanish economy, as well as its high relative weight. The inherent difficulty in calibrating (i.e. measuring the extent) of this disturbance requires close and periodic monitoring of the short-term regional indicators. Ad-hoc exercises point to spillover effects on GDP or employment in line with the weight of the Catalan economy in the Spanish economy as a whole (20% of the specific shock).

AIReF's analysis implies that the estimated impact of the uncertainty forecast by the Government is prudent, with additional downside risks. According to AIReF's analysis, the impact associated with the uncertainty shock would be in line with a relatively transient perception of the common uncertainty component, which would tend to be resolved in a short-term horizon. This view is considered prudent, especially given the complexity of the forecast in the current context, although it is worth noting that there are additional significant downside risks arising from a longer duration of the common uncertainty shock and the idiosyncratic deterioration of the economic activity in Catalonia, with negative effects on the rest of Spain, as noted above.

The growth path forecasted for 2018 and its composition are considered plausible, given the uncertain environment in which the forecasts are made. Domestic demand, despite suffering a significant slowdown, continues to be the main driver of growth in 2018. Private consumption is the component that slowed the most, and is at the bottom of both the panellists' forecasts and when compared with AIReF's internal models. However, the materialisation of the identified risks would increase the feasibility of the official forecast. Investment, in turn, has only been revised downwards since the last official forecasts, as one would expect it to be one of the main transmission channels for an uncertainty shock. The external sector strengthens its positive contribution, confirming the structural improvement identified in previous

reports. Finally, in terms of public consumption, the Government maintains its forecast of 0.7% in 2018. In the absence of more information on its components, this aggregate figure falls outside the interquartile range of the private forecasts and constitutes a relevant circumstance in view of the bias identified in the ex-post analysis. However, when compared to AIReF's models, the official forecast is within the range for 2018, thus compatible with a budgetary overrun, although at the bottom of the range.

The ex-post analysis of forecasts from previous years identified an important bias in the Public Consumption forecasts for the 2013-2016 period. The use of observed values for the valuation of all forecast biases confirms the conclusions of previous reports, namely, the existence of a significant bias in the public consumption forecast for the following year (t+1), which have been outside the interquartile range and unjustified by better ex-post results during the last 4 years.

Lastly, it should be noted that two limitations to the scope of this report have been identified, both in terms of schedules for the dissemination of statistical information and the submission of budgetary information accompanying the macroeconomic scenario. First, the current revision calendar of the Spanish National Accounts and its quarterly correspondence make it difficult to produce the macroeconomic scenario in the context of the national budgetary framework. Second, the connection between macroeconomic forecasts and the budgetary scenario cannot be explained, as the expected evolution of the various revenue and expenditure items associated with the economic scenario are not available sufficiently in advance.

Based on its analysis, AIReF makes two recommendations and two suggestions for good practices. First, to the National Statistics Institute (INE), to ensure the internal consistency in the Annual and Quarterly Spanish National Accounts estimates in the framework of the development of the macroeconomic scenario associated with the Draft General State Budget (GSB) Law, as it did until 2014. Second, to the Ministry of Economy, Industry and Competitiveness, to adopt and publicise the necessary measures to correct the important biases observed in the autumn forecasts for the following year's public consumption. AIReF also has two suggestions for good practices for the Ministry of Economy, Industry and Competitiveness. First, to integrate the key elements of the forecast into a simplified National Accounts framework, so that it is possible to understand the connections between economic activity, demand and employment on the one hand, and revenue flows and financing needs on the other. Second, to expand the information on the relevant methodologies, assumptions and parameters that support the forecasts, in line with the provisions of Spanish Directive 2011/85 on budgetary frameworks and Article 29 of the Organic Law on Budget Stability and Financial Sustainability (LOEPSF), which defines the content of the medium-term budgetary plans of the Public Administrations.

Contents

1. Introduction

In its report on the Macroeconomic Forecasts included in the 2017-2020 Stability Programme Update (SPU), the Independent Authority for Fiscal Responsibility (AIReF) endorsed the macroeconomic scenario, considering it to be prudent overall. The basic assumptions underlying the official macroeconomic scenario for the 2017-2020 period were considered feasible in relation to the most recent forecasts from international organisations and the latest developments in the commodity and debt markets. The composition of growth was considered plausible. Domestic demand was the main source of growth, although supported by a slightly positive contribution of the foreign sector for the whole horizon. This balanced growth profile, although plausible at the time of AIReF's forecasts, was subject to potentially unfavourable or downside risks in the medium term mainly due to external demand and the disappearance of some of the external stimuli that helped to boost the Spanish economy.

With the approval of the 2018 Draft Budgetary Plan, AIReF must report on the Government's macroeconomic forecasts, which are articulated around a scenario with no economic policy measures for 2018. As in 2016, the exceptional nature of the budget schedule, with some General State Budgets (GSB) extended *de facto,* entails that, in compliance with EU legislation, the Spanish Government publishes a 2018 Budgetary Plan on the basis of a scenario with no policy change for 2018.

The macroeconomic forecasts are analysed based on a two-fold approach, evaluating the biases present in the previous years' forecasts ex-post and analysing the accuracy of the forecasts cited in the Draft Budgetary Plan for 2018 ex-ante. The report consists of three main sections. First, a review of the constraints that have conditioned the preparation of the report (section 2). Second, an assessment of the previous years' forecasts (section 3) and finally, the forecasts for 2017 and 2018 are analysed in detail (section 4). Section 5 considers the results and conclusions of this analysis as a whole and offers two specific recommendations and two suggestions for good practices.

2. Scope limitations

The revision calendar of the Spanish National Accounts (SNA) and the complete series of Quarterly Spanish National Accounts (QSNA) make it difficult to prepare the macroeconomic scenario in the context of the national and European budgetary framework. Until 2014, the National Statistics Institute (INE) published the review of the SNA accounting series at the end of August, almost immediately followed (the next day) by the corresponding complete review of the QSNA. This calendar was modified in 2015, coinciding with the change of the base, leading to a gap between the two publications of more than 30 days. This gap overlaps with the preparation of the macroeconomic scenario underlying the Draft General State Budget (GSB) Law, which must be sent to the Cortes Generales by September 30th.[1] This makes it difficult to prepare the official macroeconomic forecasts (which must include the most recent statistical information related to the National Accounts). The difficulties stemming from the INE revision calendar were already the subject of an AIReF recommendation.[2] In response to this recommendation, the INE reduced the gap between publications in 2017. On September 12th, it published a review of the SNA accounting series, base 2010,[3] and on October 2nd, the consistent results of the QSNA. This response is a step forward in reducing the gap, but still does not take into account the specificity of the national and European budgetary schedules.

On the one hand, it does not resolve the problem of having to prepare the outlook associated with the GSB, and, on the other hand, it implies that the outlook associated with the Draft Budgetary Plan, which must be sent to the European Commission by October 15th, should be based on different information than the outlook underlying the GSB (which should have been prepared just 3 weeks earlier).

Therefore, **AIReF recognises the effort made by the INE, but repeats its recommendation to continue making progress in achieving internal consistency between the SNA and QSNA series in the framework of the macroeconomic scenario associated with the Draft GSB Law**. The reform of the current calendar to reduce the gap between the annual revision and the quarterly revision should be carried out in consideration of the needs arising from the national

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[1] Pursuant to Article 37 of Spanish Law 47/2003, of 26th November, on the General Budget.

[2] See Report on the Macroeconomic Forecasts for the Budgetary Plan Update of 2 December 2016.

[3] The review maintains the growth in GDP volume in reference year 2014, while it revises upwards 2015 and 2016 (0.2 p.p. and 0.1 p.p., respectively). It also provides, in cumulative terms, a greater contribution of external demand to real output growth in 2016 (at the expense of a lower strength of domestic demand).

and European budgetary framework, as much as possible. From a legal point of view, the adaptation of the publication calendar to the needs of the users is in line with the European Statistics Code of Practice,[4] which sets out the principles established in Regulation (EC) 223/2009 on European Statistics. In particular, following the Principle of Relevance and Opportunity, the production of the statistics must satisfy the needs of the users and be published in a prompt and timely manner. Adjusting the calendar with the proposed changes in order to comply with these principles[5] would be consistent with the deadlines established in the European Regulations[5] and would comply with the other principles included in the Code of Practice.

In terms of transparency, AIReF reiterates its previous recommendations on the need to have all the necessary information to corroborate the consistency between the macroeconomic scenario and the associated budget. This report was prepared with no information on the fiscal or budgetary variables in parallel with the macroeconomic scenario, beyond the evolution of aggregate public consumption. The connection between the macroeconomic forecasts and the budgetary scenario cannot be explained because the expected evolution of the different revenue and expenditure items is not available, regardless of the consideration of a scenario without measures ("no policy change"). Therefore, the 2018 forecasts analysed in this report are to be interpreted as an approximation in order facilitate the preparation of the budgetary scenario, but they do not include any feedback nor do they guarantee consistency with the budgetary assumptions included in said scenario.

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[4] Código de buenas prácticas de las Estadísticas Europeas

[5] Stating September22nd, September30th, and November 30th as deadlines for sending Eurostat the information on the Gross National Income and the rest of the results of the SNA and QSNA, respectively.

3. Macroeconomic forecasts for the period 2013-2016

3.1. Criteria for comparing forecasts

This section examines the biases in the autumn forecasts drafted by the Government for the current year and the following year over the last four years.[6] Unlike the multiannual macroeconomic forecast analysis that usually accompanies the SPU published each spring, this section compares the forecasts included in the 2013-2016 GSB, formulated at the beginning of autumn for the current year and the following year (e.g. t and t+1)[7]. For this report, the data used for drawing the comparison are taken from the panel of forecasts published by FUNCAS in the month of September for the years 2013 through 2016. Other private forecasts and those conducted by the European Commission, the Bank of Spain, the OECD or the IMF are excluded from the calculation of the comparative statistics.[8]

For each forecast horizon, any bias in the Government forecast that is large, unjustified and repeated in four consecutive years will be considered significant. 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 Consensus forecast (C), and against the observed result (R). A bias is defined as the difference between the Government forecast and the Consensus forecast (G-C) and is considered to be large if the Government forecast falls outside the interquartile distribution range of the panel's forecasts.[9] A deviation or bias in the Government forecasts in relation to the Consensus forecast will be deemed unjustified when the absolute forecast error is larger than that of the Consensus forecast; that is, if |G-R|>|C-R|. For this purpose, no analysis is made of the reasons that may explain the differences observed.

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[6] Article 14.4 of the Organic Law creating 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 November 8th, 2011, on the requirements applicable to member States' budget frameworks.

[7] On the basis of the information available for comparison, the main macroeconomic variables on the demand side are analysed in terms of general volume, employment rate and the Government's net lending/borrowing in terms of GDP. A detailed description of the valuation methodology is available in the Report on Macroeconomic forecasts in the Draft Budgetary Plan for 2015: Report on Macroeconomic forecasts in the Draft Budgetary Plan for 2015

[8] Unlike the forecasts included in the panel, which are usually published in the same period as the government forecasts, the other excluded forecasts are published in advance, not including the most recent information and making it difficult to compare them with the Government forecasts.

[9] 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.

3.2. Ex-post analysis of the 2013-2016 forecasts

The use of a complete set of observed data confirms the existence of large biases for the 2013-2016 period in about half the forecasts. For the first time, this study compares a period of 4 consecutive years of autumn forecasts for years t and t+1 (i.e. September or October of each year).[10] Thus, the assessment of the forecast bias is made using only observed data, avoiding the use of Government forecasts for the last year of the period under analysis. The existence of deviations in the Government forecasts outside the interquartile range is confirmed in approximately half of the forecasts. In addition, a greater percentage of large biases is identified in the GDP, public consumption, gross fixed capital formation, unemployment rate and deficit-to-GDP forecasts. [11]

The large forecast biases are not justified ex-post (representing a greater error than the Consensus forecast) in more than half of cases. When considering the official forecasts made during the last four autumns, the Government's forecast accuracy for the current year is almost always greater (smaller mean square error). However, for t+1, the error of the Consensus forecasts is smaller in almost all variables, except in the case of gross fixed capital formation and imports. In the case of public consumption, exports and the deficit-to-GDP ratio, all large biases have proved to be unjustified ex-post. In particular, public consumption presents the greatest forecast errors of the sample (see Table 1). This double circumstance (large and unjustified biases) occurs in only half of cases when considering GDP, private consumption and the unemployment rate.

There is a significant bias in the autumn forecast for public consumption in year t+1, with biases both large (forecasts far from the Consensus forecast) and unjustified (with forecast errors greater than the Consensus forecast) in four consecutive years. The use of observed data for this assessment confirms the conclusions of previous reports, namely that the public consumption forecast biases for year t+1 have been outside the interquartile range and have been unjustified by better ex-post results for 4 consecutive years.[12]

Based on the analysis of the autumn forecasts and supported by Council Directive 2011/85/EU, AIReF reiterates its recommendation related to the

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[10] The 2012 GSB were completed in April of that same year.

[11] A qualitative comparison with the forecasts of international organisations and the Bank of Spain for 2013-2014 was carried out in the Report on Macroeconomic Forecasts in the GSB for 2016 and for 2015-2016 in the Report on Macroeconomic Forecasts in the Draft Budgetary Plan for 2017

[12] Report on the macroeconomic forecasts in the Budgetary Plan Update for 2017.

existence of significant biases in Public Consumption for t+1.[13] AIReF believes that the explanation provided by the Government is insufficient. At the end of last year, AIReF recommended that the Government "*adopt and publish the necessary measures to correct the significant biases detected in the public consumption forecasts*". Contrary to the analysis used by AIReF for its recommendation, based on forecasts made in autumn and for t+1, the Government's response to the recommendation analyses the consumption forecasts made in the spring (that is, those used for the Stability Programme Updates and not those that usually accompany the GSB) and for year t. In the opinion of AIReF, this explanation does not correspond to its original analysis and recommendation. At a minimum, the response is incomplete, as it focuses on a different set of forecasts and a different time horizon than used by AIReF. Using the Government analysis, which, like AIReF's, is based on a comparison with the FUNCAS panel, it is not possible to identify large and unjustified biases and, therefore, it specifies no new measures to correct these significant biases.[14] It should be noted that AIReF has already stated in previous reports that no significant biases have been found in the spring forecasts for both t and t+1.[15]

CHART 1. FORECAST PRECISION STATISTICS 2013-2016

		PIB	Consumo Privado	Consumo Público	FBCF	Expor	Impor	Tasa de paro[1]	Deficit[2]
Error absoluto medio 2013-2016									
t	*Gobierno*	0.3	0.4	0.7	2.1	1.0	1.7	0.2	0.5
	Consenso	1.4	1.5	1.3	5.6	0.8	3.4	1.9	0.4
t+1	*Gobierno*	0.9	1.0	3.1	2.5	1.3	2.5	1.0	1.3
	Consenso	0.7	0.9	2.1	3.4	1.1	2.9	0.8	1.0

		PIB	Consumo Privado	Consumo Público	FBCF	Expor	Impor	Tasa de paro[1]	Deficit[2]
Raiz del error cuadrático medio 2013-2016									
t	*Gobierno*	0.3	0.4	1.0	2.3	1.1	2.4	0.3	0.6
	Consenso	1.7	2.2	1.6	6.5	0.9	4.4	2.1	0.5
t+1	*Gobierno*	1.0	1.2	3.7	2.8	1.3	2.9	1.2	1.6
	Consenso	0.8	1.1	2.7	3.6	1.2	3.2	1.0	1.2

Fuente: INE, MINECO, FUNCAS y estimaciones de AIReF
Nota: 1) Parados sobre población activa 16-64 años 2) Ratio sobre el PIB

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[13] According to Article 4.6 of COUNCIL DIRECTIVE 2011/85/EU of 8 November 2011, on the requirements applicable to Member States budgetary frameworks, "if there is a significant bias in the course of the evaluation that affects the macroeconomic forecasts for a period of at least four consecutive years, the Member State shall take the necessary measures and publish them".

[14] Response to AIReF's Recommendation included in the Report on the Macroeconomic Forecasts in the Budgetary Plan Update for 2017.

[15] Report on the Macroeconomic Forecasts of the Draft GSB for 2017.

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4. Macroeconomic forecasts: analysis ex-ante

4.1. Forecast analysis criteria

The aim of subjecting the Government forecasts to ex-ante analysis is to assess whether they are realistic, and whether they define the most likely macroeconomic scenario or one that is more prudent. First of all, the forecasts are checked for any bias by comparing them against the forecasts of other institutions, as in previous years. The methods, parameters and assumptions underpinning the forecasts are revised, as far as the available information allows, and checked to determine whether the most up-to-date information was used for the forecasts.

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 likelihood 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 National Accounts, as well as any risks that exist in that scenario.

Overall, the results from these comparative checks assess whether or not the macroeconomic scenario contained in the 2018 Draft Budgetary Plan is deemed the most likely in the light of the ex-ante bias analysis, or a more prudent scenario. A more prudent scenario would contemplate the materialisation of some of the risks identified in the baseline or neutral scenario which are detrimental to economic activity and to the correction of existing imbalances.

4.2. General remarks

The Government's macroeconomic forecasts for 2018 use the most up-to-date short-term information from indicators and the most recent National Accounts data available on the date of submitting the scenario, including the latest national accounts update, published on September 12th and the revised Quarterly National Accounts series consistent with the last annual update.

As reflected in previous reports, the information accompanying the official macroeconomic forecasts is deemed insufficient in terms of transparency. Concerning the methodologies, assumptions and parameters supporting the forecasts, the Government could continue to progress in terms of transparency,

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understanding and the ability to reproduce forecasts.[16] The government has also not published the integration of the main outlook variables with the granularity befitting the simplified national accounts framework.

4.3. Forecast analysis

4.3.1. The international environment

The basic assumptions underpinning the macroeconomic scenario for 2017 and 2018 and the Draft Budgetary Plan for 2018 are deemed feasible. These assumptions are plausible in relation to the most recent forecasts from international organisations and the latest developments in the commodity and debt markets (see Charts C1 and C2 in Annex). In relation to the 2017 SPU, this macroeconomic scenario reflects an accelerated growth scenario for leading trading partners and world trade in goods and services. As for oil prices, the previous stabilisation forecasts are maintained, in line with the expectations of the futures markets. Likewise, the euro-dollar exchange rate forecast reflects the strengthening of the European currency observed in recent months. Finally, it should be noted that the assumptions made related to the interest rates curve have remained unchanged with respect to the 2017 SPU, although futures markets point to a moderation of long-term rates.

The Government projects solid growth in global and euro zone GDP, in accordance with the major international organisations. For global GDP, the slight downward revision contrasts with the recent upward revision of the European Central Bank's (ECB) forecasts for 2017, associated with the acceleration of emerging countries (in particular, the stabilisation of commodity exporters) more than compensating for the downward revision of the United States (after the change in expectations on its fiscal policy). Similarly, world trade is performing better than projected at the beginning of the year and the recovery of advanced economies continues to benefit from accommodative fiscal and monetary policies. Consequently, the labour and credit market situation has continued to improve, as reflected in the higher growth in 2017 and 2018 projected for the euro zone by the Government and the major international organisations.

Upside and downside risks to global growth are balanced in the short term and biased in the medium term. Stronger confidence drives investment and trade from reduced levels. In particular, the IMF, in its update to its October forecasts, points to more sustained cyclical growth in Europe, where political risk has declined. However, the IMF warns of the persistence of political uncertainty related to the trend towards greater trade protectionism, with the ups and downs of United States fiscal and

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[16] Article 4.5 of Council Directive 2011/85/EU requires Member States to publish their methodologies, assumptions and relevant parameters that underpin the macroeconomic and budgetary forecasts.

regulatory policy and the outcome of the Brexit negotiations. In addition, there continue to be financial vulnerabilities. Faster-than-expected normalisation of advanced countries' monetary conditions could lead to destabilizing movements of capital and the exchange rate at the global level. In addition, the fragility of the balance sheets of some euro zone banks, together with the renewed political risk, could revive financial tensions and worsen public debt dynamics.

The Government and the main forecasting centres project that the euro will stabilise following its appreciation in recent months with respect to the dollar. As a result, the ECB projects the euro's nominal effective exchange rate to appreciate by 2.3% in 2017 and 2.6% in 2018, which could partially offset the stimulus stemming from the acceleration of external demand.

The assumptions regarding the performance of Government debt securities are within prudent limits, being more demanding than market expectations. The interest rate trend for Government debt at 10 years forecast in the macroeconomic scenario in the Draft Budgetary Plan stands at 1.7% in 2017, increasing to 2.1% in the year to come. These forecasts are above the yields implicit in the futures markets (1.6% for 2017 and 1.8% for 2018), which could reflect a moderation in expectations of withdrawn monetary stimuli following the August meeting of central bankers in Jackson Hole and the ECB Governing Council meeting in September. Therefore, to maintain the SPU assumption on the long-term interest rates of Spanish debt seems *a priori* too strict.

The oil price trajectory is in line with futures markets and the forecasts from the main international organisations. The assumption of oil prices stabilising at around $53 per barrel remains practically unchanged with respect to the 2017 SPU. The agreement of the Organisation of the Petroleum Exporting Countries (OPEC) to reduce production at the end of last year led prices to increase to $55 per barrel, and then steadily decline to around $53 per barrel, thanks in part to the level of US reserves. However, in September oil prices rebounded again to close to $60 per barrel due to accelerated global demand, the tensions in Kurdistan and the OPEC agreement to reduce production. Crude oil production fell in August by 79,000 barrels a day for the first time since March 2017 and the OPEC agreement was renewed at least until March 2018. In any case, the reactivation of the production of nonconventional oil in the US has moderated the upward market trend in recent weeks, so that the spot and future oil price has stabilised at around $55.68 per barrel, which could lead to a new upward trend in prices. In any case, the futures markets are betting on the price stabilising around its current level for the near future.

4.3.2. GDP and the composition of demand

The growth forecasts included in the Draft Budgetary Plan incorporate an upward revision in 2017, but anticipate a significant downward correction for 2018 due to the political and institutional uncertainty in Catalonia, the impact pf which can be

estimated at 0.3-0.4 percentage points of GDP. In the second half of 2017, the information anticipated by the most recent short-term indicators affirms the rate observed in the first months of the year, with quarterly rates close to 0.8%, and implies an annual rate of above 3%. This dynamism, along with an improvement in the external environment, a monetary policy delaying the withdrawal of stimulus, a more dynamic euro zone and contained global risk, favour relatively high growth of around 2.7% in the absence of disturbances and economic policy measures. This is slightly above the previous official forecasts of the SPU in April (2.5) and the approval of the Spending Ceiling in July (2.6%). However, the update included in the 2018 Draft Budgetary Plan scenario anticipates a downward correction to 2.3%, a result of incorporating the negative impact of the uncertainty shock surrounding the current political situation in Catalonia on domestic demand, with an estimated impact of 0.3-0.4 percentage points of GDP.

Making macroeconomic forecasts in a politically unstable environment such as the present one is particularly complex and entails methodological challenges that result in greater forecast uncertainty than in normal conditions. The evaluation of the uncertainty shock has two dimensions: a common component that affects the Spanish economy as a whole, and an idiosyncratic component of the Catalan economic activity. Although the different transmission channels can be expected, quantification involves numerous methodological difficulties. First, high frequency short-term evidence does not yet provide information on the magnitude, extent or duration of the disturbance. In addition, the idiosyncratic component of Catalonia's economic activity entails an added difficulty in the absence of directly comparable historical episodes due to the synchrony of cycles between the Spanish regions or relevant comparisons in the economic literature. Assuming the genuine difficulties of an impact exercise with the current uncertainty scenario, this report includes a specific sensitivity exercise to evaluate the effect of the common uncertainty component, based on the most recent economic literature. We must also consider the additional effect of the idiosyncratic component, which the most recent information indicates will be relevant.

The analysis of the impact of the common component of the uncertainty shock for 2018 implies a significant downward correction of the inertial path of GDP, as well as an associated deterioration of public finances. The impact of the common component of the uncertainty shock in 2018 is tentatively estimated to be between 0.4 and 1.2 percentage points of GDP, depending on the degree of permanence of the stressed scenario. In turn, this effect would lead to deterioration of the budget balance (between 0.2 and 0.5 percentage points) through lower revenues and the denominator effect of GDP. This deterioration in public finances would jeopardise the attainment of the deficit foreseen in the 2018 Budget for (2.3% of GDP, 0.1% above the target set), reducing its feasibility. In addition, the idiosyncratic component associated with the disruption in Catalan activity has an additional negative impact through adverse spillover effects on the rest of the regions, given its deep integration into the rest of the Spanish economy, as well as its high relative weight. The inherent

difficulty in calibrating (i.e. measuring the extent) of this disturbance requires close and periodic monitoring of the short-term regional indicators. Ad-hoc exercises point to spillover effects on GDP or employment in line with the weight of the Catalan economy in the Spanish economy as a whole (20% of the specific shock).

AIReF's analysis implies that the estimated impact of the uncertainty forecast by the Government is prudent, with additional downside risks. According to AIReF's analysis, the impact associated with the uncertainty shock would be in line with a relatively transient perception of the common uncertainty component, which would tend to be resolved in a short-term horizon. This view is considered prudent, especially given the complexity of the forecast in the current context, although it is worth noting that there are additional significant downside risks arising from a longer duration of the common uncertainty shock and the idiosyncratic deterioration of the economic activity in Catalonia, with negative effects on the rest of Spain, as noted above.

The growth path forecasted for 2018 and its composition are considered plausible, given the uncertain environment in which the forecasts are made. The projected impact of the materialisation of the identified risks to GDP growth for 2018 is significant and entails a downward correction, increasing the feasibility of the official path. When verifying the breakdown of growth for 2018, the downward correction through lower internal demand presented in the Budgetary Plan is considered plausible, especially in light of an uncertainty shock. It should be noted that there is some asymmetry in its component distribution, since the lower dynamism of domestic demand is essentially concentrated on worse private consumption.

Growth is expected to be moderated for private consumption, mainly due to the restraint of domestic demand. The official outlook forecasts a growth rate of 1.8%, after anticipating 2.5% for the current year. The reasons for the reduction would be, on the one hand, less vigour in the rate of job creation, and on the other, the gradual moderation of real income due to higher inflation levels than observed in previous years. However, the deceleration of private consumption is noticeably greater than that presented in the Consensus of private institutions, although it may be feasible, conditional on the impact of the uncertainty shock.

For public consumption, the Government maintains its growth forecast of 0.7% in 2018, which is at the bottom of AIReF's range. In the absence of more information about the items that support this aggregate figure, it should be noted that they fall outside of the interquartile range of private and public forecasts (between 0.9% and 1.6%), which is especially relevant in light of the bias identified in the ex-post analysis. However, when compared to AIReF's models, the official forecast is within the forecast range for 2018, thus compatible with a budgetary overrun situation, although at the bottom of the range.

The gross fixed capital formation forecasts for 2018 have hardly been revised in the latest update. The continued favourable financing conditions and a sounder financial position condition this aggregate, which is relatively well-balanced in light of AIReF's

inertial path. Likewise, the government forecast (3.5%) is deemed prudent in relation to other public institutions, such as the Bank of Spain (4.6%), the European Commission (3.9%) and the OECD (4.9%). In relation to previous forecasts, investment has hardly been revised downward, as one would expect this to be one of the main transmission channels for the uncertainty shock, especially in terms of production.

The contribution of the external sector to growth has been corrected upward with respect to the forecasts included in the 2017-2020 SPU, standing at 0.5% in 2018, while the forecast real growth rates for imports and exports are deemed likely. The good performance shown in exports would be supported by the favourable expectations held for the international markets, although it could be somewhat offset by the exchange rate trends or the existence of a certain degree of saturation in the tourism sector. The behaviour of imports will in turn be linked to the import content of both investment and exports, providing for a maintenance of the current account surplus, which ratifies the diagnosis of structural change in the growth pattern cited in the SPU report. These forecasts are very similar to those issued by both private analysts and major international organisations.

Employment forecasts have been corrected downward in line with the GDP correction, although they appear to be slightly optimistic if the productivity trends are considered. Employment is projected to grow 2.4% in 2018, which, taking the GDP forecast into account, would imply an apparent zero change in productivity, a fact that is quite exceptional in the historical series (in the current accounting base, the only lower figure was observed in 1999, with negative 0.1%). This rate falls outside the panellists' interquartile range, and within the upper range of AIReF's models. The slowdown in growth will mark slower expansion in employment, with moderate but positive productivity expected. In any case, this employment forecast, together with the decline (or stagnation) of the labour force, would reduce the unemployment rate to slightly above 15%, as the Government anticipates. This result would be consistent with the higher employment-GDP elasticity detected in recent years (confirming a structural change in the Okun relationship since 2012).

The evolution of the prices included in the Government's macroeconomic framework is plausible and very similar to that obtained by AIReF's internal models, slightly higher than the Consensus forecast of private institutions and international organisations. The inflation forecast stands at 1.6% in 2018, about 0.1% higher than the European Commission and the OECD forecast (1.5%) or 0.3% higher than that of the Bank of Spain (1.3%). The increasingly less inflationary contribution of energy prices, higher than the moderate gradual increase in core inflation, will permit this containment. On the other hand, it is feasible that the GDP deflator will stand around the 1.6% level indicated by the Government, which translates to a nominal GDP growth of about 4.0% for 2018, which is lower than the 2017 figure.

Similarly, the trend in labour costs (compensation of employees) for 2018 is deemed likely, although more contained in relation to the projections of AIReF and the group

of public and private panellists. It is slightly below the growth of the general price level, which again leads to a minimum loss of worker purchasing power. However, the collective bargaining trends, as well as the negotiation of salary increases in the public sector (no information has been provided) could cause this diagnosis to vary, with clear repercussions in terms of private consumption and tax collection.

BOX 1. Impact analysis of an uncertainty shock

One of the risks associated with macroeconomic forecasts in the short term is the impact that domestic uncertainty could have if it becomes permanent. Protracted uncertainty in the field of domestic policy, stemming from a lack of agreement in approving budgets or doubts surrounding the legal and institutional framework, for example, could eventually affect the confidence of the economic agents, their expenditure decisions and their financing conditions. Therefore, as the current uncertainty is expected to continue, the objective of this outlook is to perform a sensitivity exercise on its potential short-term impact.

Impact in 2017

The impact in 2017 is considered marginal, given the robust growth in the first three quarters and its consequent cumulative effect. The latest results from AIReF's MIPReD nowcasting model show no signs of a slowdown in Spain's economic growth. In fact, the high-frequency short-term information available to date allows growth to advance at around 0.8% for the third and fourth quarters of 2017 and 3.1% for the year as a whole. Taking the 2017 third quarter forecasts as given, it is possible to perform a growth accounting exercise in order to identify the impact on the annual variation of GDP against of an unexpected drop during the last quarter of the year. Considering this year's progress, quarter-on-quarter growth in the fourth quarter would have to be significantly reduced (below 0.4%) in order to bring the annual rate down from 3%. A drop in the quarterly rate of this calibre (from 0.8% to 0.4%) is unlikely based on empirical evidence. Since the early 1990s, this type of episode has been observed in less than 15% of cases.

Impact in 2018

The risk that political tensions, if they persist, will have an impact on the economy increases as the time horizon extends. In order to analyse the impact in 2018, AIReF has decided to perform a 4-step sensitivity exercise: (i) identification of a relevant uncertainty indicator; (ii) calibration of a disturbance in the uncertainty indicator; (iii) estimation of a non-structural model; (iv) simulation of the impact of the calibrated shock.

First, the Economic Policy Uncertainty Index (EPU) developed by Baker, Bloom and Davis (2015) is selected as a confidence measure. This index is especially relevant for 2018 because it focuses on episodes of economic uncertainty stemming from economic policy, including events of a similar nature to the current situation in Spain. Moreover, it has multiple advantages such as its diffusion, transparency and regular updating, its high correlation with other uncertainty measures (such as the implied volatility of stock index options) and its use by multiple institutions (IMF, ECB, Federal Reserve, etc.). The index is published monthly for the major European economies (Germany, France, Italy, Spain, UK, as well as the EU aggregate). It is defined in terms of the presence of words related to uncertainty, economics and politics appearing in the mainstream media. The result is adjusted by the total number of articles published and is presented as an index with an average value of 100 for the period 2001m1-2010m12.

Figure R.1 shows the evolution of the indicator for Spain as of 2001, where it can be observed that the peaks coincide with some of the moments of greater economic policy uncertainty during recent years, which may differ substantially in intensity and duration. For example, the biggest increase recorded in the series is associated with the Iraq war, lasting 3 months (surpassing 350 points). In contrast, the increase in uncertainty due to the euro crisis averaged 140 points for almost 3 years. Finally, from the end of 2015, it is possible to observe an increase in volatility with peaks of almost 250 points due to Spain's inability to form a government or external factors such as Brexit or Trump's victory.

Figure R.1. Uncertainty Indexes, Spain (EPU_ES)
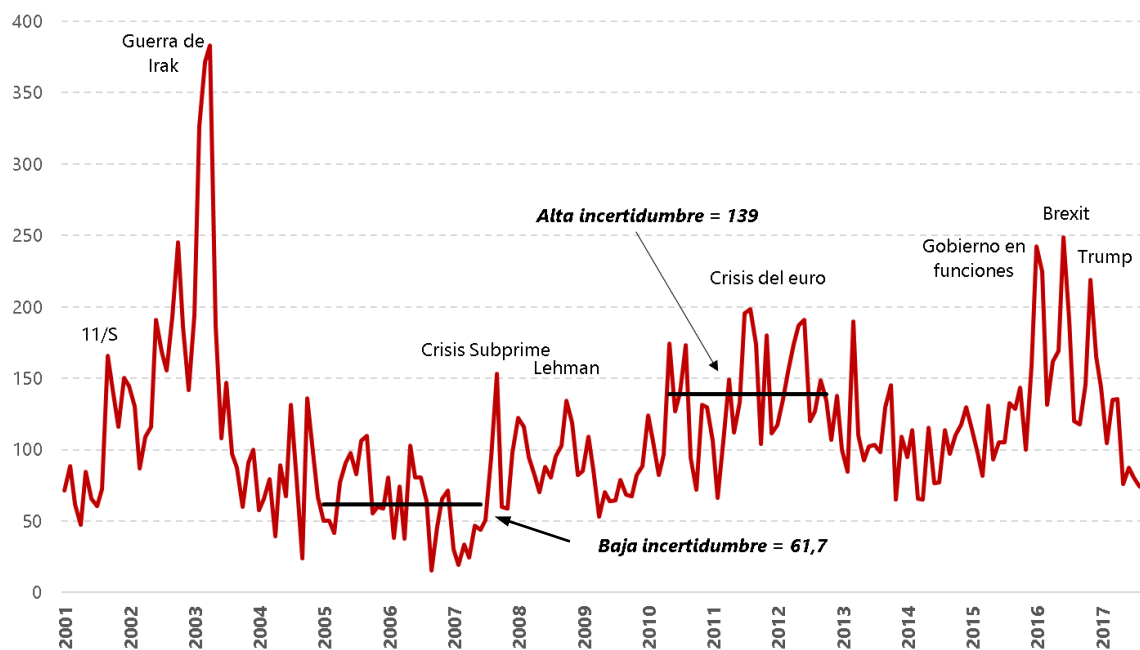
Source: Baker et al. and AIReF.

In other countries, once events related to war and terrorism are ruled out, the events that seem to increase uncertainty the most are those related to governmental incapacity due to lack of political agreement, such as the debt ceiling or legal/institutional uncertainty, such as Brexit. Throughout 2016, the difference between the Spanish and the European EPUs expands, suggesting a lesser transmission of events related to Brexit or the American elections to the level of domestic uncertainty. Although the level of uncertainty in Spain appears to be declining in 2017. In the last 3 months, the uncertainty differential cited above has fallen by 50%, coinciding with the increase in domestic political tensions.

Second, the calibration of the shock or impulse follows a narrative approach, approximated by identifying similar events in qualitatively comparable situations. To quantify the scope of the uncertainty shock to be modelled in the Spanish case, 41 comparable events are first filtered, some of which are shown in Table R.2. Next, those associated with war or terrorist attacks are eliminated, leaving 29 events (more detail can be found in annex 7.4). Second, the remaining events are averaged, taking the scope of the shock in terms relative to the standard deviation of the series as a normalised measure of shock. With all the above, the

final calibration assumes an increase in the uncertainty index of 2.42 standard deviations (132 points).

**Figure R.2.** Major Events with Increases in Uncertainty in Spain

Country	Date	Event	No. SD
Spain	2003.01_2003.3	Iraq war + events (+ Prestige)	4.79
Spain	2015.12_2016_1	Elections / Unable to form government	2.94
Spain	2001.08	9/11	2.75
Spain	2016.06	Brexit+New Catalonia referendum drive	2.03
Spain	2013.03	Rescue of Cyprus	1.85
Spain	2007.09	Subprime Crisis	1.75
US	2011.06_2011.08	Debt ceiling dispute	5.45
Germany	2016.06	Brexit	4.88
US	2001.08	9/11	4.85
UK	2016.06_2016.07	Brexit	4.77
US	2008.09	Lehman	4.30
US	2016.11	Trump	3.99
US	2016.06	Trump wins primaries + Orlando Massacre	3.77
US	2013.08_2013.09	Government without budget	3.66
Italy	2001.08	9/11	3.43
Italy	2016.11	Trump	2.99
UK	2016.10_2016.11	Trump+Depreciation of the Brittish pound	2.92
US	2012.05_2012.06	Fiscal cliff	2.75
France	2016.06	Brexit	2.04
Italy	2016.09_2016.11	Constitutional reform (Renzi)	2.01

Note: the scope of the different episodes is normalised by number of standard deviations

It should be noted that the economic impact of an increase in the level of uncertainty also depends on whether the uncertainty is temporary or permanent. The persistence of uncertainty for prolonged periods can lead to a greater negative disturbance to the economy. Taking into account the duration of the shock, two different scenarios are calibrated and simulated, one returning to normal after one quarter (temporary disturbance) and the second being rooted in a higher level of uncertainty (permanent disturbance). To calibrate the difference between the two scenarios, the behaviour of the series modelled for Spain (EPU_ES) is observed, finding average values associated with long periods of relative calm and high uncertainty. In Figure R.1, the low uncertainty episode between early 2005 and mid-2007 can be seen, when after the impact related to the Iraq war and the March 11th attacks, the indicator is at its baseline level, reaching an average of about 74 points. Subsequently, the period between mid-2010 and the end of 2012 (both periods last 30 months) is considered as an alternative or stressed state, whose average is 77 points higher, coinciding with the greatest tensions in the financial markets in Spain. Later, after a period of high internal uncertainty (existence of acting Government) and external

uncertainty (Brexit, US elections), the indicators return to their baseline levels, below 100 points. Considering this information and this starting point, the simulated shocks follow the profile shown in Figure R.3, with an initial rise to the level calibrated according to the historical episodes and later a quick return to normality in the case of the temporary scenario or maintenance at structurally higher levels in the permanent scenario.

Figure R.3. Time profile of disturbances in both scenarios
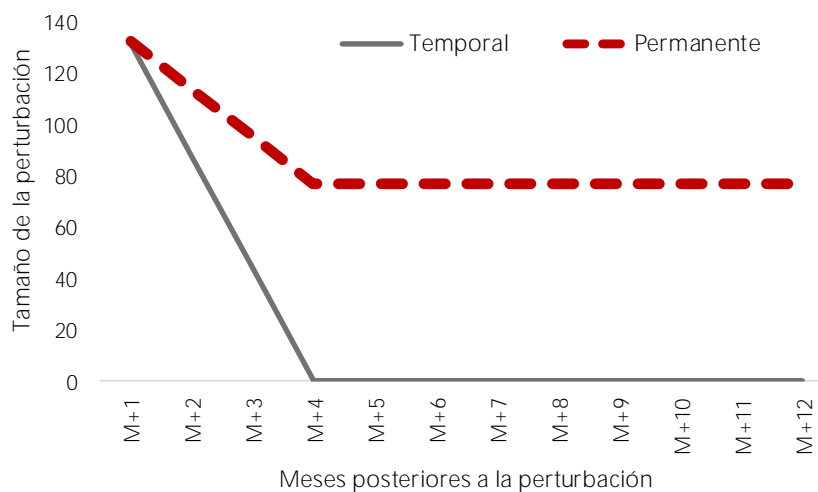
Third, once the shock is defined, the next step is to select the economic variables that may be related to the narrative of uncertainty events, taking the different transmission channels into account. In terms of consumption, the perception of risks is associated with an increase in precautionary saving and a delay in the consumption of durable goods. As far as investment is concerned, evidence shows that new projects tend to be postponed until uncertainty decreases, leading to contractions in gross capital formation (Meinen *et al*, 2016). On the financial level, uncertainty is related to an increase in interest rates, with credit rationing and declines in stock market indices.

In accordance with the above, and always striving to minimise the number of variables selected, a BVAR (Bayesian Vector Autoregression) model is applied, with a monthly frequency and for a sample ranging from 2001m1 to 2017m9. In addition to the EPU index for Spain, the BVAR includes a monthly real GDP forecast obtained from AIReF's MIPReD model as a summary of the economy. Second, the financial and savings channel is captured through the inclusion of two other variables: on the one hand, the IBEX35 as a proxy for the impact on investor confidence in the economic future, and on the other, the premium paid by the 10-year Spanish Treasury bonds in comparison to its German counterpart, as an approximation of the markets' relative perception of the state of public finances. The set of series is completed with the inclusion of the CPI, which makes it possible to single out the impact that uncertainty may have on prices and, therefore, to filter the real effect on the other variables. Annex 7.4 contains all the details regarding the series included in the model and its forecast.

Finally, the analysis of the impulse-response functions reflects the impact on GDP variables. In qualitative terms, an increase in the level of uncertainty has a negative impact on GDP growth. For this reason, the calibrated perturbations are simulated in the different scenarios defined (temporary and permanent), reflecting their impact on the economy in Table R.4. In particular, the increase in the previously calibrated index would imply a decrease in growth in 2018 between 0.4% and 1.2%. This impact on economic activity would, in turn, lead to a deterioration in public finances for 2018 between 0.2% and 0.5%, through lower revenues (with elasticity slightly greater than 1) and a denominator effect that would increase the revenues ratios with respect to GDP.

Table R.4. Sensitivity analysis: Impact of increased uncertainty

Impacto anual en el PIB (%)	
Shock Temp.	Shock Perm.
-0.38	-1.22

Source: AIReF

The analysis follows the line of study of previous work that assessed the impact of uncertainty on economic growth (BBVA Research (2016), Fernández-Villaverde (2016) and Meinen (2016)). However, it differs from these studies in some respects. First, this analysis is enriched by the calibration of the shock with a narrative approach, exploiting the information contained in the Spanish economic uncertainty indices. Second, a differentiation is made regarding the duration of the shock, whether temporary or permanent, which allows the model to provide a range of the possible expected impact of the uncertainty on GDP. Third, this exercise uses a monthly GDP estimate derived from the MIPReD model, which enables more precise monitoring of the impact on economic activity. Finally, it has been shown that the results obtained are robust to the quarterly forecast. A more detailed view of the econometric specification and robustness comparisons can be found in the annex.

5. Conclusions, endorsement and recommendations

AIReF endorses the Government's macroeconomic forecast for the 2018 Draft Budgetary Plan. AIReF deems the Government's macroeconomic scenario to be prudent overall. The basic assumptions underlying the Government macroeconomic scenario are considered feasible and reflect balanced risks stemming from the external environment. On the one hand, the growth forecasts of the major trading partners have improved and the tailwinds provided by the expansive monetary policy measures are expected to be maintained in the short term. On the other hand, there are downside risks stemming from the possible impact of Spanish exports, an increase in energy costs due to the higher price of crude oil and the trend in the euro exchange rate in foreign markets (in particular its strengthening against the dollar) on competitiveness..

The growth path forecasted for 2018 and its composition are considered plausible, given the uncertain environment in which the forecasts are made. Domestic demand, despite suffering a significant slowdown, continues to be the main driver of growth in 2018. Looking at domestic demand, private consumption is the component that slowed the most, and is at the bottom of both the panellists' forecasts and when compared with AIReF's internal models. However, the materialisation of the identified risks would increase the feasibility of the official forecast. Investment, in turn, has only been revised downwards since the last official forecasts, as one would expect it to be one of the main transmission channels for an uncertainty shock. The external sector strengthens its positive contribution, confirming the structural improvement identified in previous reports. Finally, in terms of public consumption, the Government maintains a forecast of 0.7% in 2018. In the absence of more information on its components, this aggregate figure falls outside the interquartile range of the private forecasts and constitutes a relevant circumstance according to the bias identified in the ex-post analysis. However, when compared to AIReF's models, the official forecast is within the range for 2018, thus compatible with a budgetary overrun, although at the bottom of the range.

The ex-post analysis of forecasts from previous years identified an important bias in the Public Consumption forecasts for the 2013-2016 period. The use of observed values for the valuation of all forecast biases

confirms the conclusions of previous reports, namely, the existence of a significant bias in public consumption for the following year (t+1), which have been outside the interquartile range and unjustified by better ex-post results during the last 4 years.

It should be noted that there are two scope limitations identified in this report, both in terms of schedules for the dissemination of statistical information and the submission of budgetary information accompanying the macroeconomic scenario. AIReF believes that there are two scope limitations relevant to this report. First, the current revision calendar of the Spanish National Accounts and its quarterly correspondence make it difficult to produce the macroeconomic scenario in the context of the national budgetary framework. Second, the connection between macroeconomic forecasts and the budgetary scenario cannot be explained, as the expected evolution of the various revenue and expenditure items and the fiscal policy measures included in the 2018 Draft Budgetary Plan and its macroeconomic impact are not available sufficiently in advance for the drafting of this report.

Finally, in terms of transparency, AIReF reiterates the need for further progress in the publication of methodologies and the dissemination of information.

Based on its analysis, AIReF makes two recommendations and two suggestions for good practices. First, to the National Statistics Institute (INE), to ensure the internal consistency in the Annual and Quarterly Spanish National Accounts estimate in the framework of the development of the macroeconomic scenario associated with the Draft General State Budget (GSB) Law, as it did until 2014. Second, to the Ministry of Economy, Industry and Competitiveness, to adopt and publicise the necessary measures to correct the important biases observed in the autumn forecasts for the following year's public consumption. AIReF also has two suggestions for good practices for the Ministry of Economy, Industry and Competitiveness. First, to integrate the key elements of the forecast into a simplified National Accounts framework, so that it is possible to understand the connections between economic activity, demand and expenditure on the one hand, and revenue flows and financing needs on the other. Second, to expand the information on the relevant methodologies, assumptions and parameters that support the forecasts, in line with the provisions of Spanish Directive 2011/85 on budgetary frameworks and Article 29 of the Organic Law on Budget Stability and Financial Sustainability (LOEPSF), which defines the content of the medium-term budgetary plans of the Public Administrations.

6. ANNEX: TABLES AND CHARTS

C.1)   Basic assumptions for the 2017-2018 scenario
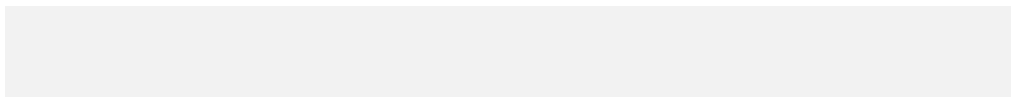
Annual percentage change, unless otherwise indicated

	2017	*Δ* SPU 17-20	2018	*Δ* SPU 17-20
Short-term interest rates (Euribor at three months)	-0.3	0.00	-0.3	-0.16
Long-term interest rates (Government debt at 10 years, Spain)	1.7	0.0	2.1	0.0
Exchange rate (USD/EUR)	1.13	0.06	1.18	0.10
Global GDP growth, excluding the EU	3.5	-0.2	3.6	-0.3
GDP growth in the euro zone	2.2	0.5	1.8	0.0
Spanish export markets	3.6	0.0	4.1	0.2
Oil prices (Brent, USD/barrel)	52.8	-0.7	54.8	1.6

2017-2020 Forecast

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

C.2)   Government macroeconomic forecasts

Macroeconomic scenario of the 2018 Draft GIP

	2016	Δ SPU 17-20		2017	Δ SPU 17-20		2018	Δ SPU 17-20	
GDP	3.3	0.0		3.1	0.4		2.3	-0.1	
GDP at current prices: MM€	1,118.5	4.7		1,167.0	6.0		1,213.5	4.5	
GDP at current prices: % var	3.6	0.0		4.3	0.1		4.0	-0.2	
DEMAND COMPONENTS (% var)									
Final consumption expenditure	2.5	-0.1		2.1	0.0		1.5	-0.5	
- Final consumption expenditure of households (a)	3.0	-0.2		2.5	-0.1		1.8	-0.6	
- Final consumption expenditure by government	0.8	0.0		0.9	0.2		0.7	0.0	
Gross capital formation	3.1	-0.7		4.1	1.3		3.4	0.8	
- Gross fixed capital formation	3.3	0.2		4.2	1.4		3.4	0.8	
Fixed material assets									
Construction	2.4	0.5		3.9	1.9		3.5	1.3	
Capital goods and biological resources	4.9	-0.1		4.8	0.8		3.8	0.5	
- Changes in inventories (contribution in p.p.)	0.0	-0.2		0.0	0.0		0.0	0.0	
Domestic demand (contribution to GDP growth)	2.5	-0.3		2.4	0.2		1.8	-0.2	
Exports of goods and services	4.8	0.4		6.2	0.6		5.1	0.2	
Imports of goods and services	2.7	-0.6		4.4	0.0		4.1	0.0	
Net foreign demand (contribution to GDP growth)	0.7	0.3		0.7	0.2		0.5	0.1	
PRICES (% var)									
GDP deflator	0.3	0.0		1.2	-0.3		1.6	0.0	
Private final consumption expenditure deflator	-0.1	0.1		2.0	0.5		1.6	0.1	
LABOUR COSTS AND EMPLOYMENT (% var)									
Compensation per employee (labour cost)	-0.3	-0.3		1.1	-0.2		1.1	-0.4	
Compensation of employees (labour cost)	2.9	-0.2		4.1	0.2		3.6	-0.4	
Total employment (b)	3.0	0.1		2.9	0.5		2.4	0.0	
Productivity per employee (b)	0.3	-0.1		0.2	0.0		0.0	-0.1	
Unit labour costs (ULC)	-0.6	-0.2		0.8	-0.2		1.2	-0.3	
Memorandum items (Labour Force Survey data)									
Unemployment: % economically active population	19.6	0.0		17.2	-0.4		15.5	-0.1	
FOREIGN SECTOR (% GDP)									
Current account balance	1.9	0.0		1.7	-0.2		1.6	-0.2	
Net lending (+) / borrowing (-) vis-à-vis the rest of the world ©	2.1	0.1		1.8	-0.2		1.7	-0.1	

2017-2018 Forecast

(a) Households and ISFLSHs

(b) Full-time equivalent employment

SOURCE: INE and Ministry of Economy and Competitiveness

C.3) Forecasts by international organisations

*(variación % sobre al año anterior, salvo indicación)*

		2016	2017	2018
BCE (Septiembre 2017)	PIB mundial (ex área del euro)	3.2	3.7	3.8
	PIB del área del euro	1.8	2.2	1.8
	Importaciones de bienes y servicios (ex. área del euro)	1.1	5.3	3.8
	Precios del petróleo tipo Brent (USD por barril)	44.0	51.8	52.6
	Euribor a tres meses (%)	-0.3	-0.3	-0.3
	Tipos de interés de la deuda pública del área del euro a 10 años (%)	0.8	1.1	1.3
	Tipo de cambio USD/EUR (nivel)	1.11	1.13	1.18
	Tipo de cambio efectivo del euro	3.8	2.3	2.6
FMI (Octubre 2017)	PIB mundial	3.2	3.6	3.7
	PIB del área del euro	1.8	2.1	1.9
	PIB de la UE	2.0	2.3	2.1
	Comercio de bienes y servicios	2.4	4.2	4.0
	Precios del petróleo Brent (USD por barril)	42.8	50.3	50.2
	Libor a seis meses (%)	-0.3	-0.3	0.2
Comisión Europea (Mayo 2017)	PIB mundial	3.0	3.4	3.6
	PIB del área del euro	1.8	1.7	1.8
	PIB de la UE	1.9	1.9	1.9
	Comercio mundial de bienes	2.0	3.4	3.8
OCDE (Junio 2017)	PIB OCDE	1.8	2.1	2.1
	PIB del área del euro	1.7	1.8	1.8
	Comercio de bienes y servicios	2.4	4.6	3.8
Expectativas de mercado (Octubre 2017)	Tipos de interés a largo (deuda pública a 10 años, España)	1.4	1.6	1.8
	Precios del petróleo tipo Brent (USD por barril)	43.3	52.5	55.6

C.4) Forecast bias 2013-2016

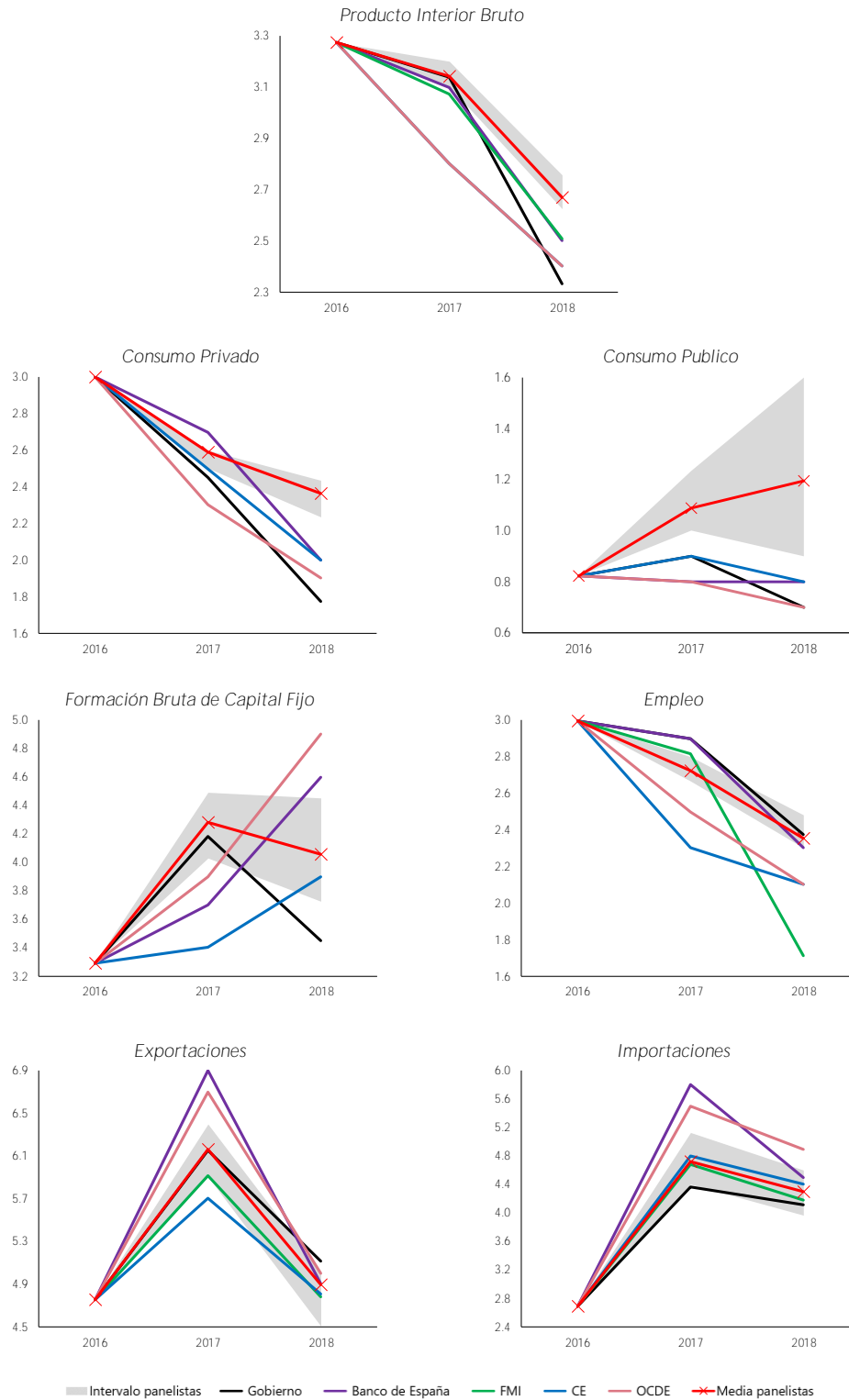|	Previsiones año anterior, para el año corriente		Previsiones año corriente, para el año corriente		Todas las previsiones	
	% Grande	% Grande e Injust.	% Grande	% Grande e Injust.	% Grande	% Grande e Injust.
PIB	50	50	50	50	50	50
Consumo Privado	50	50	-	-	25	50
Consumo Público	100	100	25	100	63	100
FBCF	75	-	75	33	75	17
Exportaciones	25	100	25	100	25	100
Importaciones	25	-	50	50	38	33
Paro	75	33	25	100	50	50
Déficit/PIB	75	100	25	100	50	100
Todas las partidas	59	58	34	64	47	60

Fuente: Elaboración de AIReF en base a datos de INE, MINECO y FUNCAS.

G.1) Forecasting errors and biases 2013-2016
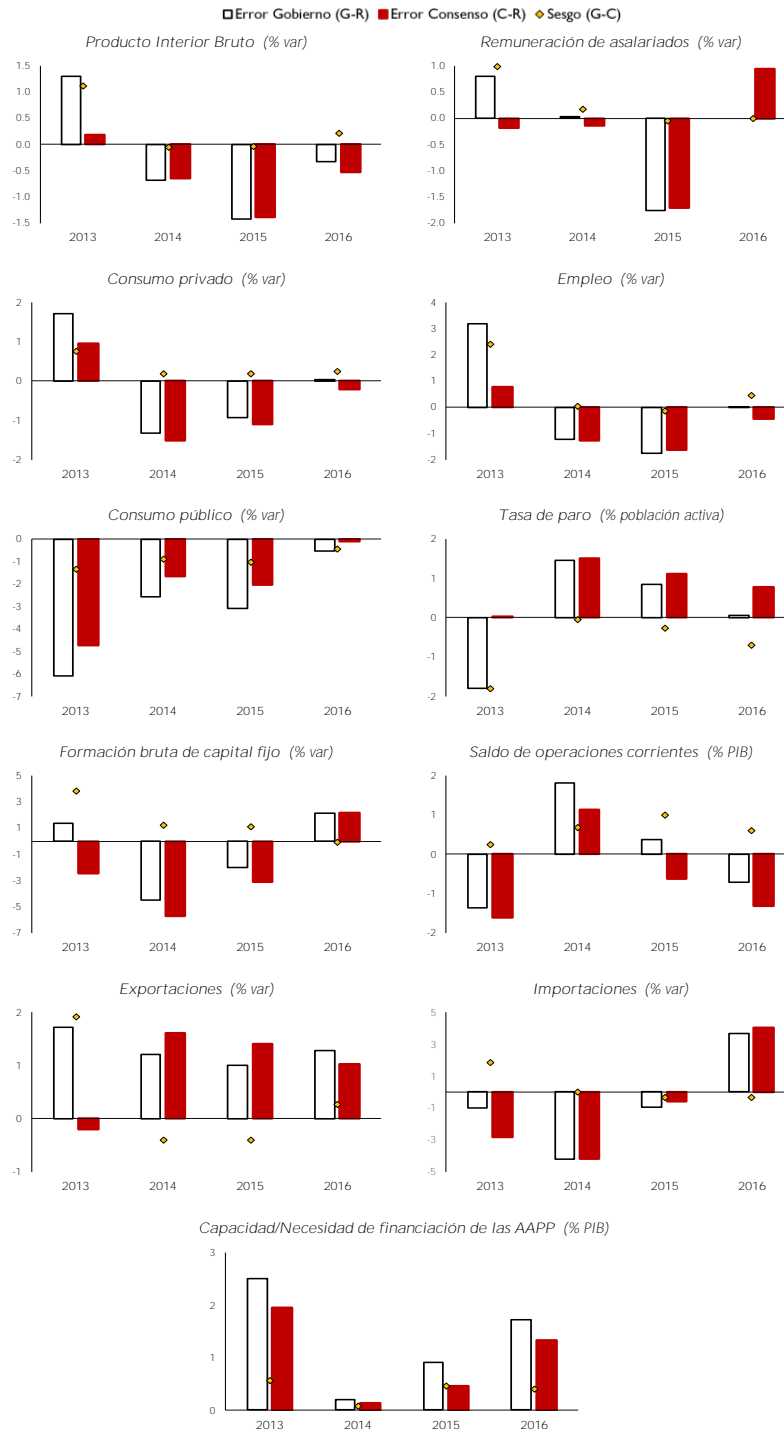
Fuentes: Elaboración propia con datos de INE, FUNCAS y estimaciones de AIReF.

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

Producto Interior Bruto

Consumo Privado

Consumo Publico

Formación Bruta de Capital Fijo

Empleo

Exportaciones

Importaciones

Intervalo panelistas — Gobierno — Banco de España — FMI — CE — OCDE — Media panelistas

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

G.3) Government forecasts and AIReF uncertainty ranges
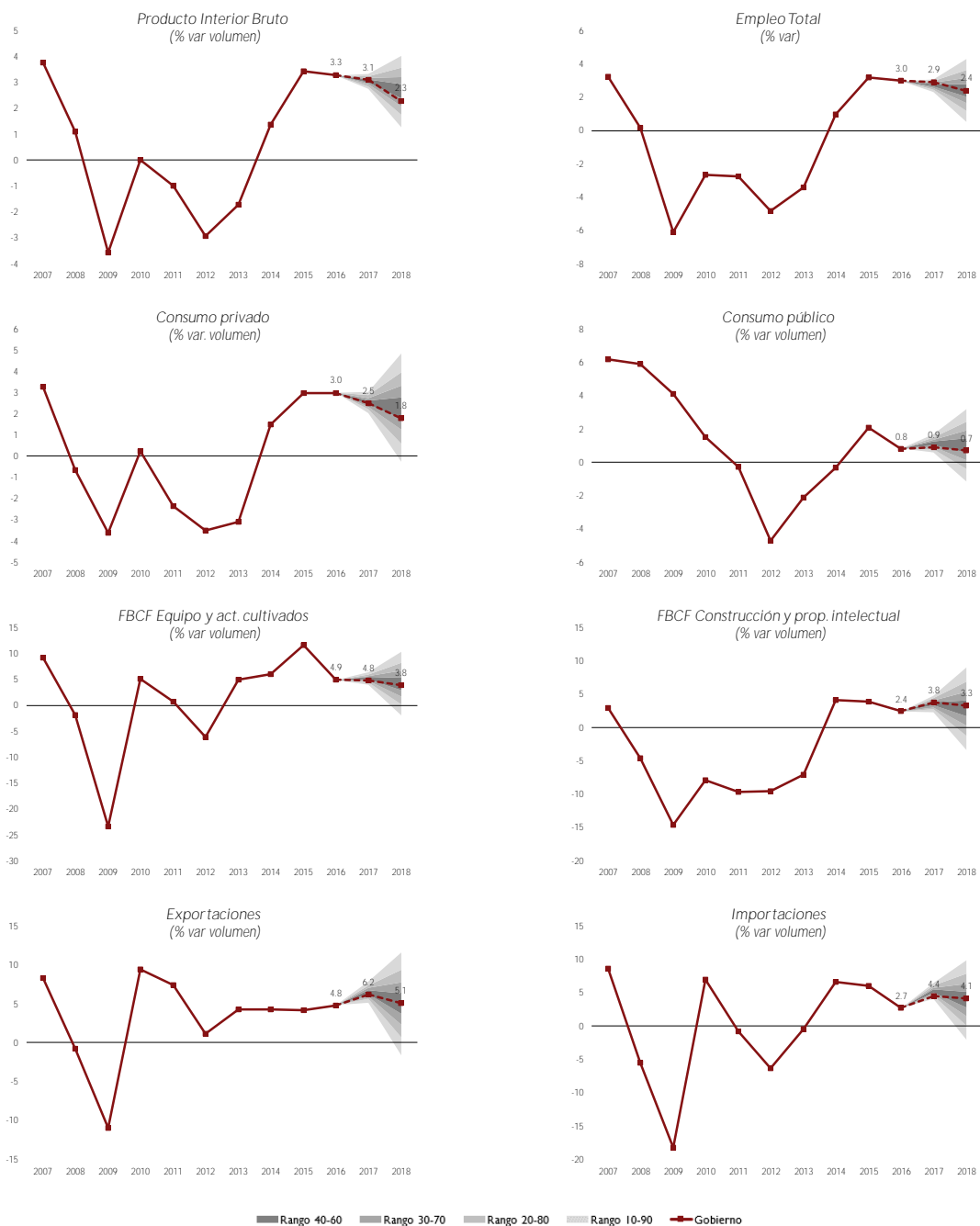
*Sources: Own processing based on INE, **MINECO** and AIReF's estimates.*

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 methods.

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 frequency data.

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

7.1. Uniequational structural models

For a quantitative assessment founded on a structural formula suggested by economic theory, several behavioural equations have been used based on the representation of error correction. A simplified presentation using Excel spreadsheets is available on 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 a 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 at 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 work 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 consumer household 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 expenditure capacity of 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 ponders each component in the final demand (Consumption, Investment and Exports) according to its 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 models 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 factorial 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, considering 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 factorial 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 vision of the aggregate status of the 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 factorial 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 by 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 factorial 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 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 of 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. BVAR Model

7.4.1. Data

The estimated BVAR Model includes the following variables with monthly frequency, starting in 2001m1 through 2017m9, according to the following identification:

1. Uncertainty index for Spain (www.policyuncertainty.com)
2. Index (monthly average) IBEX 35
3. 10-year risk premium (monthly average) comparing Spain with Germany (MINECO – BDSICE)
4. MIPReD GDP Volume index (AIReF)
5. Consumer Price Index (INE)

The majority of these series have been seasonally adjusted with Tramo-Seats, except for the CPI, which has been seasonally adjusted with the X11-ARIMA.

Also, a number of variables have been taken into account to introduce the approximation of decisions on the consumption of durable goods (passenger car registrations) and investment (permits for new construction management, IPI, apparent cement consumption, PMI of the manufacturing industry, financing to companies and families, number of employees and number of contracts). None of which significantly improved the BVAR estimate, thus a more parsimonious specification was chosen.

The final set of series used is as follows:

Figure 7.1 – Series used in the BVAR estimate (% monthly var)
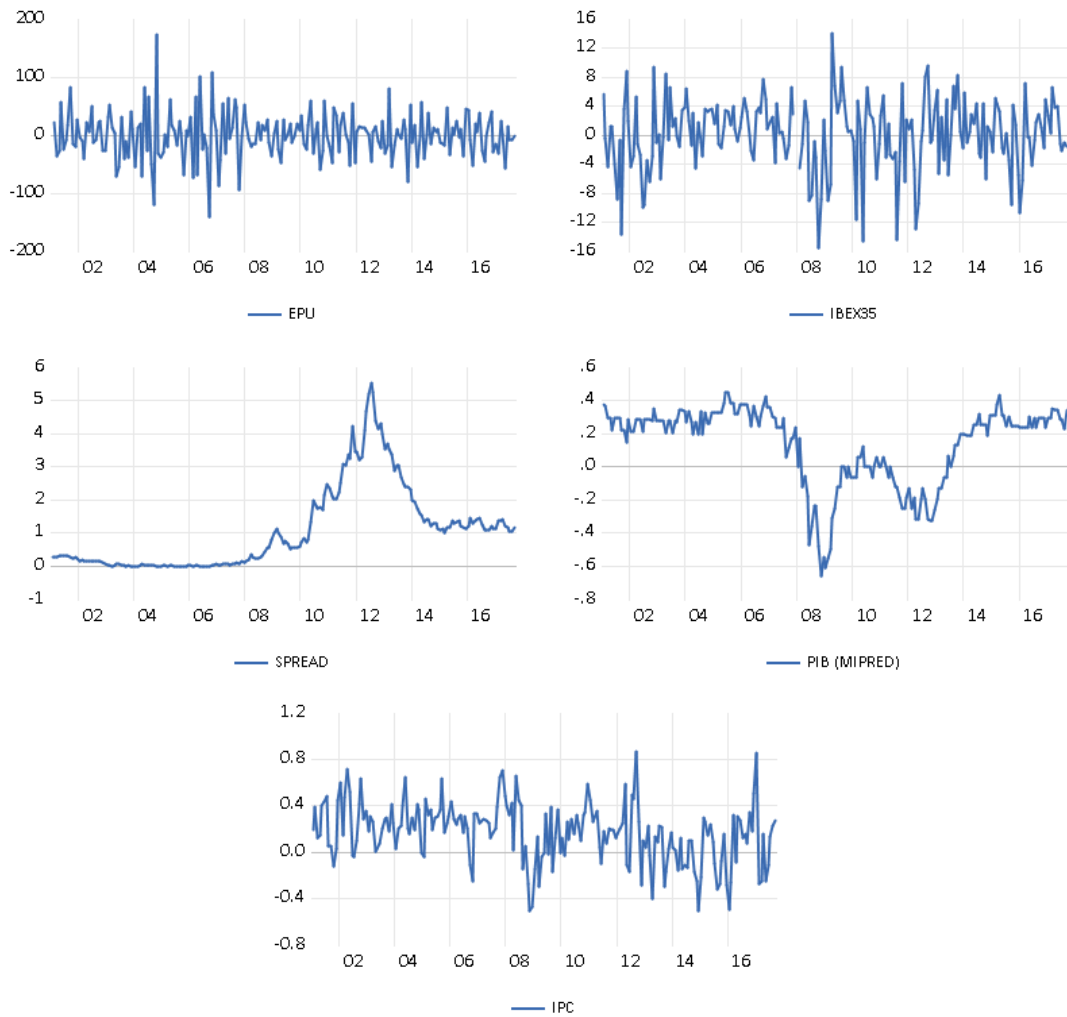
Source: AIReF. **Note:** Series expressed in difference of logarithms, except the spread with the German bond, which is expressed in levels.

7.4.2. Selected events

Table 7.1 – List of events selected

Size	Country	Date	Event	SD	No. SD
199	US	2011.06_2011.08	Debt ceiling dispute	36.5	5.4
323	Germany	2016.06	Brexit	66.1	4.9
177	US	2001.08	9/11	36.55	4.85
281	Spain	2003.01_2003.3	Iraq war + events (+ Prestige)	58.63	4.79
713	UK	2016.06_2016.07	Brexit	149.6	4.8
157	US	2008.09	Lehman	36.5	4.3
146	US	2016.11	Trump	36.5	4.0
138	US	2016.06	Trump wins primaries + Orlando Massacre	36.5	3.8
134	US	2013.08_2013.09	Government without budget	36.5	3.7
133	Italy	2001.08	9/11	38.72	3.43
116	Italy	2016.11	Trump	38.7	3.0
173	Spain	2015.12_2016_1	Elections / Unable to form govt.	58.6	2.9
437	UK	2016.10_2016.11	Trump+Depreciation of the Brittish pound	149.6	2.9
101	US	2012.05_2012.06	Fiscal cliff	36.5	2.7
161	Spain	2001.08	9/11	58.63	2.75
174	Germany	2016.11	Trump	66.1	2.6
374	UK	2017.05_2017.06	London terror attacks	149.58	2.50
160	Germany	2001.08	9/11	66.13	2.42
147	Germany	2003.02	Gulf War II	66.13	2.22
143	Germany	2011.08_2011.11	Euro zone debt crisis	66.1	2.2
203	France	2016.06	Brexit	99.4	2.0
119	Spain	2016.06	Brexit+New Catalonia referendum drive	58.6	2.0
78	Italy	2016.09_2016.11	Constitutional reform (Renzi)	38.7	2.0
192	France	2016.11	Trump / Calais refugee camp / Primary elections on the righ	99.4	1.9
108	Spain	2013.03	Rescue of Cyprus	58.6	1.8
65	US	2007.08_2007.09	Subprime. Citibank	36.5	1.8
103	Spain	2007.09	Subprime crisis	58.6	1.8
63	US	2003.03	Gulf War II	36.55	1.72
100	Germany	2008.10	Rescue of Hypo Real Estate	66.1	1.5
142	France	2017.03	Presidential elections	99.4	1.4
112	France	2012.04	Presidential elections	99.4	1.1
106	France	2015.06	European migrant crisis?	99.40	1.06
105	France	2004.03	Regional elections. Left defeated.	99.4	1.1
156	UK	2012.05	Recession	149.6	1.0
103	France	2007.08	Subrime crisis. BNP freezes pension plan	99.4	1.0
143	UK	2014.07_2014.09	Scottish referendum	149.6	1.0
95	France	2001.08	9/11	99.40	0.95
142	UK	2015.09	European migrant crisis?	149.58	0.95
126	UK	2008.09_2008.10	Lehman	149.6	0.8
98	UK	2007.08_2007.09	Subprime crisis. Northern Rock	149.6	0.7

Source: AIReF.

7.4.3. Model specification

The Minnesota prior (μ=0, λ_1=0.1, λ_2=0.99, λ_3=1) was used in the estimation. The order chosen is 1, as it is higher in four of the six selection criteria, as shown in the following table:

Table 7.2 – Order Selection Criteria

| Order	LogL	LR	FPE	AIC	SC	HQ
0	2554.43	NA	0.00	-26.84	-26.75	-26.80
1	3181.83	1215.18	**2.69***	**-33.18***	**-32.66***	**-32.97***
2	3206.38	**46.25***	0.00	-33.17	-32.23	-32.79
3	3222.82	30.12	0.00	-33.08	-31.72	-32.53
4	3243.00	35.88	0.00	-33.03	-31.24	-32.30

Source: Prepared by AIReF
Note: * amount of optimal lags. **LR**: LR test sequentially modified (at 5%)
FPE: Final prediction error. **AIC**: Akaike. **SC**: Schwarz. **HQ**: Hannan-Quinn

The results have also been contrasted using two periods, as suggested by some of the information criteria, with no significant differences in the aggregate impact on GDP. The series introduced are stationary in first differences:

Figure 7.2 – Location of the roots of the autoregressive polynomial
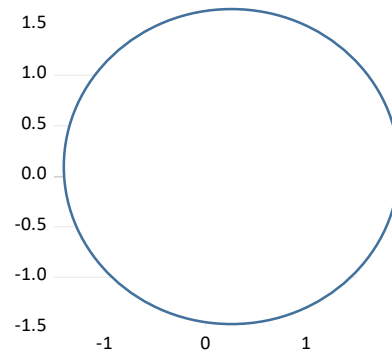
Source: AIReF.

Finally, the estimated impulse-response functions are the following, both in Spain and in Europe. The impact on both GDP growth and the risk premium is usually greater in the case of the Spanish EPU in an initial term of 15 months.

Figure 7.3 – Functions of Impulse-Response to an EPU shock of σ *(in %)*
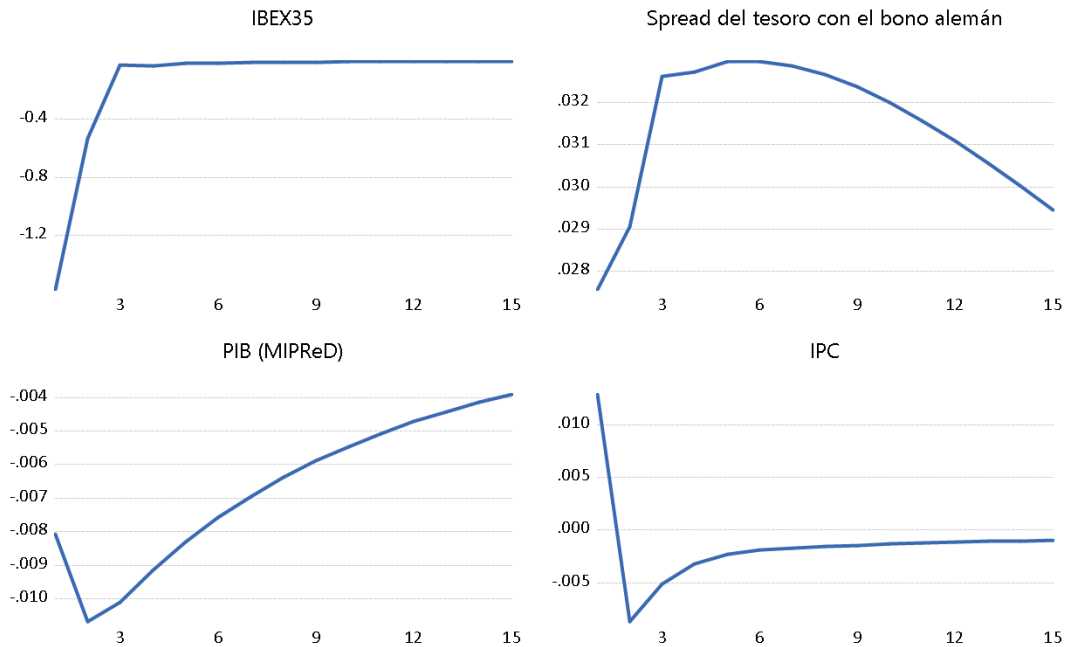
Source: AIReF.

Although the monthly frequency is particularly useful for periodic monitoring, an estimate was made with the same specification but using quarterly series. The impact on GDP is robust to the frequency change, obtaining similar quantitative results, especially in the first 9 months. Additionally, a monthly frequency estimate was made by replacing GDP with car registrations as a proxy for the consumption of durable goods. The impact is qualitatively similar to that of GDP, but with greater intensity and shorter duration, indicating a greater sensitivity of the consumption of durable goods with respect to increases in the level of uncertainty.

Figure 7.4 – Impulse-Response functions at different frequencies (shock of σ)
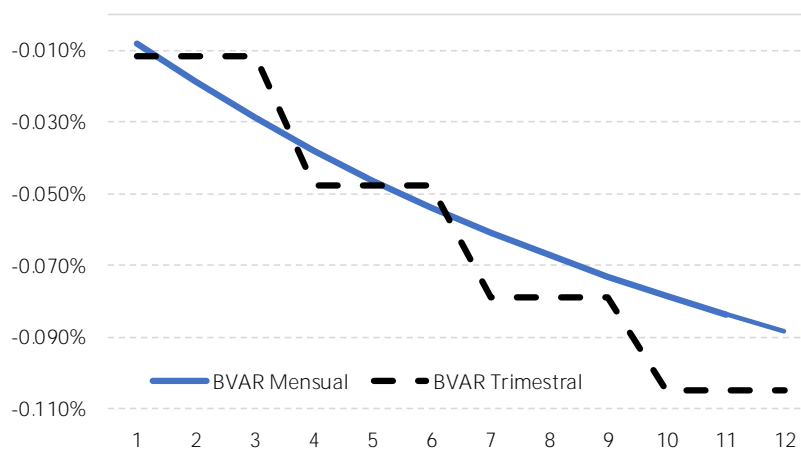
Source: AIReF.

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