



Report on macroeconomic forecasts

Draft State Budget for 2015

Executive Summary

AIReF endorses as probable the scenario of macroeconomic forecasts provided by the government. AIReF considers that the macroeconomic scenario of the government is likely as a whole. [Page 21](#)

Risks related to real GDP growth and employment seem to be balanced. Risks affecting domestic demand appear slightly to the downside for private consumption and gross capital formation and, upwards for government consumption. On the external demand, there are upward risks in both exports and imports, broadly netting out. [Page 21](#)

Among the downward risks noticed in this report, it would be prudent to take into account those derived from the international environment. The European economy could develop worse than expected, and this would have a significant impact on the Spanish economy. [Page 21](#)

AIReF makes several recommendations to the government: Revise the procedure and timetable of the forecast; avoid substantial methodological changes to the statistical base underlying the forecasts in the course of their elaboration; expand the minimum set of information provided in the forecasts; and specify in detail and make available to the public the methods, assumptions and data used in the preparation of the forecasts. [Page 21](#)

The Independent Authority for Fiscal Responsibility (AIReF) was founded with the mission of overseeing strict compliance of the budget stability and financial sustainability principles provided for in article 135 of the Spanish Constitution.

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I. Introduction

Draft budgetary plans for all Public Administrations shall be accompanied by a report indicating whether their underpinning macroeconomic forecasts have been endorsed by AIReF or not, according to the Organic Law creating the Spanish Independent Fiscal Authority (AIReF). This report complies with AIReF's mandate, providing an assessment of the Government's macroeconomic scenario, as presented in its draft Budget for 2015. The report is split in two main sections, dealing with: i) ex-post evaluation of the 2011-2014 macroeconomic forecasts (Section II); and ii) ex-ante assessment of the 2015 forecasts (Section III). Finally, section IV presents a global assessment and some specific recommendations.

The 2011-2014 macroeconomic projection exercises are examined ex-post, with a view to gauge whether forecasts showed a significant bias. To this end, government forecasts of the main macroeconomic variables are compared, on one hand, with those provided by other independent institutions, both private and public –singularly with those of the European Commission--, and on the other hand, with observed outcomes. A bias in the projection of a variable is simply understood as its gap with respect to the average forecast from the benchmark institutions. The bias will be deemed significant if it has been systematic, i.e. repeated in consecutive years, and if, in addition, it has been large and not justified by a better approximation to the observed outcomes.

The detailed ex-ante analysis of government forecasts for 2015 aims at assessing whether the official projections are realistic and define the most likely macroeconomic scenario, or a more prudent one.¹ To do that, an analysis of existing biases with respect to the reference institutions is performed, as for previous exercises. Moreover, the assumptions, methodologies and relevant parameters behind

¹ According to the Organic Law 6/2013, in its article 14.3, this report shall assess whether the Government's projections comply with the requirements established in the EU Directive 2011/85; i.e. draft budgets shall be based on the most likely macroeconomic scenario or alternatively, a more prudent one.

the projections are reviewed, whenever available, verifying also that they use of up-to-date information.

Realism in the projections is checked against a suite of models providing results on the likelihood and risks associated to the specific scenario for each variable.² These partial results are later integrated in an encompassing setting, which guarantees internal consistency of the set of variables related through national accounts, as well as the risks that exist in that scenario.

A global assessment of the 2015 macroeconomic scenario of the draft Budget will conclude whether it is considered the most likely outcome or not, or a more prudent one. A more prudent scenario will be considered one contemplating the realization of some of the risks identified in the base scenario, which are unfavourable for economic activity and the correction of existing imbalances.

² All relevant models and statistical techniques are described in the methodological annex and more details are available online in the files accompanying this document.

II. Macroeconomic forecasts for 2011 to 2014

II.1 Comparison with other forecasts

II.1.1 Comparison criteria

When comparing different forecasts it is essential to take into account the information available at the time each forecast was produced and the specific assumptions used, as these two elements can notably affect the observed gap. Understanding the reasons behind this gap helps in assessing ex-ante the existence of biases in government forecasts, i.e. in the moment in which they are made. The ex-ante analysis for 2015 figures is considered in the next section.

The ex-post analysis compares official or government forecast with those of a set of independent institutions, both private (included in FUNCAS panel) and public (European Commission and Banco de España, individually considered). The purpose of the comparison is to find significant biases in official forecasts, without analyzing or justifying the explanatory factors behind them.

Forecasts from the private pool of institutions are compiled by FUNCAS and published regularly (6 times a year). The latest publication before the presentation of the draft Budget can include the most updated available information.

European Commission and Banco de España forecasts, in contrast, are less directly comparable as they are updated less frequently and their policy assumptions are different, so that they can be outdated at the time the government prepares its forecasts. Hence, the latest forecasts released by public institutions, though of great relevance within the set of information on which government forecasts are based, will be treated separately.

A bias in government forecasts which is unjustified and repeated in consecutive years will be considered a significant bias. A bias is defined as the gap between the official forecast and the average of the projections from the benchmark institutions. The assessment of the significance of

the identified biases shall be drawn on the observed errors or gaps with respect to the observed value. In sum, official projections (G) are checked against: (i) the previous most recent consensus or average benchmark (C), depicting the existing bias; and (ii) with the realized or observed value (R)³, signalling the final forecast error. A bias is deemed large if it falls outside the interquartile⁴ range of the distribution represented by the benchmark institutions. The deviation of the government forecast from the average consensus value will be considered unjustified in case its absolute forecast error has been bigger than the error made by the average consensus panelist; that is, if $|G-R| > |C-R|$.

II.1.2 Analysis of the 2011-2014 forecasts

The macroeconomic scenario included in the draft Budget for 2011 projected a sustained recovery of the Spanish economy, after the deep recession of previous years. According to the government forecast, the recovery in real GDP growth up to 1.3% should be driven by foreign demand, with exports growing twice quicker than imports, and national demand expanding very little (0.4%).

Official forecasts showed a positive bias with respect to the consensus in terms of GDP and its private demand components and the labour market outcome. At the same time, the average panellist projections remained closer to those of the European Commission and the Banco de España than to the official forecast. The panel of benchmark institutions envisaged a more moderate rise in output than the government, with a slightly less dynamic behaviour of internal demand components, employment and both, exports and imports. **On the other hand, the official projections for fiscal variables, government consumption and general government balance, remained on the pessimistic side, yielding negative biases or gaps with respect to the panel (see Chart panel 1)**

³ Or the most up-to-date official forecast provided by the Government itself, in case the outcome has not been realized yet.

⁴ The interquartile range is defined as difference between the first and the third quartile of a distribution, covering 50% of total observations, centered at the mean.

As the year 2011 unfolded, the initial bias in official projections towards higher GDP growth, more robust consumption, resilient investment and dynamic labour markets, could not be justified by a better approximation to the realized outcome. The Spanish economy entered again into recession. Even so, real GDP grew in 2011 in line with the forecasts of private and public institutions (0.7%). Although the contribution of net exports to real GDP growth increased significantly, national demand dropped abruptly. The correction of fiscal and external imbalances turned out uneven. While the budget deficit target was not met, despite stagnating public consumption, the current account correction was in line with official forecasts.

The recession deepened in the year 2012, and the government forecast in the spring already anticipated a decline of 1.7% in real GDP. All components of national demand were projected by the government to continue shrinking in 2012, in the context of a worsening sovereign debt crisis in Europe and generalized fiscal consolidation measures. As an inverse image of the fall in national demand, net external demand was expected to dampen substantially the decline of real output. The government projected exports to grow 3.5% and imports to fall 5.1% in 2012.

Given the unusual size of these numbers, the differences in the GDP scenarios were not substantial. Government figures were broadly in line with the consensus (see Chart panel 2) and slightly more pessimistic than the Banco de España (-1.5% projected as of January) and the European Commission (-1% foreseen already in April).

Focussing on the internal demand components, the bias with respect to the consensus turned out to be unjustified ex-post. Private consumption dropped more (-2.8% versus -1.4% projected), while government consumption (-4.8% versus -8%) and gross fixed capital formation (-7.0% versus -9%) did so less than expected. The deterioration in labour market conditions was anticipated in the forecasts of the government and the rest of institutions, but turned to be more severe than

envisioned, with faster deceleration of salaries and worse employment dynamics. **Fiscal and external imbalances evolved unevenly.** The budget deficit widened to 10.6% of GDP in 2012, instead of shrinking, as foreseen by all institutions in the Spring.⁵ Finally, external imbalances dropped sharply and although this adjustment had been unanimously foreseen by all forecasters, its magnitude exceeded the most optimistic projections, mainly due to a strong decline in imports.

The economy was still contracting in September 2012, at the time the budget cycle resumed its regular schedule with the presentation of the draft Budget for 2013, and all forecasters expected the recession to continue. However, **the government forecast was notably less gloomy than the rest**, as shown in the charts of panel 3 in the Annex. **The government projected real GDP to decline** by 0.5% in 2013, outside the interquartile range of private forecasts (from -1.7% to -1.4%), and more than two standard deviations away from the consensus number (-1.5%). The projections published by the European Commission (in May) and the Banco de España (in January) were outdated at that time.

There was an unusually large margin of uncertainty in the outlook for national demand components, as reflected in the dispersion of the forecasts provided by private institutions, after the negative surprises received in the course of 2012. The biases in the government scenario were towards less contraction of private consumption and investment, and a sharper downward adjustment in government consumption. These biases were sizeable and ex post had the wrong sign. **In contrast, government projections of export and import demand had the right sign in their bias with respect to the consensus.** They correctly anticipated a higher growth of exports and a lower decline of imports than the average of private forecasts. **On the labour market, the government expected more favourable developments** (higher wages and more employment) than private forecasters. In terms of imbalances, **the current account improvement was more accurately projected by the government** (a small surplus of

⁵ Part of this deviation was due to the impact of the one-off financial assistance under the Programme for the Recapitalisation of Spanish Financial Institutions, which amounted up to 3.8% of GDP in 2012.

0.2% of GDP) than by consensus (a marginally negative figure of -0.1%), although the outcome was clearly more positive than anticipated by both (0.8% of GDP surplus). Finally, **the budget deficit, initially targeted to come down to 4.5% of GDP, was later raised to 6.5%**, and the outcome estimated was 6.6%, a figure outside the range of private sector initial forecasts.

Real GDP growth foreseen by the government for 2014 in the draft Budget presented in September 2013 was exactly the same (0.7%) as in the consensus forecast published the same month. The basic information for these comparisons is summarized in the charts of panel 4. In the spring of 2013, Banco de España had foreseen an increase of 0.6%, while the European Commission had been slightly more optimistic (0.9%). **The composition of national demand expected by the government, however, differed notably from the consensus one.** The government envisaged higher growth of private consumption and investment demand, balanced by a more pronounced decline of public consumption and investment.

There have been positive surprises in economic developments over 2014. Driven by buoyant domestic demand, real GDP is now projected to grow at a rate of 1.3%, almost two times faster than anticipated 12 months ago. These positive dynamics has validated the initial positive bias in private consumption with respect to the consensus. Labour market developments have also been positive, surprisingly so for both the Government and benchmark institutions. On the contrary, the negative bias of the government forecast for government consumption with respect to the private benchmark has not been confirmed by actual developments and seems unjustified ex-post.

Finally, in terms of imbalances, the consensus agreed with the Government's deficit target. Overall, the deficit target for 2014 is within reach, even after factoring a more dynamic public consumption and taking into consideration the fact that the initial figure was revised upwards (from -5.8% to -5.5%) in the updated Stability Programme. On the other hand, **there was a discrepancy in the projections for the current account balance**, with the Government being more optimistic about the external surplus (2.8% versus 2.1% of consensus). Given that

the current account is finally expected to record a slight deficit, due to weak exports behaviour and a quicker recovery than expected of imports, **the initial official bias has had the wrong sign.**

II.2 Conclusions: forecast errors and biases

From the above analysis, it can be concluded there have been systematic biases in many cases when comparing the official projections with the benchmark of the consensus average. However, the identified biases were not large in most of the situations. There have been biases in the same direction in most variables in consecutive years (see Chart panel 5). The mean absolute bias of the government forecasts with respect to the consensus has been 0.8% for the set of all variables and 0.9% for GDP and its components. In the 2011-2014 period, the government forecast was higher than the consensus for private consumption (positive bias) and lower for government consumption (negative bias). The government forecast for the balance of current operations with the rest of the world and the budget balance was also persistently more positive than the consensus. Finally, for GDP, exports and imports, there were consecutive positive biases for the years 2011-2013.

Official and consensus errors have been closely related. Simple linear regressions for the forecast errors of all variables and for the subset of GDP and its components present coefficients and constant terms not significantly different from one and zero, respectively, yielding high correlation coefficients (see Chart 1 for an identification of unjustified biases).

The mean absolute error in government forecasts in the 2011-2014 macroeconomic scenarios have been bigger than in the average consensus forecast. For all variables (11) included in the scenarios, the government mean forecast error has been 1.5%, against 1.1% of the average consensus forecasts. Considering only GDP and its five components, the respective mean absolute errors have been 1.6% for the government and 1.4% for the consensus.

Summing up, **the analysis of government projections against the average benchmark reflects the existence of systematic biases. These differences or biases can be considered significant for private consumption in the 2011-2013 period and public consumption in the 2012-2014 exercises.** Indeed, the biases were located outside of the interquartile range and could not be justified ex-post by a better approximation to the observed outcome.

III. Macroeconomic forecasts for 2015

III.1 General remarks

The forecasts included in the government macroeconomic scenario for 2015 use the most up-to-date available information. The latest short-term indicators, having a heavy influence on the upcoming outlook and thus influencing the whole macroeconomic scenario for 2015, have been taken into account. The GDP and annual national accounts estimates based on the new ESA2010 system, which were released only this week by the National Institute of Statistics, have also been included. This change has generated some uncertainty around the dynamics of the variables analysed, complicating the forecasting exercise of the government and, consequently, the examination by AIRF of the official forecasts. In this area, it would have been helpful to access the information concerning the national accounts changes, which should have been facilitated by the Technical Committee on National Accounts (as mandated by Additional provision 1 of Organic Law 6/2013).

There is very little public information on the methodologies and parameters underpinning government forecasts⁶. Even if the methodology used in preparing the forecasts seems to be standard, with models and equations widely acknowledged by analysts, the specific instruments used in the forecast exercise have not been disclosed. Furthermore, the set of information and forecasts, which should be integrated in an overarching accounting framework to guarantee their unity and internal consistency, has not been released together with the forecasts. This precludes an understanding of the link between the main variables of the macroeconomic scenario.

The basic hypotheses of the macroeconomic scenario are examined in this section, which also compares the government forecasts with those of other institutions. The bias or gap in government forecasts with respect to other institutions is checked, as done in the previous section, but now from an ex-ante perspective and with a more refined statistical analysis of the key variables. Statistical distributions are generated around the mean (or consensus) forecast variables published in the last FUNCAS Panel (15 September 2014), using a procedure of repeated simulations described in more detail in the methodological annex to this report.

In addition to these comparisons, BVAR models and explanatory equations for some of the projected variables are used to describe the existing margins of uncertainty, within a probability range between 15% and 85%.

The analysis of these biases will conclude whether the forecasts for the different variables are realistic or not, and whether the macroeconomic scenario is, as a whole, the most likely, or a more prudent one.

⁶ Article 4.5 of COUNCIL DIRECTIVE 2011/85/EU, requires that Member States publish the methodologies, assumptions and relevant parameters underpinning their macroeconomic and fiscal forecasts.

III.2 Analysis of forecasts

III.2.1 International environment

The basic assumptions behind the macroeconomic projection exercise are in line with the forecast of international organizations such as IMF and the ECB (see Tables 1 and 3). In general, these assumptions reflect a likely, although benign, international environment in 2014 and 2015 in which (i) the drivers supporting the recovery in advanced economies remain in place: a highly accommodative monetary policy and a moderate fiscal consolidation, (ii) easy global financial conditions persist, and (iii) geopolitical tensions diminish.

The euro area growth path comes from September ECB Staff macroeconomic projections, which are conditioned on favorable assumptions: (i) a neutral fiscal policy, (ii) a highly accommodative monetary policy stance that helps improving credit conditions and reducing financial fragmentation, and (iii) structural reforms start to produce results on activity. However, risks related to crisis legacy such as low potential growth, the ongoing disinflation and the deleveraging process in highly indebted economies could impact on the recovery and its intensity. Disappointing GDP performance in the second quarter 2014 feeds these doubts. In particular, uncertain prospects for Italy and France may end up posing some risks for the whole euro area.

Long-term interest rates are expected to remain low. According to the macroeconomic scenario, 10-year interest rate on Spanish government bonds will stand at 2.8% on average in 2014 and 2.6% in 2015, which would be based on two assumptions. On the one hand, it shares with the September ECB Staff projections the rise in long term rates in 2015 in the euro area from current levels. On the other, it shows a contraction in the spread with the average euro area long term rates. The latest Consensus Forecasts considers that Spanish 10-year interest rate stands at 2.5% in 2014 and at 2.8% in 2015. However, from a prudence viewpoint, some factors could push long-term rates and spreads up. First, the Federal

Reserve (and the Bank of England) is expected to start interest rate hikes in 2015, which might trigger a reversal of recent risk spread and volatility compression. This would limit the effectiveness of the measures introduced by the ECB to tackle low inflation and address financial fragmentation. Second, in an environment of high indebtedness, as in the Spanish economy, euro area disinflation could strain long-term rates. In conclusion, the hypothesis on long-term rates requires that ECB range of actions announced are effective.

Oil prices are consistent with the path implied by futures markets. However, in the event that geopolitical tensions related to Middle East or Russia-Ukraine conflicts escalate, supply bottlenecks could push oil prices markedly up.

Regarding the euro exchange rate, the hypothesis taken assumes that bilateral exchange rates remain unchanged over the projection horizon. This assumption implies some upside risk to external demand, since unconventional measures pointed out by the ECB and the lack of monetary policy synchronization in advanced economies –with expected interest rate hikes in US and UK— could further depreciate the effective exchange rate of the euro.

III.2.2 GDP and the composition of demand

The recovery of the Spanish economy in the course of 2014 is expected to settle in 2015 (see Table 2). With the data for the two last quarters of the current year still to be known, all forecasts point towards a real GDP growth in 2014 of approximately 1.3%. The forecasts from different institutions barely deviate by one tenth of a percentage point from this figure, and the government forecast is a good starting point for budgetary programming for 2015. Short-term indicators suggest that output growth tends to stabilize in the second half of the current year at rates close to 2%. The analysis for the different variables in this section will take into account the remaining uncertainty still existing around the final 2014 figure.

In line with other institutions, the government forecasts a real rate of GDP growth of 2.0% for next year (see Chart panel 5). Domestic and foreign demand dynamics also present noticeable similarities, despite some marginal differences, which are addressed later. The composition of national demand projected by the government for 2015 is similar to the one expected for the end of the current year. Private consumption is projected to grow around 2%, government consumption to exercise a mild contractionary influence, investment in capital goods to expand at high rates and construction to enter into an expansionary phase, after going through the deep recession of the last years. Net external demand is expected to have a marginally positive contribution to real GDP growth (0.2%), in contrast to the negative result of 2014, as a consequence of exports accelerating at a brisker pace than imports.

The forecast for real private consumption growth in 2015 included in the government macroeconomic scenario is considered as likely or probable. It is aligned with the other available forecasts, as shown in Chart panel 5, and more specifically in Chart 3, where the figures for this variable in the draft Budget (represented by the flat lines for 2014 and 2015) are framed within a range of uncertainty derived from the BVAR model described in the methodological annex to this report. This range is anchored at the center by the consensus figure. Mechanical projections of real growth of private consumption obtained with the BVAR model, under the prior of long-term convergence to the unconditional mean of the series, confirm this assessment and are presented in Chart 4. Finally, government forecast figures are also within acceptable ranges as generated by a behavioral equation (described in the methodological annex). The projected path for private consumption and the confidence intervals around it are presented in Chart 5. They show that private consumption forecasts in the macroeconomic scenario of the government are reasonable, although they remain closer to the upper band.

Government consumption foreseen by the government embodies a normative element which does not allow for a direct and mechanical comparison with the other institutions. Whereas budget forecast envisage by how much government consumption would have to grow in order to attain fiscal targets, especially for deficit reduction, private forecasts seem to include some kind of “most likely hypothesis” on what can be expected from this variable. From the point of view of transparency, government forecasts would be more useful if they can discriminate between, on one hand, the likely developments in government consumption under a “no policy change” scenario, and on the other, the expected impact on this variable from policies contemplated in the draft budget. In the absence of this differentiation, it is worth recalling that there has been a significant contractionary bias in the initial government forecast attached to the draft budget. It should also be taken into account that government consumption of Autonomous Communities and Municipalities, whose expenditures are not approved in this General Budget for the State, amounts to around 80% of the whole general government sector.

The forecast of a 1% drop of real government consumption in 2015 is slightly above one standard deviation away from the consensus forecast of flat growth, and outside the interquartile range (from -0.72% to 0.90%) of the distribution obtained from private institutions. Furthermore, purely mechanical models (like the BVAR) tend to foresee a positive change of real government consumption instead of a contraction. When the BVAR model is anchored at the consensus forecast (see Chart 6), the dynamics of this variable indicate that going down from the increases recorded in the first part of 2015 to a zero growth rate for 2015 on average would entail a sharp deceleration of spending in the first half of next year. The unconditional projection of this variable in the BVAR model, on its side, suggests a steady inertial acceleration (see Chart 7). From this analysis, it can be concluded that the bias in the initial forecast of government consumption is large and that it is unlikely that the reduction foreseen by the government materializes, unless additional measures containing public spending are implemented, particularly in Autonomous Communities.

Real gross fixed capital formation official forecasts for 2015 are slightly optimistic, but not unlikely. When compared with other forecasts, they are on the high side but within the confidence interval, and outside of the interquartile range of the distribution of private forecasts. Only one of the forecasts checked is higher (by 0.2 percentage points) than the official figure (4.5%). Mechanical projections from the models used to contrast the likelihood of the government forecast, following the same methodological approach as for private consumption, are presented in Charts 8 and 9. There exists, however, a wide margin of error in the forecast of this variable, and a more detailed analysis of its individual components is required.

The main discrepancy in the forecast figures is due to the remarkably stronger recovery in construction foreseen by the government. The analysis of these differences is particularly difficult in the current situation as the uncertainty in the foreseeable strength of the recovery in construction is added to the uncertainty derived from the change of the statistical base, affecting its cyclical profile. Identified downward risks lie in the strength of the recovery of the credit channel and the accumulation of liquid financial assets by households on the demand for housing, as both elements would push up house prices and residential investment.

Differences between forecasts of gross fixed capital formation in capital goods and other products are much smaller, as both consensus and government forecasts indicate a slowdown of this variable by one percentage point in 2015. The error correction model for investment in capital goods has as explanatory variables real GDP developments and a measure of changes in the profitability of investment, approximated by developments in the IBEX-35 and the capital stock. After taking the figures expected by the government for real GDP, IBEX-35 developments still remain uncertain. In the benign financial environment which is expected to continue in 2015, it is foreseeable a sustained growth of this index, which could facilitate the realization of government forecasts. Nevertheless, a sensitivity exercise assuming a stabilization of

the stock market, the slowdown of investment in equipment could be much sharper.

The growth rates of exports and imports projected in the government macroeconomic scenario are probable. Although these rates are somewhat below the respective consensus projections, they are well centered within the ranges of uncertainty estimated from historical series in the BVAR model (see Charts 10 to 13). The short-term dynamics of these variables projected by the model shows an acceleration of exports in the next quarters that tends to fade out towards the end of 2015, and stable growth of imports. The behavioral equations applied to check the consistency of the projected figures with their determinants (see Charts 14 and 15) suggest that the basic hypothesis of the macroeconomic scenario support the forecasts. The fundamental determinants in the exports equation are growth in foreign markets (2.9% in 2014 and 4.3% in 2015), changes in the nominal effective exchange rate (-0.3 and -1.5, respectively) and developments in relative prices versus OECD (which are not detailed in the macroeconomic scenario of the government and have been projected with a simple ARIMA model). The main determinants in the imports equation are final demand for imports (1.8% in 2014 and 2.7% in 2015), which is the sum of national demand as foreseen by the government and exports demand projected by the previous equation, and relative prices defined as the deflator of imports and the deflator of National Gross Value Added. The deflator for imports has been calculated on the basis of the export prices of competitors projected by the Banco de España last July (-1.2% in 2014 and 1.4% in 2015), and the internal prices have been based on the HICP forecast of the Banco de España (0.1% in 2014 and 0.7% in 2015).

The information on labor market developments and the imbalances of the Spanish economy provided by the government is succinct and does not allow a detailed analysis. Compensation per employee growth in 2015 is foreseen by the government to be 1%, against 0.8% expected for 2014. These figures are above consensus forecasts (-0.1 in the current year and 0.4% the next), but the comparison is distorted by the change in the national accounts base. The growth of total employment for 2014 and 2015 envisaged by the government are likely and aligned with the consensus. They are also supported by the unconditional projection of the BVAR model, which jointly considers all the other demand variables mentioned before. The fall in the unemployment rate in 2015 expected by the government, however, has a slightly optimistic bias with respect to the consensus.

Concerning the external and public accounts imbalances, the information provided does not allow linking these figures with the other variables of the macroeconomic scenario of the government. Thus, it is not possible to assess their internal consistency with the other variables through the accounts of the institutional sectors. There seems to be no substantial differences between government and consensus forecasts on the trade balance, as net exports have the same contribution to real GDP growth. Consensus forecasts, in contrast, anticipate a bigger budget deficit in 2015 (-4.7% of GDP), with more government consumption but the same output growth as the macroeconomic scenario of the draft Budget. If additional measures restricting public spending were implemented to produce the reduction of government consumption the government envisages, real GDP growth might be slightly lower, but the target budget deficit in the macroeconomic scenario of the government would be achievable.

III.3 Conclusions: realism and risks of the forecasts

Government forecasts in the macroeconomic scenario 2014-2015 are realistic as a whole (see Chart 18), taking into account the methodological peculiarity of the normative character of government consumption forecasts and the uncertainty on the cyclical pattern of investment. The realization of this forecast of government consumption, whose initial negative bias is large because it falls outside the interquartile range of private forecasts, requires measures to moderate and increase efficiency in public spending, above all in Autonomous Communities and Municipalities. The positive bias in government forecasts of gross fixed capital formation is also large, in the precise meaning adopted in this report, and it is probably associated to the prevailing uncertainty to forecast the strength of the cyclical swing in construction and the slowdown of investment in equipment. Biases with respect to the consensus in the other variables are not large and tend to compensate one another in their impact on output growth. These biases can be considered risks for the macroeconomic scenario envisaged by the government.

In the analysis of risks it is worth stressing that the assumptions on the external environment show downward risks as a whole. These downward risks derive from a lower growth in the euro area, a less benign financial environment or more severe geopolitical tensions. There are also upward risks, although with a more limited scope in the short-term, like those derived from a sharper depreciation of the euro and from a quicker restoration of normality in credit markets as a result of the adopted monetary policy measures.

Concerning the risks for national demand, there are some downward risks to private consumption and gross fixed capital formation, but upward risks in government consumption. On the external demand, in contrast, risks are to the upside in exports and imports, without these risks affecting notably the balance of both. From this, it can be concluded that risks for output and employment seem to be broadly balanced.

IV. Endorsement of the forecasts and specific recommendations

AIReF endorses as probable the scenario of macroeconomic forecasts provided by the government. AIReF considers the scenario as a whole as likely, although this assessment should be taken with some caution, in view of the conditions of statistical uncertainty derived basically from the change in the national accounts base and accounting conventions of the European System of Accounts, which has restricted and delayed the available information.

The risks assumed for real GDP growth and employment appear balanced overall. Risks affecting internal demand appear as downward risks, particularly in private consumption and investment. On the contrary, public consumption as well as external demand risks appear to be to the upside. On external demand the upward risks, both in exports and imports, broadly net out.

It would be prudent to take into consideration some of the downward risks identified in this report. In particular, risks derived from lower euro area growth could have a significant impact on the Spanish economy.

In order to improve the forecast process in the future, AIReF submits to the government the following recommendations:

1. **On the procedure and timetable,** it would be convenient that the initial forecasts included in the draft Budget by end-September are prepared under the assumption of unchanged current policies (i.e. no policy change). They should be accompanied by a separate quantification of the impact of new policies on macroeconomic aggregates. A revision of this forecast before the end of the calendar year, once the budget has been approved, would be conducive to a better monitoring and assessment of budget implementation.

2. **On the statistical basis underlying macroeconomic forecasts, substantial methodological changes should be avoided in the middle of the elaboration of the forecasts.** Institutions responsible for the production of these statistics (INE, IGAE and Banco de España) should program their tasks in a way which does not interfere with the preparation and validation of the forecasts.
3. **On the minimum set of information provided in the forecasts,** AIR^eF recommends to integrate consistently in a simplified framework of national accounts the key elements of the forecasts, so that it would be possible to understand the links between economic activity, demand and employment, on one side, and income flows and financing needs, on the other, identifying the impact of policy measures adopted by the government.
4. **On the forecast methods,** while there is no commonly accepted method to produce good forecasts, good practices include the specification of the technical instruments (like models), the data, and the assumptions used in the forecasts. In particular, it seems advisable to separate the assumptions on variables which are beyond the government control (e.g. the risk premium on government debt) from the policy assumptions under its responsibility (like the VAT rates). All this information should be disclosed to the public.

V. ANNEX: TABLES AND CHARTS

Tables

C.1) Basic assumptions underlying the Macroeconomic Scenario 2014-15

percentage change per annum unless stated otherwise

	2013	2014	2015	Source
World demand (growth rate)				
World GDP	3,2	3,3	3,9	IMF and MECC
Euro area GDP	-0,4	0,9	1,6	ECB (September 2014)
Spanish markets	2,0	2,9	4,3	IMF, CE and MECC
Exchange rate				
Dollares per euro	1,33	1,35	1,30	BE and MECC
Apreciation (+) o depreciation (-) euro <i>in percentage</i>	3,3	1,5	-3,7	"
Nominal effective exchange rate				
Apreciation (+) o depreciation (-) euro <i>in percentage</i>	3,8	-0,3	-1,5	BE and MECC
Oil price "Brent"				
Dollars / barrel	108,7	106,2	104,1	Futures, BE and MECC
<i>percentage change per annum</i>	-2,7	-2,3	-2,0	"
Euros / barrel	81,7	78,6	79,5	"
<i>percentage change per annum</i>	-5,9	-3,8	1,0	"
Interest rates				
Short-term (3-month euribor)	0,2	0,2	0,2	MECC
Long-term (10-years euribor)	4,6	2,8	2,6	"

C.2) Macroeconomic prospects 2014-15

ESA-2010

	PROJECTIONS		
	2013	2014	2015
Components of real GDP (growth rate; p.c.)			
Final consumption expenditure	-2,4	1,5	1,3
Private final consumption expenditure (a)	-2,3	2,0	2,1
Government final consumption expenditure	-2,9	0,2	-1,0
Gross capital formation	-3,7	1,5	4,4
Gross fixed capital formation	-3,8	1,5	4,5
Equipment	3,4	7,0	6,0
Construction	-9,2	-3,3	3,1
Dwellings	-7,6	-3,9	1,9
Non-residential	-10,4	-2,8	4,0
Final domestic demand (contribution to GDP growth; p.p.)	-2,7	1,4	1,8
Exports of goods and services	4,3	3,6	5,2
Imports of goods and services	-0,5	4,4	5,0
External balance of good and services (contribution to GDP growth; p.c.)	1,4	-0,1	0,2
Real GDP: (growth rate; p.c.)	-1,2	1,3	2,0
Nominal GDP: (growth rate; p.c.)	-0,6	1,4	2,7
PRICES (index growth rate; p.c.)			
Private consumption deflator	0,9	0,2	0,6
LABOUR COSTS AND EMPLOYMENT (growth rate; p.c.)			
Total employment (b)	-3,3	0,7	1,4
Unemployment: (% working age population)	26,1	24,7	22,9
BALANCE OF PAYMENTS (% GDP)			
Net lending (+) / borrowing (-) vis-à-vis rest of the world (*)	2,1	1,5	1,7
(a) Households and NPISH			
(b) Full-time equivalent			
(*) 2013 figures have been estimated by Ministerio de Economía y Competitividad			
SOURCE: INE and Ministerio de Economía y Competitividad			

C.3) International institutions forecasts

(percentage change per annum unless stated otherwise)

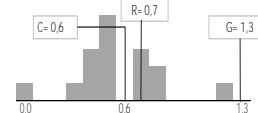
		2013	2014	2015
ECB (Sep 2014)	World GDP (excluding euro area)	3,7	3,7	4,2
	Euro area GDP	-0,4	0,9	1,6
	Imports of goods and services (excluding euro area)	3,4	3,9	5,5
	Oil prices (USD per barrel)	108,8	107,4	105,3
	3-month Euribor (%)	0,2	0,2	0,2
	10-year all euro area government bonds yield (%)	2,9	2,3	2,2
	Exchange rate USD/EUR (level)	1,3	1,4	1,3
IMF (WEO Update July 2014)	Effective exchange rate	3,8	1,4	-0,8
	World GDP	3,2	3,4	4,0
	Euro area GDP	-0,4	1,1	1,5
	Trade of goods and services	3,1	4,0	5,3
European Commission (May 2014)	Oil prices	-0,9	0,1	-4,3
	World GDP	2,9	3,5	3,8
	Euro area GDP	-0,4	1,2	1,7
OECD (May 2014)	Imports of goods and services	2,2	4,4	5,7
	World GDP	2,8	3,4	3,9
	Euro area GDP (Sep. 14)	-0,4	0,8	1,1
	Trade of goods and services	3,0	4,4	6,1

Panels

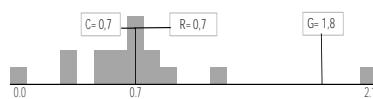
P.1) Economic Forecast - September 2010

GDP 2011, growth rate

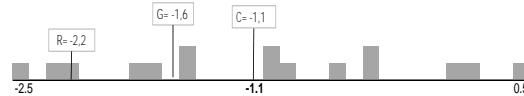
C = Consensus FUNCAS
 G = Government
 R = Realized



PRIVATE CONSUMPTION 2011, growth rate



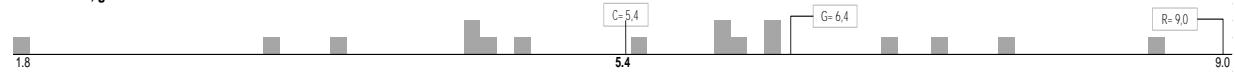
PUBLIC CONSUMPTION 2011, growth rate



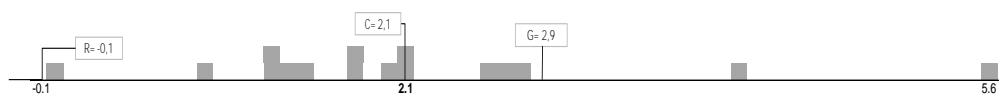
GROSS FIXED CAPITAL FORMATION 2011, growth rate



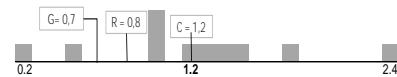
EXPORTS 2011, growth rate



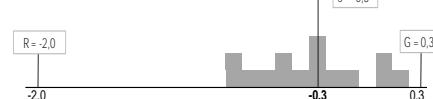
IMPORTS 2011, growth rate



COMPENSATION PER EMPLOYEE 2011, growth rate



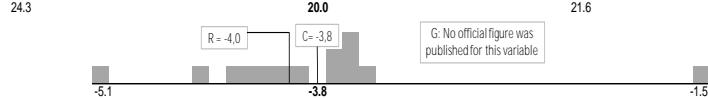
TOTAL EMPLOYMENT 2011, growth rate



UNEMPLOYMENT RATE 2011



CURRENT ACCOUNT 2011, percentage of GDP



G: No official figure was published for this variable

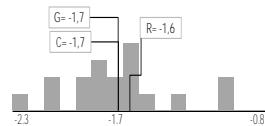
GENERAL GOVERNMENT BUDGET BALANCE 2011, percentage of GDP



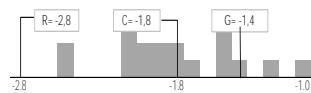
P.2) Economic Forecast – April 2012

GDP 2012, growth rate

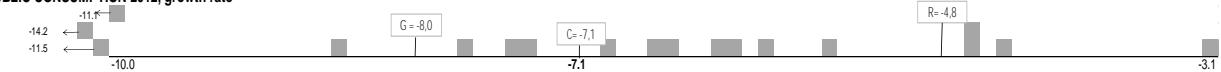
C = Consensus FUNCAS
G = Government
R = Realized



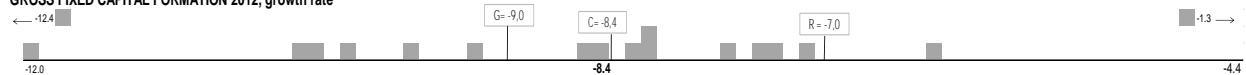
PRIVATE CONSUMPTION 2012, growth rate



PUBLIC CONSUMPTION 2012, growth rate



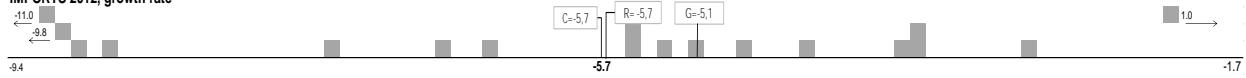
GROSS FIXED CAPITAL FORMATION 2012, growth rate



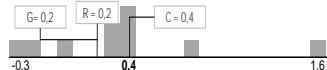
EXPORTS 2012, growth rate



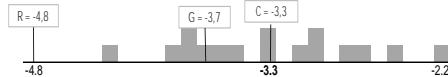
IMPORTS 2012, growth rate



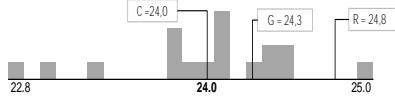
COMPENSATION PER EMPLOYEE 2012, growth rate



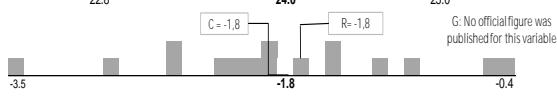
TOTAL EMPLOYMENT 2012, growth rate



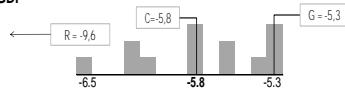
UNEMPLOYMENT RATE 2012



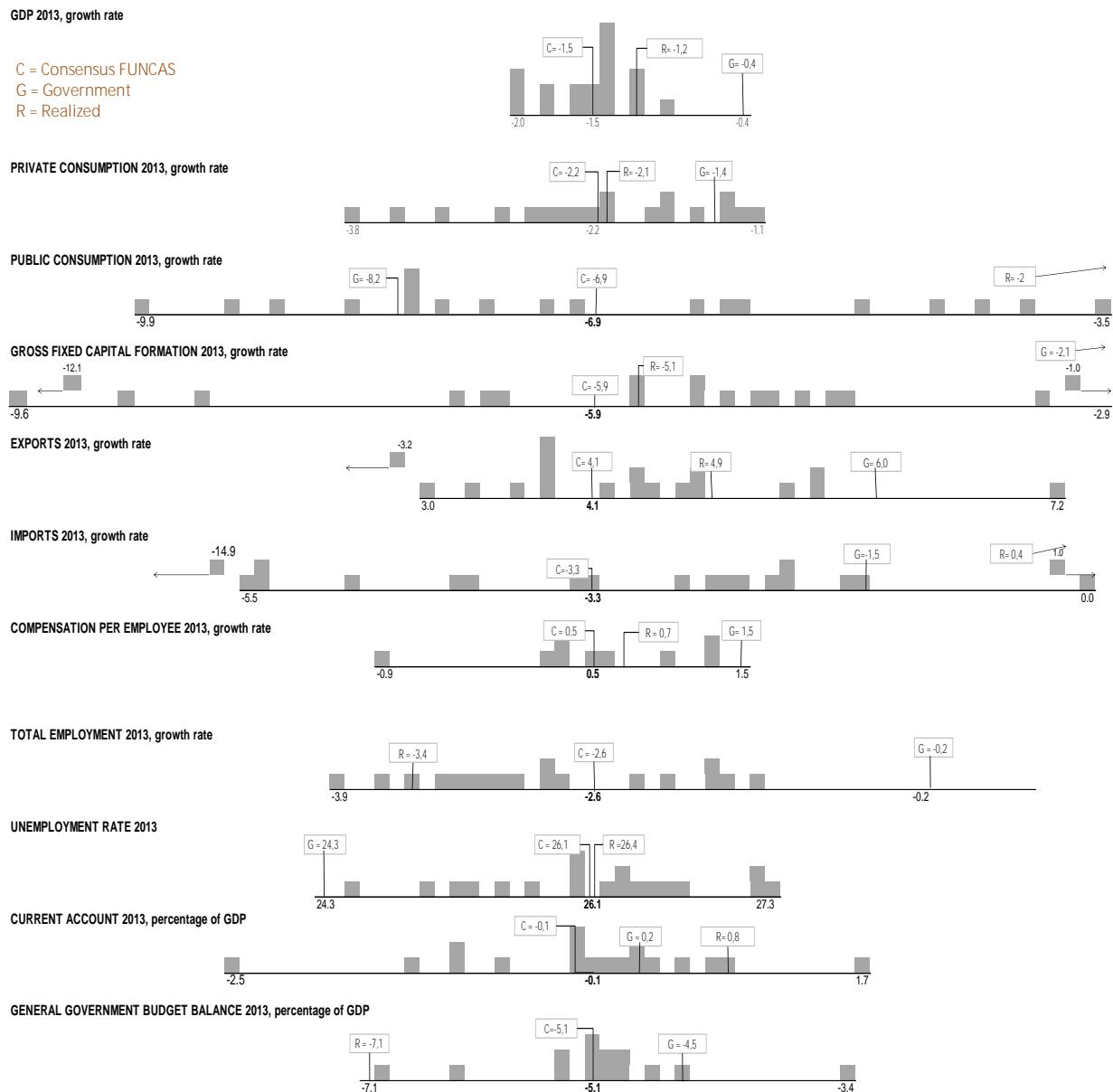
CURRENT ACCOUNT 2012, percentage of GDP



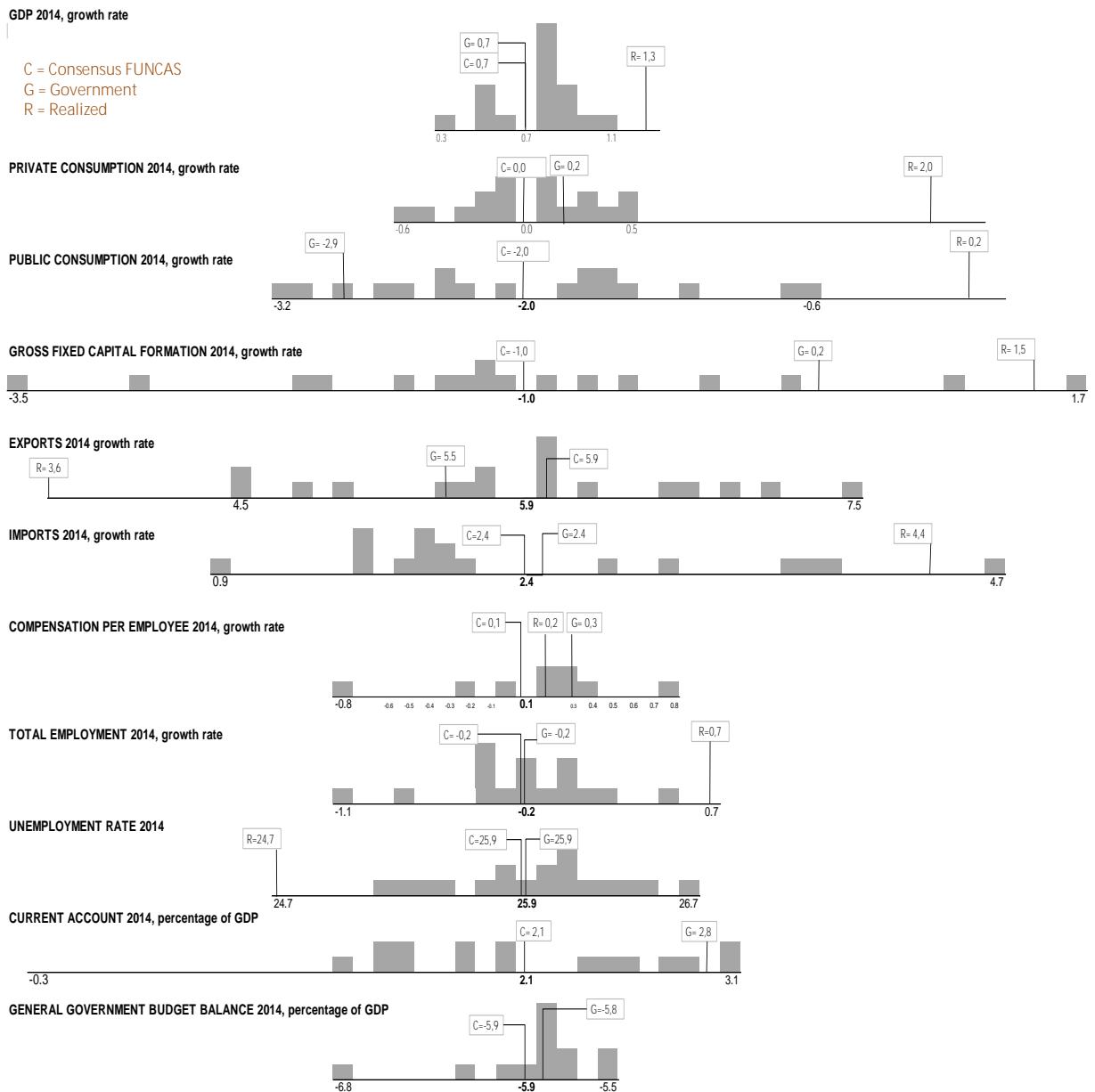
GENERAL GOVERNMENT BUDGET BALANCE 2012, percentage of GDP



P.3) Economic Forecast – September 2012



P.4) Economic Forecast – September 2013



P.5) Economic Forecast – September 2014

GDP 2015, growth rate

C = Consensus FUNCAS
 G = Government
 R = Realized (Government forec.)
 BE = Banco de España (July 2014)
 EC= European Commission (Spring 2014)

BE= 2,0
G= 2,0
EC= 2,1

C= 2,0
1.7 2,0 2,3

PRIVATE CONSUMPTION 2015, growth rate

EC= 1,6
BE= 1,6
C= 1,9
G= 2,1

1,3 1,9 2,9

PUBLIC CONSUMPTION 2015, growth rate

BE= -1,5
G= -1,0
EC= -0,7
C= -0,0

-2,0 0,0 1,2

GROSS FIXED CAPITAL FORMATION 2015, growth rate

C= 3,4
EC= 4,2
BE= 4,2
G= 4,4

2,0 3,4 4,7

EXPORTS 2015, growth rate

G= 5,2
C= 5,6
BE= 5,9
EC= 6,7

4,6 5,6 6,9

IMPORTS 2015, growth rate

G= 5,0
C= 5,3
BE= 5,8
EC= 6,7

4,0 5,3 6,8

COMPENSATION PER EMPLOYEE 2015, growth rate

C= 0,4
EC= 0,2
G= 1,0

0,2 0,4 0,8 1,0

TOTAL EMPLOYMENT 2015, growth rate

G= 1,4
BE= 1,4
EC= 1,2

1,2 1,5 1,9

UNEMPLOYMENT RATE 2015

G= 22,9
C= 23,2
EC= 24,0

22,4 23,2 23,8

CURRENT ACCOUNT 2015, percentage of GDP

G= 1,1
EC= 1,5

0,7 1,6

GENERAL GOVERNMENT BUDGET BALANCE 2015, percentage of GDP

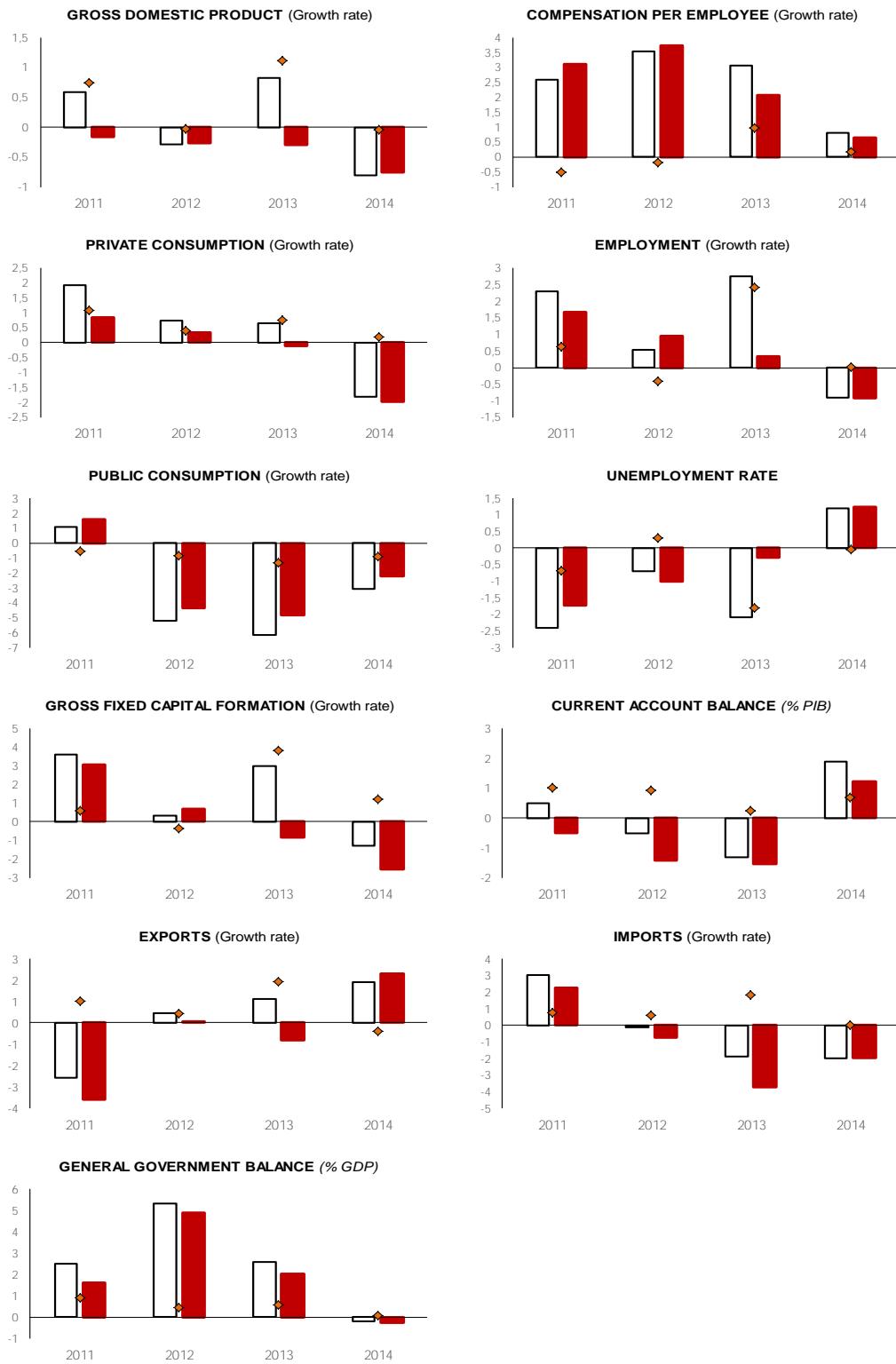
CE= -6,1

-5,4 -4,7 -4,2

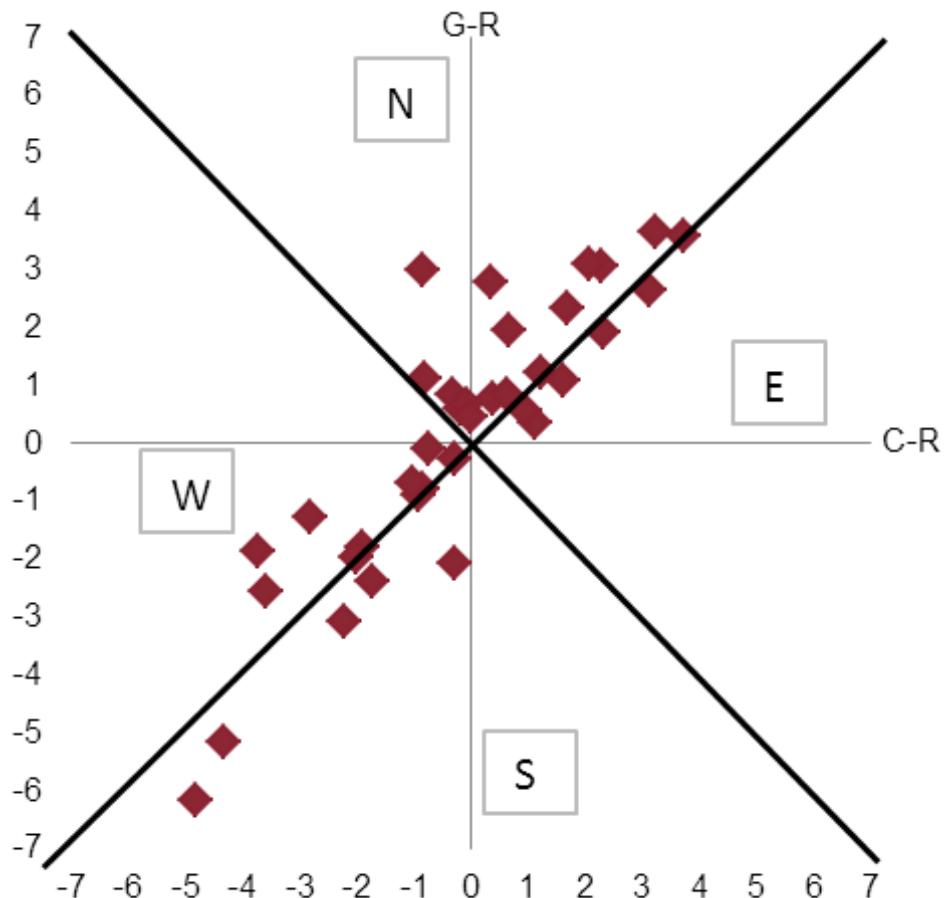
Source: AIR&F, Consensus FUNCAS, Banco de España, European Commission, Government of Spain. The forecast is based on the latest available information. It is subject to change as new data becomes available. The forecast is expressed in percentage points unless otherwise indicated.

P.6) Forecast errors and biases 2011-2014

□ Government error (G-R) ■ Consensus error (C-R) ◇ Bias (G-C)

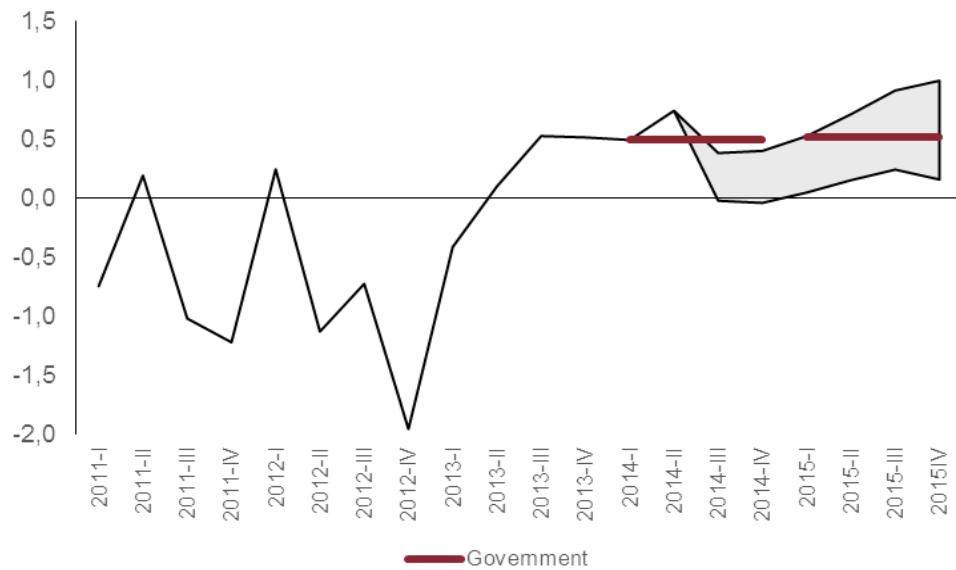


Charts

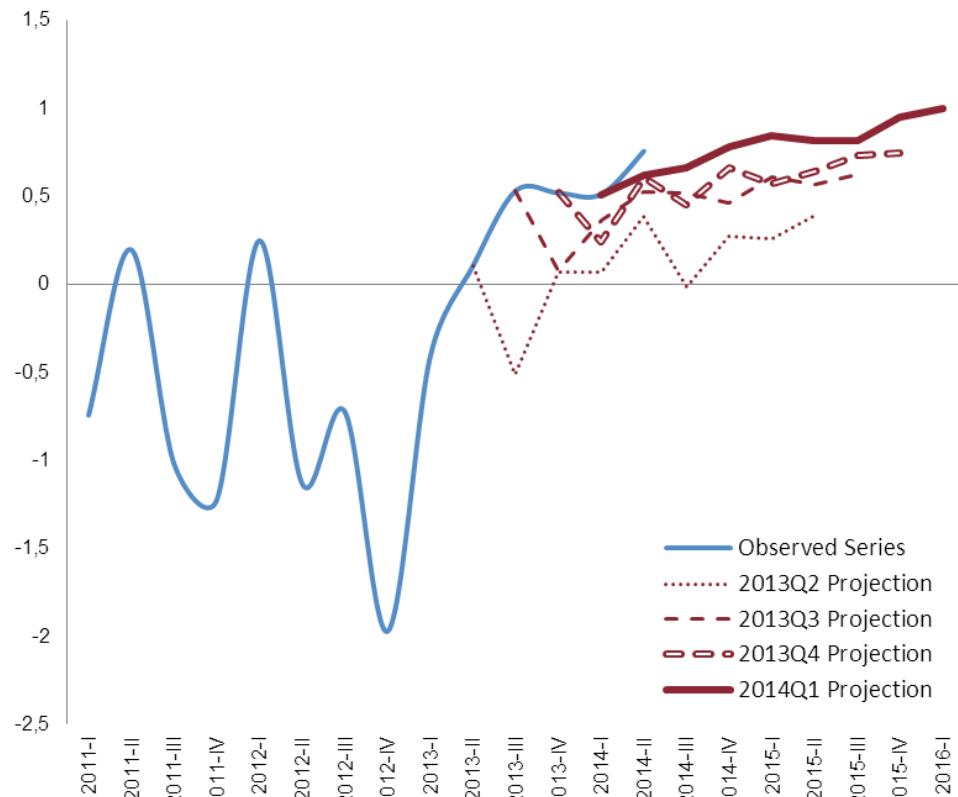
G.1) Government and consensus forecast errors

Unjustified positive and negative biases are respectively located in the north and south triangles.

G.3) Private consumption: Fan chart anchored around Consensus

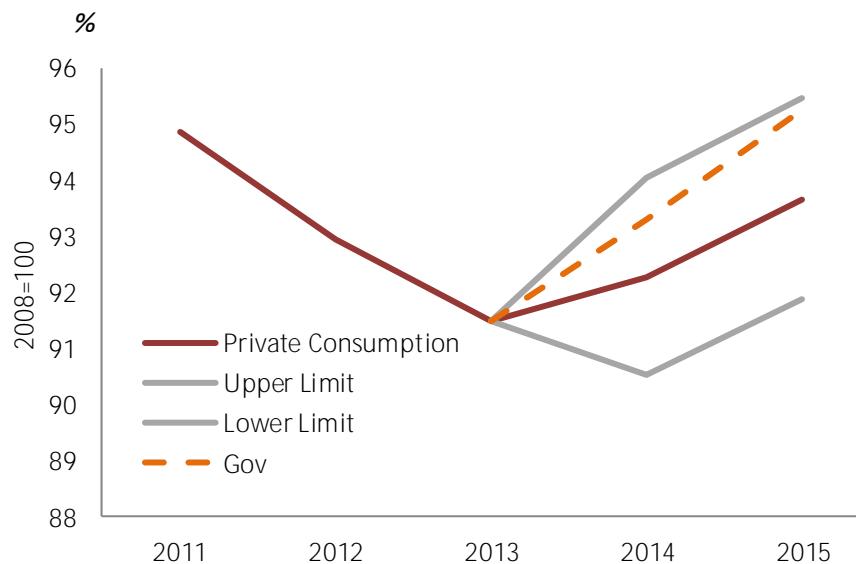


G.4) Private consumption: BVAR model

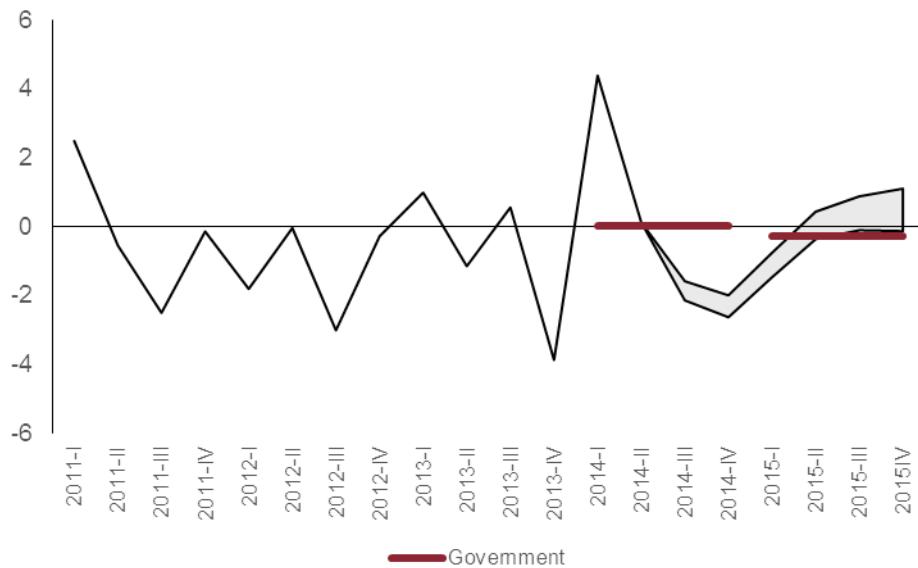


q-o-q growth rate

G.5) Private consumption: ECM model vs government

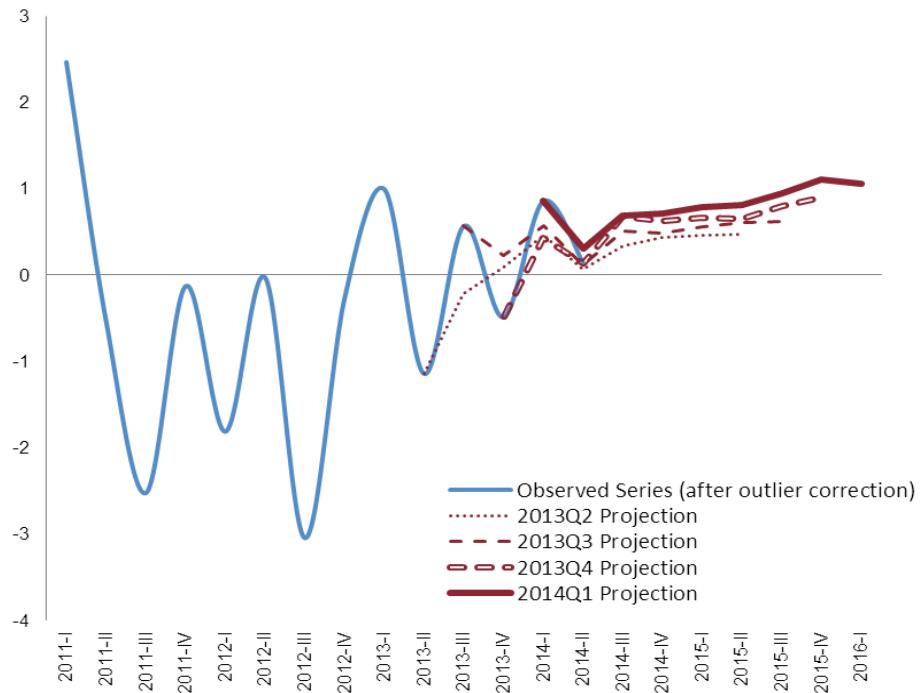


G.6) Government consumption: Fan chart anchored around Consensus

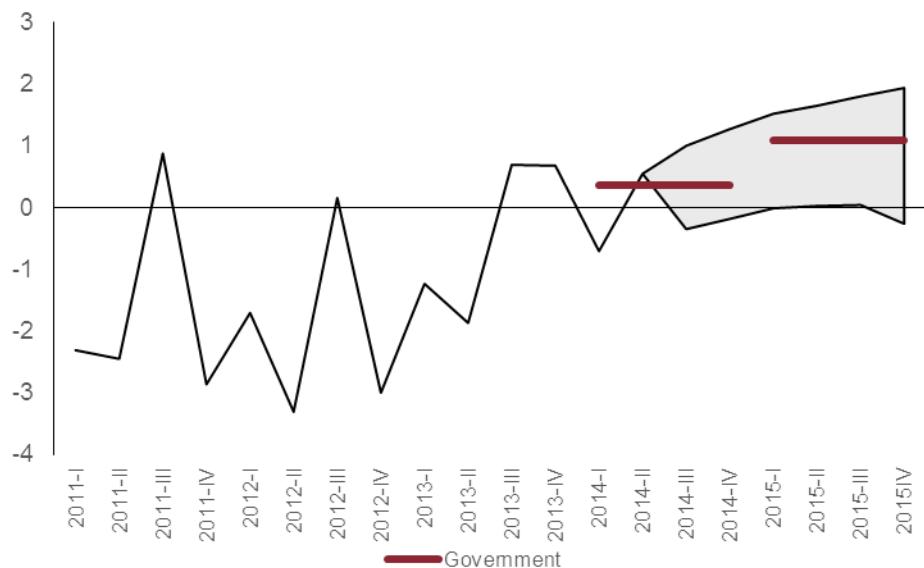


q-o-q growth rate

G.7) Government consumption: BVAR Model

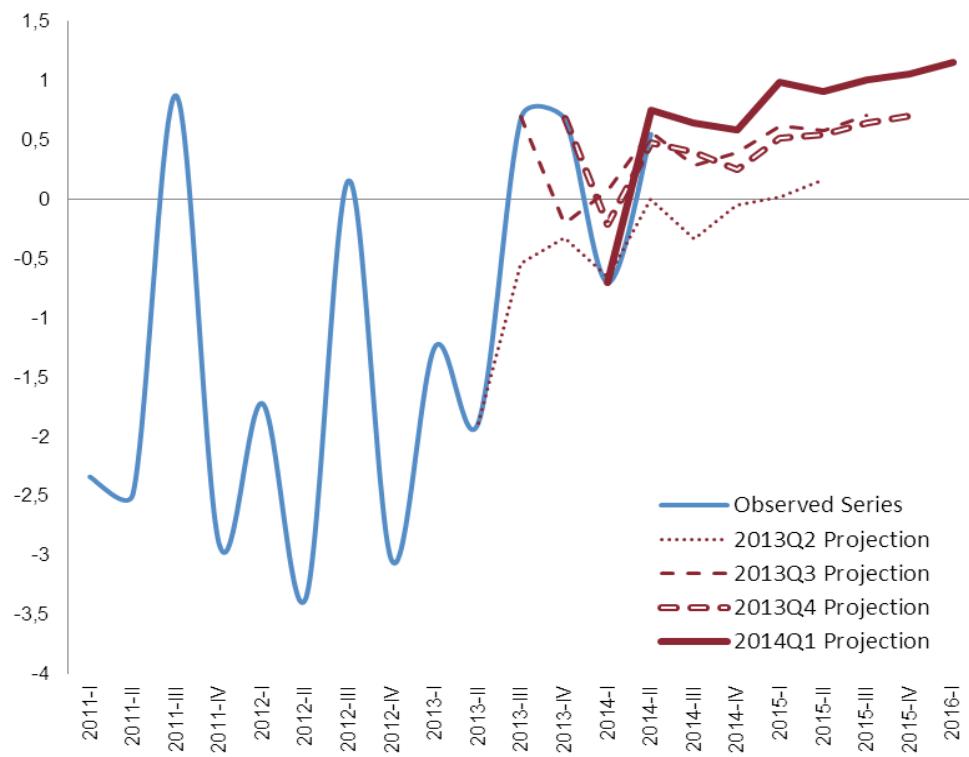


G.8) Investment: Fan chart anchored around Consensus

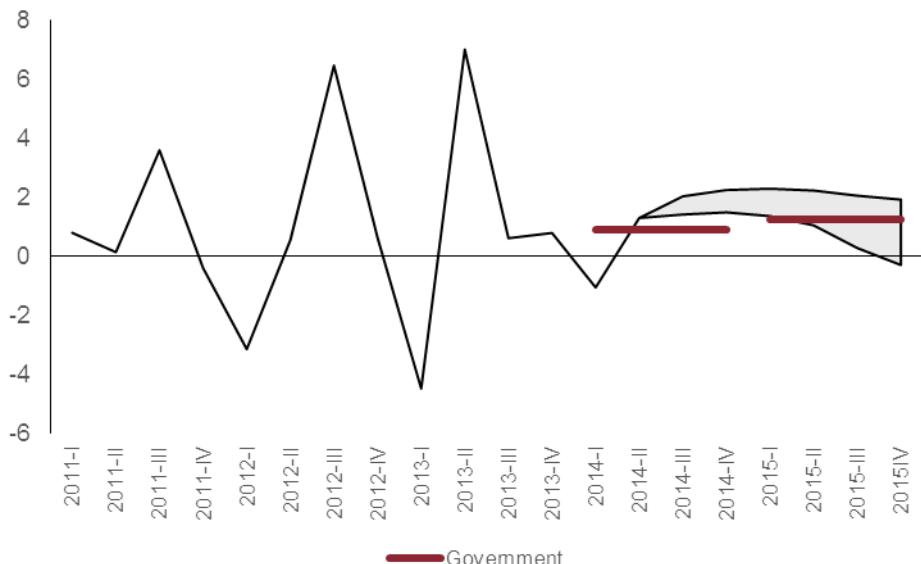


q-o-q growth rate

G.9) Investment: BVAR Model

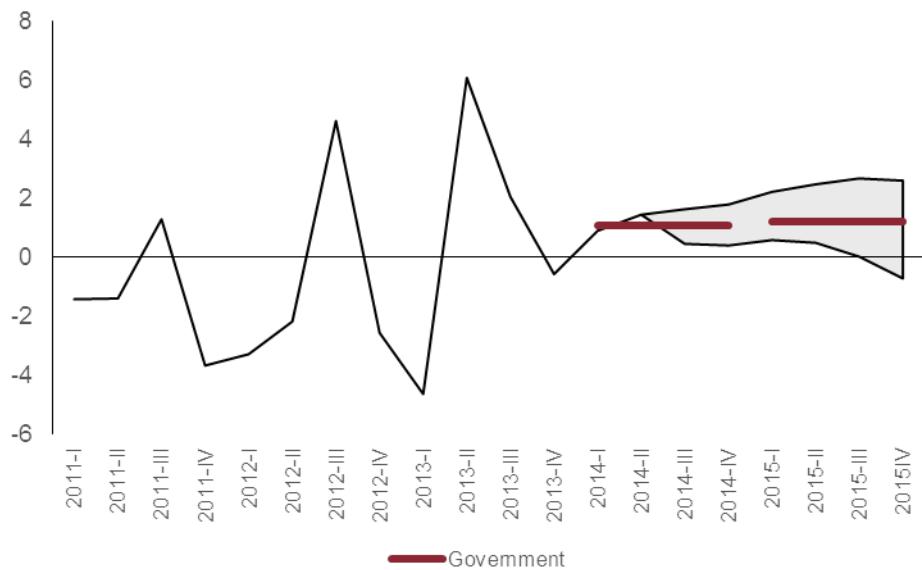


G.10) Exports: Fan chart anchored around Consensus

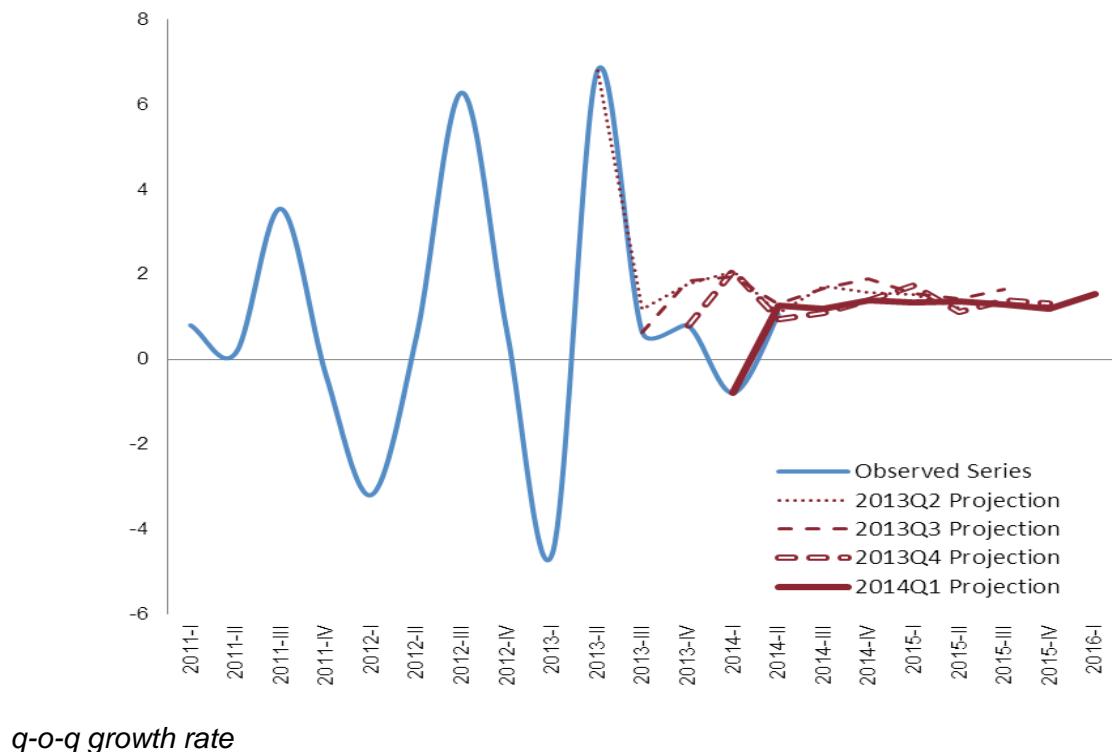


q-o-q growth rate

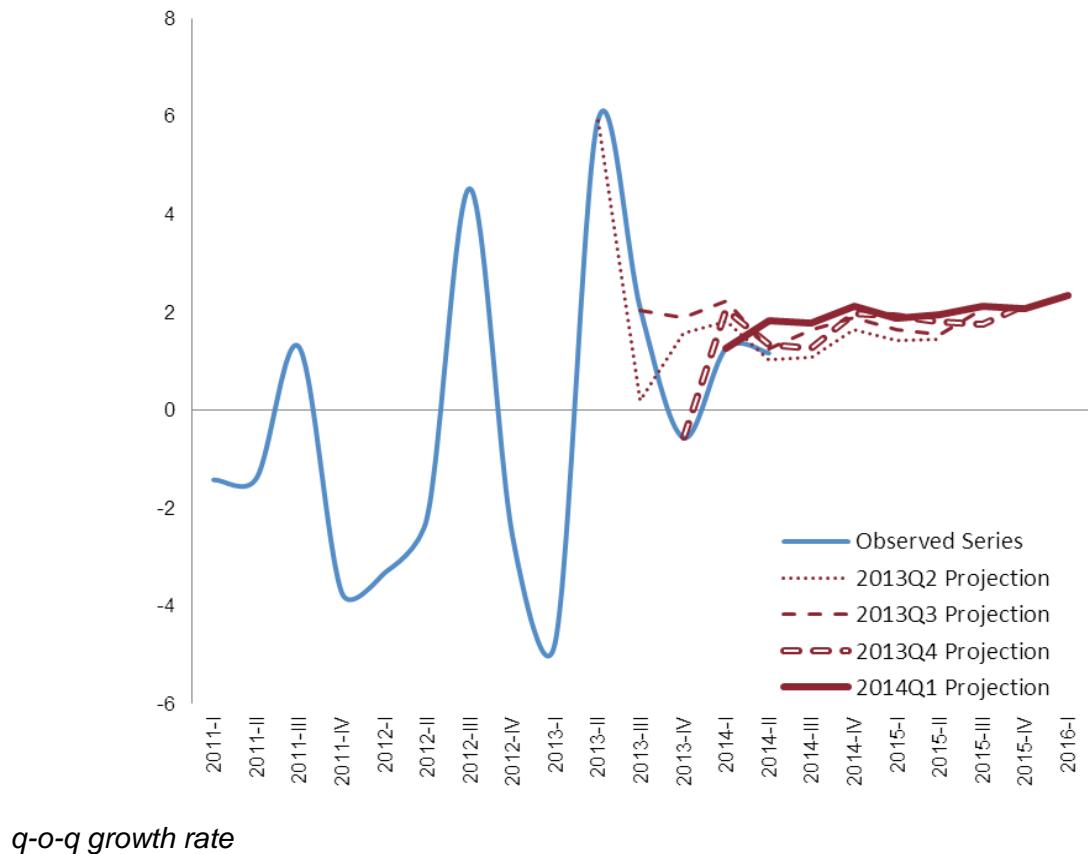
G.11) Imports: Fan chart anchored around Consensus



G.12) Exports: BVAR Model

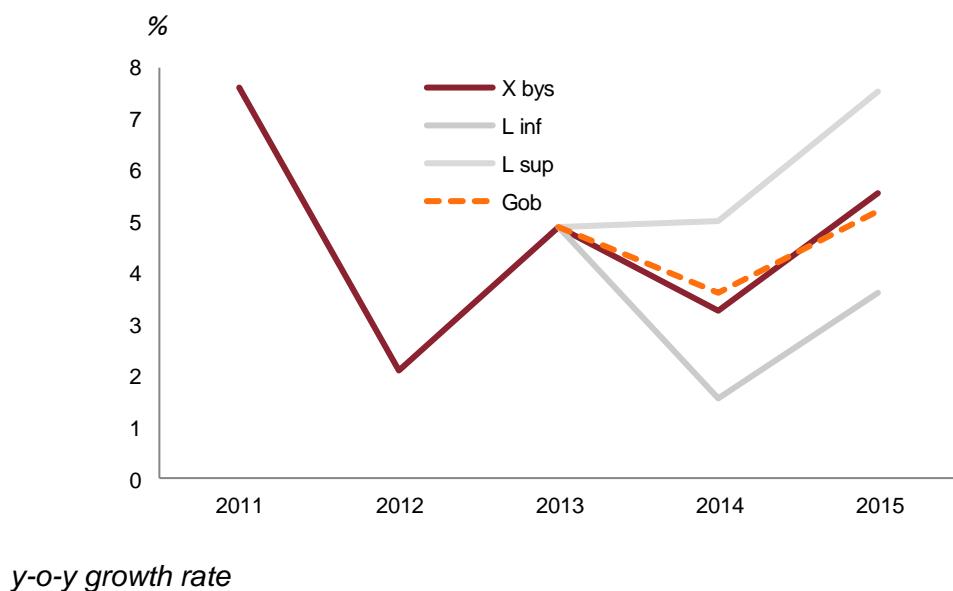


G.13) Imports: BVAR Model



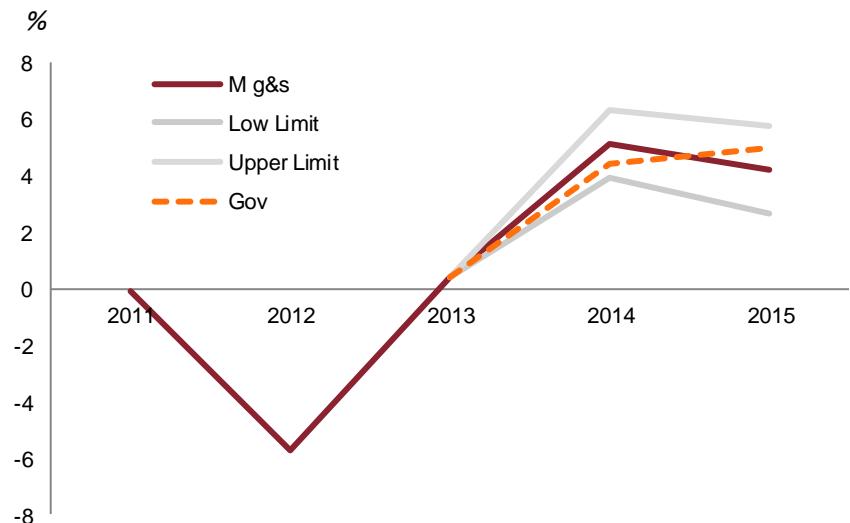
q-o-q growth rate

G.14) Exports: ECM model vs government



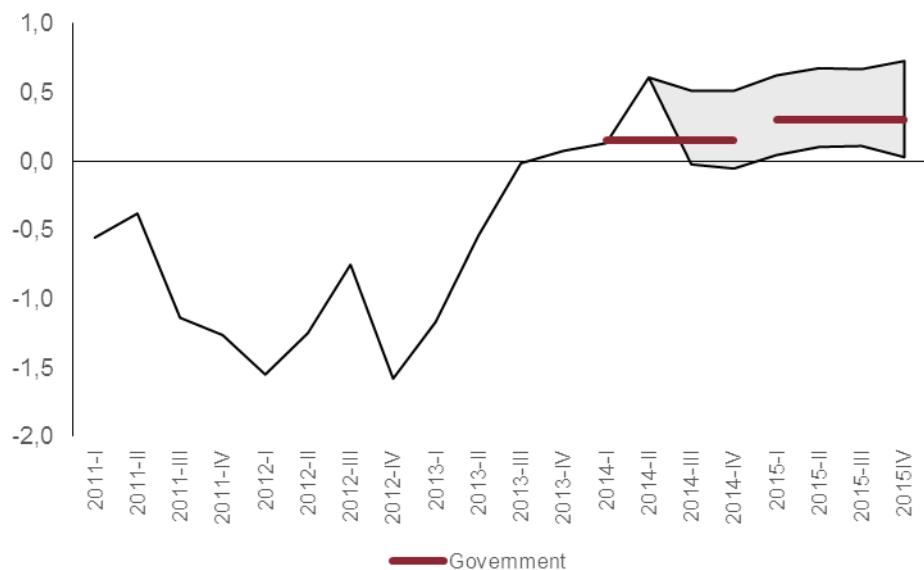
y-o-y growth rate

G.15) Imports: ECM model vs government



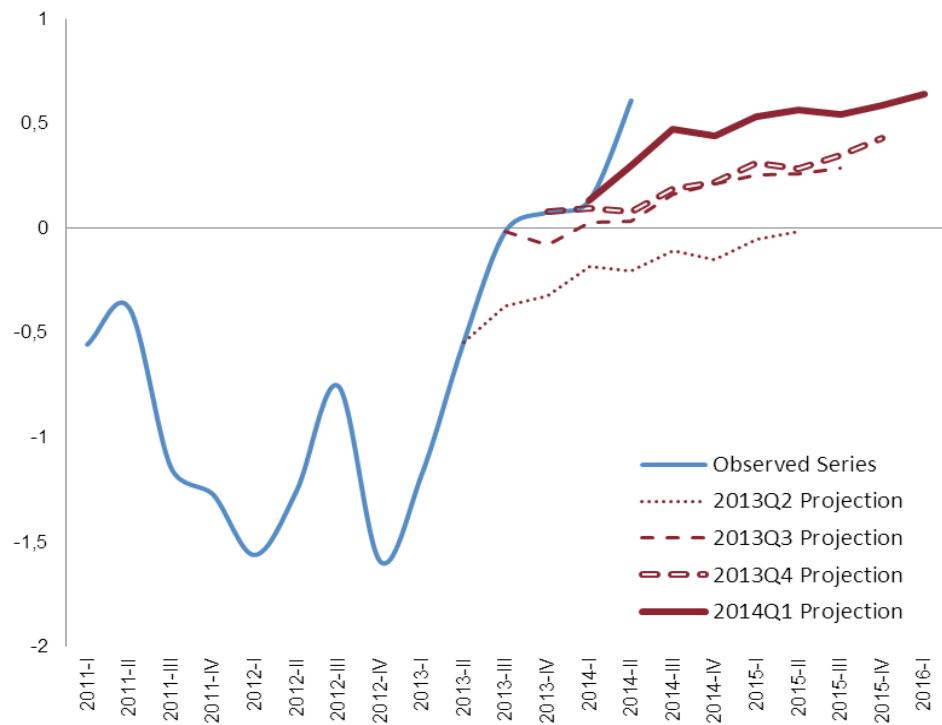
y-o-y growth rate

G.16) Employment: Fan chart anchored around Consensus

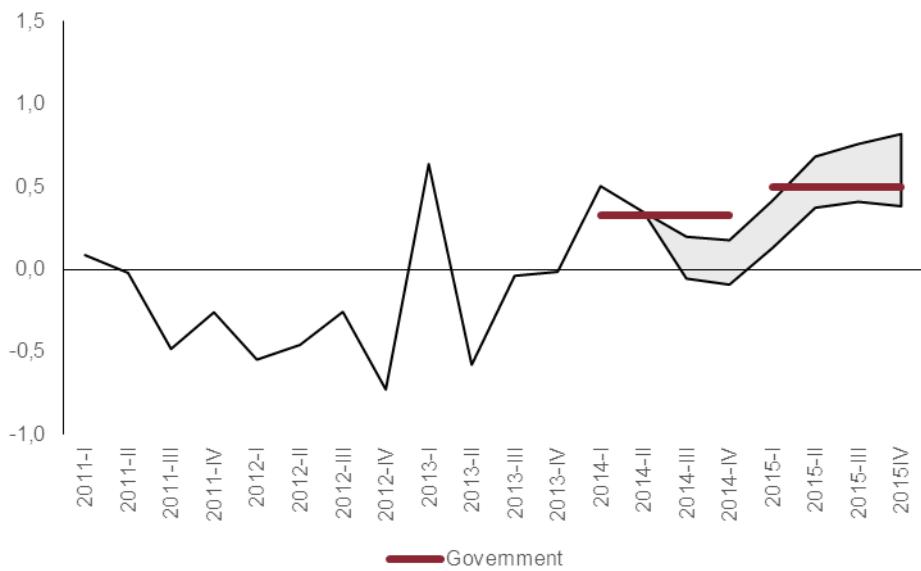


q-o-q growth rate

G.17) Employment: BVAR Model



G.18) Gross domestic product: Fan chart anchored around Consensus



q-o-q growth rate

VI. ANNEX. Methodology of the report on macroeconomic forecasts

The elaboration of this report has required the use of different econometric tools in order to provide a quantitative assessment of the official government forecasts. These tools cover a relatively wide spectrum, from Monte Carlo simulation to multivariate time series modelling, and complement each other in their temporal frequency (annual or quarterly) and in the nature of their design (structural models and reduced form models). This annex provides a summary description of their main features, with the aim to explain the methodological elements on which the report is based. Some simplified examples of these models, programmed in spread sheets, can be downloaded from the AIReF's website.

The first section explains the procedure used to generate confidence intervals based on the forecasts provided by a panel of independent analysts. The resulting intervals are taken as a benchmark to compare the official forecasts. This technique uses annual data and relies on numerical simulation.

The second section presents the methodology to estimate structural one-equation models. These models have been selected to check the consistency of the explanations underlying the official forecasts, taking into account explicitly the macroeconomic determinants of the main variables that compose the macroeconomic table. These models use quarterly data and apply linear estimation.

Finally, the third section presents a multivariate, reduced form econometric model. This model summarizes the joint dynamics of the main real macroeconomic aggregates (consumption, investment, employment...). The model operates under very mild theoretical assumptions and its specification is basically driven by statistical considerations. The model is quarterly frequency and based on Bayesian techniques of estimation.

1. Confidence intervals

The statistical distributions that have been calculated as a benchmark to evaluate the official government forecasts for 2015 are obtained combining the most recent forecasts made by a panel of independent analysts (Funcas panel of economic forecasts, September 2015) with the historical pattern of correlation among the GDP components from the demand side.

More technically, the procedure performs a large number of simulations (5.000) on the key variables that compose the macroeconomic table (consumption, investment, employment, inflation, etc.), taking as input the mean and variance of the variables

forecasted by the panellists for the years 2014 and 2015. These moments are used to calibrate a set of Beta type distributions. Depending on the calibrated moments a wide range of behaviours can be modelled, with different degrees of concentration, including uniform range of forecasts. Therefore, if the panellists are uniformly distributed across the range, the estimated distribution captures this feature, but if the panellists are concentrated above or below some central value, the distribution also captures that case.

We combine the information about the uncertainty of the panellists for each of the variables with the past cross correlation across these macroeconomic variables. Therefore, we create 5000 scenarios, internally consistent in two dimensions, the panellist-uncertain dimension and the variable co-movements one. This final simulation considers that the historical correlation can be characterized with a Gaussian copula.

The 5.000 simulations can be used to compute location measures (e.g., mean, median), dispersion measures (e.g. standard deviation, interquartile range) as well as any other percentile or probabilistic measure.

2. Structural one-equation models

Several behavioural equations, based on the error correction mechanism, have been implemented in order to provide a quantitative assessment of the consistency of the official macroeconomic forecasts. The specification of these equations combines the information provided by the economic theory concerning the determinants of the variables to be analyzed with the more appropriate statistical techniques to check the existence of stable, equilibrium relationships.

The general principle that underlies this methodological approach has two steps. The first step defines a behavioural linkage between the variable to be explained and its macroeconomic fundamentals, as suggested by the relevant economic theory. This linkage defines an equilibrium (long term) relationship that operates as an attraction basin for the endogenous variable. This long run relationship is distorted by stochastic shocks that prevents it fulfilment as an exact relationship, generating deviations or errors that decouple the observed variable from its fundamentals.

The second step is aimed at explaining the short-run dynamics of the endogenous variable, as measured by its quarter-on-quarter rate of growth. The explanation relies on the combination of two elements. On the one hand, a partial correction of the error derived from the long run equation. This gradual adjustment quantifies the pace at which the variable reduces its gap with respect to the level consistent with its long term

fundamentals. On the other hand, the second element consists of the linear combination of present and past values of the endogenous variable and the exogenous variables.

The specification of the model relies on the analysis of cointegration. This analysis tests the existence of a stable and well-defined long-term relationship that may serve as a hinge to sustain the short-run dynamics.

In the following, the main equations are succinctly described. All of them use data observed at the quarterly frequency, corrected from seasonal and calendar effects and the sample tries to cover the widest range for each one, ranging in general from 1990:I to 2014:2.

2.1. Final household consumption

The equation describing the household's consumption demand depends on their real gross disposable income, their financial and non-financial wealth (separately considered), the employment rate, the volume of real credit available for consumer goods and the real interest rate. The latter is defined as the difference between three-month Euribor and the deflator of final consumption expenditure.

2.2. Gross fixed capital formation

This equation assumes that firms determine their investment in equipment depending on the evolution of aggregate demand and the expected return on their investment projects. Aggregate demand is approximated by the real GDP. In addition, the expected return is defined as the Tobin's Q, estimated as the ratio between the IBEX-35 stock index and the stock of productive capital.

2.3. Exports of goods and services

In this equation, the volume of exports of goods and services depends on the external demand for domestic products and the relative price of exports with respect to similar products supplied by the rest of OECD countries.

The proxy for external demand is the index of global trade volume compiled by the Central Planning Bureau (CPB) of the Netherlands. In addition, the relative prices are defined using the consumer price indices of OECD countries, adjusted from variations in the nominal exchange rate.

2.4. Imports of goods and services

The demand for imported goods and services depends on the internal demand and the relative prices of the imported products with respect to their domestic substitutes.

An index that weights each component of final demand (consumption, investment and exports) according to their importing content serves as proxy for the demand for imported goods and services. In addition, the indicator of relative prices is defined as the ratio between the deflator of imports of goods and services and the domestic demand deflator.

3. Reduced-form multivariate model

A Bayesian Vector of Autoregressions (BVAR) has been calibrated and estimated in order to evaluate the official government forecast of the main aggregates that compose the macroeconomic table.

BVAR models combine flexibility and objectivity. They are flexible because they represent the joint dynamics of the vector of variables from a purely statistical perspective, trying to match the observed dynamics as much as possible. They are objective because, once the set of variables to be analyzed has been decided, the estimation of the parameters of the model can be made using fully reproducible and explicit statistical criteria.

The Bayesian component of the model tries to improve its forecasting performance and reflects only statistical views on the dynamics, both at the univariate level as well as at the multivariate level. In addition, some views related to the steady state of the system are also incorporated into the set of priors.

BVAR models forecast the level of a given variable as the linear combination of three elements: lagged values of the variable (own dynamics), lagged values of the other variables (cross dynamics) and a purely random innovation that reflects the non-systematic component of the equation.

The weight of each of these elements is determined on a purely statistical way, trying to achieve the best fit to the sample. The Bayesian components compensate the overfitting effects due to the large number of parameters that have to be estimated.

The point forecasts and confidence intervals for each variable are obtained projecting the BVAR into the future. In particular, the confidence intervals quantify the uncertainty attributable to the forecast of each variable at different forecasting horizons. The BVAR model forecast jointly the six variables that describe the GDP decomposition from the

demand side, providing also confidence intervals for all of them. These intervals quantify the uncertainty of the forecast of each variable at each horizon.

Bibliography

- Bógalo, J. (2012): "Modelo trimestral para estimar el consumo privado", Working Paper 2012/1, General Directorate of Macroeconomic Analysis, Ministry of Economy and Competitiveness.
- Cuerpo, C. and Pontuch, P. (2013): "Spanish housing market: adjustment and implications". ECFIN Country Focus, Vol. 10 Issue 8, Dec. 2013.
- Estrada, A. and Buisán, A. (1999): "El gasto de las familias en España". Estudios Económicos nº 65, Bank of Spain.
- Estrada, A., Fernández, J.L., Moral, E., and Regil, A.V. (2004): "A Quarterly Macro-econometric Model of the Spanish Economy", Working Paper 0413, Bank of Spain.
- García, C., Gordo, E., Martínez-Marín, J., and Tello, P. (2009): "Una actualización de las funciones de exportación e importación de la economía española", Ocassional Paper 0905, Bank of Spain.
- Hurtado, S., Fernández, E., Ortega, E. and Urtasun, A. (2011): "Nueva actualización del modelo trimestral del Bank de España", Ocassional Paper 1106, Bank of Spain.
- Hurtado, S., Manzano, P., Ortega, E. and Urtasun, A. (2014): "Update and Re-estimation of the Quarterly Model of Banco de España (MTBE)", Ocassional Paper 1403, Bank of Spain.
- Litterman, R. (1984): "Specifying Vector Autoregressions for Macroeconomic Forecasting", Staff Report n. 92, Federal Reserve Bank of Minneapolis.
- Meucci, A. (2011): "A Short, Comprehensive, Practical Guide to Copulas", GARP Risk Professional, p. 22-27.
- Ortega, E., Burriel, P., Fernández, J.L., Ferraz, E. and Hurtado, S. (2007) "Update of the Quarterly Model of the Bank of Spain", Working Paper 0717, Bank of Spain.
- Posada, D., Urtasun, A. and Gonzalez, J. (2014): "Un análisis del comportamiento reciente de la inversión en equipo y de sus determinantes", Bank of Spain, Economic Bulletin, junio 2014.
- Sastre, L. (2005): "Simultaneidad de exportaciones e importaciones, curva J y condición de Marshall-Lerner en España," Información Comercial Española, n. 824.
- Villani, M. (2009): "Steady State Priors for Vector Autoregressions", Journal of Applied Econometrics, vol. 24, p. 630-650.