

Economic forecasts and sovereign yields^{*}

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Abstract

We assess whether the corrections made to the EC macro and fiscal forecasts (GDP growth rate, inflation, budget balance, debt ratio, current account) have an impact in sovereign yields. We a panel analysis of 15 EU countries (Austria, Belgium, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Sweden), for the period from 1999:1 until 2012:1, and we also analyse each country individually, on the basis of a SUR estimation. We find that corrections in the EC's forecasts impinge on 10-year sovereign bond yields, particularly corrections in fiscal variables, being more pronounced in countries with less favourable economic conditions. The penalization for the yields is higher in corrections for the current and next years than for previous years.

Keywords: macro forecasts, fiscal forecasts, sovereign yields.

JEL: C23, E44, H68.

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1. Introduction

Since 1998 the European Commission (EC) releases in a regular basis twice a year, in the spring and in autumn, short-term economic forecasts for the member states of the Economic and Monetary Union (EMU), candidate countries and other important economies, as the United States, Japan and the United Kingdom.

Since the forecasts are publicly available, investors may use this information to decide their investment portfolio, notably their investment in the sovereign bonds. Therefore, the release of these forecasts should, theoretically, have an impact on sovereign spreads. Indeed, we may argue that rational investors use all the available information, thus a release of new information will cause a rearrangement in their investment portfolio. However, it is not obvious that this happens in reality.

Hence, we are interested in assessing what is the impact of releasing economic forecasts on the sovereign yields. If, as expected, the impact on sovereign yields is significant, the institutions which release these forecasts (EC, Organization for Economic and Co-operation Development (OECD), European Central Bank (ECB), and others) and in particular the governments, want to be aware of the consequences of forecast accuracy. That is particularly relevant regarding forecasts for current and next year (the ones with most obvious possible influence), but also for past years, as there are often corrections to past data.

Moreover, there is also an interest for private agents to know the impact of macro and fiscal forecasts, especially traders, as every anticipation of future movements in bond's prices may bring profit. Therefore, knowing if and how the bond market reacts to the release of these forecasts is paramount.

The present research will try to provide an answer for this problem, and it is a contribute to the literature since these linkages have not been much explored, at least to our knowledge, after reading the existing related literature. In fact, there are only a few studies for the USA¹, and some were made 15 or more years ago.² On the contrary, there are numerous studies on sovereign spreads' determinants, on forecasts' accuracy, and on the causes of forecast errors.

We perform an econometric analysis of the linkages between different economic forecasts and sovereign yield spreads, using a panel of 15 EU countries (Austria, Belgium, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Sweden), covering the period from 1999:1 until 2012:1. First we do the analysis for the entire panel, and afterwards we study each country individually, specifically on the basis of a SUR analysis. Notice that we use as variables the difference between the forecasts of two consecutive semesters, and not the forecast itself. This has as purpose to identify not only the impact of the forecasts' corrections in the yields, but also the credibility of the previsions.

¹ See Canzoneri, Cumby and Diba (2003)

² See Porter-Hudak and Quigley (1994)

In a nutshell, we can draw an important conclusion from our study: corrections in the EC's forecasts do impinge on the 10-year sovereign bond yield spreads, particularly the corrections in fiscal variables (public debt and budget balance), but this impact is different across countries, being more pronounced in countries with less favourable economic conditions. The penalization for the yields is higher in corrections for the current and next years than for previous years.

This paper is organised as follows. Section two covers the related literature. Section three explains and discusses the data and the construction of the variables. Section four presents the empirical strategy and the results. Section five summarises the conclusions.

2. Literature review

2.1. Literature on sovereign spreads' determinants

To perform our analysis, we need to know the main determinants of sovereign bond yield spreads. There is a great amount of literature on this subject, but there are still some conflicting results, as there are many factors which may influence sovereign spreads.

However, there are some conclusions that are common to the majority of the studies. The variables which more often appear as significant are the level of GDP, GDP *per capita* or GDP growth rate (Hilscher and Nosbusch, 2010; Afonso, 2010), fiscal performance, through public debt and budget balance (Dell'Erba and Sola, 2011; Baldacci and Kumar, 2010; Afonso, Arghyrou and Kontonikas, 2012; Afonso, 2010; Amira, 2004; Laubach, 2009; Akitoby and Stratmann, 2006; Gruber and Kamin, 2010), current account balance (Amira, 2004) and monetary policy (Gruber and Kamin, 2010).

The literature also presents several interesting conclusions. For example, the impact of the level of public debt is quantitatively lower than the one of public deficits (Faini, 2006; Laubach, 2009), and worst fiscal behaviour lowers the ratings of sovereign debt (Afonso & Gomes, 2010), which may induce a rise in the yields demanded by market participants.

Dell'Erba and Sola (2011), using a panel of 17 OECD countries from 1989 to 2009, conclude that a budget deficit increase has greater impact in small peripheral countries or in countries with low financial integration. Baldacci and Kumar (2010), with data from 31 developed and in developing countries, between 1980 and 2008, report that higher deficits and levels of public debt lead to a significant increase in long-term interest rates, and that the magnitude of such increase depends on the initial fiscal, institutional and structural conditions, and on the spillovers of the global financial markets.

A study by the EC (2011) finds a negative relationship between the strength of rules-based fiscal governance and sovereign spreads, using the Fiscal Rules Index as a measure of the quality of the fiscal institutions. Alexopoulou, Bunda and Ferrando (2009) conclude that the current account and budget balance, inflation, exchange and short-term interest rates, among other factors, influence the

cost of long-term finance of new EU countries, while Afonso and Rault (2010) conclude that the inflation rate, budget and external imbalances have an impact on OECD countries sovereign spreads.

Thus, our empirical analysis will consider as determinants of the 10-year government bond yields the GDP real growth rate, the public debt-to-GDP ratio, the budget balance ratio, the inflation rate, given by the harmonised index of consumer prices (HICP), the real effective exchange rate (more specifically, the percentage change to the preceding year), the current account balance, also as a percentage of GDP (all of these sourced as EC forecasts), the international risk (represented by the VIX – the S&P 500 implied stock market volatility index), and monetary policy (represented by the short-term interest rates defined by the monetary authority). We also control for the existence and strength of fiscal rules, including as a variable the Fiscal Rule Index, calculated by the EC.

2.2. Literature on forecast errors

Regarding forecasts errors, there are two different topics usually explored: errors in government's forecasts and their causes, and errors in independent agencies' forecasts and their causes. Both are important for our work due to the dependency of the EC's forecasts on governments' forecasts, since they are based on the information provided by the country's government.

Concerning governments' forecasts, three main conclusions appear in the literature:

- 1) preliminary data releases are biased and non-efficient predictors of the true values, especially for GDP and public deficit, and several corrections occur over the subsequent vintages (Castro, Pérez and Vives, 2011; Moulin and Wiertz, 2006; Merola and Pérez, 2012; Martins and Mora, 2007; Frankel, 2011; Jonung and Larch, 2006);
- 2) the economic cycle is not fully included in the GDP forecast, making GDP forecast errors an important cause of budget deficit errors (Merola and Pérez, 2012; Frankel, 2011; Jonung and Larch, 2006; Moulin and Wiertz, 2006; Castro, Pérez and Vives, 2011);
- 3) being subject to a fiscal rule, without having strong and independent supervision, leads to an increase in GDP and budget deficit errors, possibly due to creative accounting (von Hagen and Wolff, 2006; Frankel, 2011).

Bernoth and Wolff (2008), and von Hagen and Wolff (2006) mention that most European Union's members incur in stock flow adjustments (i.e., the change in their government debt is higher than the budget deficit), which increases the yields demanded by financial markets. This increase is higher when the events of creative accounting are reported in the media. On the other hand, Castro, Pérez and Vives (2011) argue that modifications in Eurostat budget rules also explain a significant part of forecast errors, and forecasts may be considered rational after two years (i.e., forecast for year t may be considered correct in year $t+2$). This conclusion was the reason for the use in our study of forecast's corrections till two years ago as regressors.

Concerning independent agencies' forecasts, two main conclusions are possible:

- 1) they seem to be unbiased and efficient, either for the EU and for the non-EU countries (Grenouilleau, Melander and Sismanidis, 2007);
- 2) however, they appear to be correlated with the electoral cycles, though less than those from the government, and do not include all the available information, though they consider more information than governments (Merola and Pérez, 2012).

Thus, it appears that independent agencies' forecasts are more reliable than governments'. Melander, Sismanidis and Grenouilleau (2007) show that the forecasts for GDP, inflation, current account balance and public budgets are the most accurate ones, though not totally correct.

In our analysis we will consider EC's forecasts, as they are part of the basis of budgetary surveillance in the context of the application of the Excessive Deficits Procedure, and are considered more reliable than the government's, being a major reference for investors, economists and managers.

3. Data and variables

As already mentioned, in our study we use a panel of 15 countries: Austria (AT), Belgium (BE), Germany (DE), Denmark (DK), Spain (ES), Finland (FI), France (FR), United Kingdom (GB), Greece (GR), Ireland (IE), Italy (IT), Luxemburg (LU), Netherlands (NL), Portugal (PT) and Sweden (SE).

The EC's forecasts of budget balance-to-GDP ratio (BAL), public debt-to-GDP ratio (DEBT), GDP real growth rate (YR), current account balance (CA), inflation (INF) and real effective exchange rate (REER) were retrieved from the EC's website, as well as the short-term interest rates (I), the 10-year government bond yields (YIELDS) and the fiscal rule index (FRI). The VIX was obtained from Bloomberg's.

The forecasts are released twice a year, typically around March-April (the spring forecast) and October-November (the autumn forecast), therefore, our data will be bi-annual. As the first forecasts were made in the second semester of 1998, our analysis covers the period from 1999:1 till 2012:1. The short-term interest rates, the yields and the VIX used relate to the month of the release of the forecast. We use monthly yields instead of daily ones in order to try to capture some market anticipation of the forecast's release.

It is important to understand correctly the meaning of all variables. We will include forecasts made in year t for year t , year $t+1$, and also for years $t-1$ and $t-2$. This choice was based on Castro, Pérez and Vives (2011), as mentioned above. If forecasts may be considered rational after two years, investors will not pay much attention to corrections made after that (except if those corrections are truly significant, but it is not a frequent occurrence). Moreover, as already said, we will use forecasts' corrections as variables, and not the forecast itself.

Therefore, every semester s we have a forecast for variable X , for country i and year t , $X_{i,s}^t$. Our variable of interest will then be $\Delta X_{i,s}^t = X_{i,s}^t - X_{i,s-1}^t$, the difference between forecasts made for year t in two consecutive semesters. We are not interested in knowing if the release of the forecast itself has an

impact on the yield, but whether if the corrections made in the forecasts are significant enough to alter the yields. This way, we can evaluate if the EC's and governments forecasts have credibility.

4. Empirical strategy and results

4.1. Panel estimation results

We will start by using a panel data approach, using all data to try to obtain the aggregate effect of forecasts' corrections on the sovereign yields. The baseline specification is

$$(1) \quad YIELD_s = \beta_0 + \beta_1 * \Delta \bar{X}_{i,s}^T + \beta_2 * I_{i,s} + \beta_3 * VIX_{i,s} + \beta_4 * FRI_{i,s}$$

where $T=\{t, t+1, t-1, t-2\}$ refers to the year of the forecast, and $\bar{X}=\{\text{BAL, CA, DEBT, INF, REER, YR}\}$ is the forecasts' vector, and varies from regression to regression, depending on the variables we want to study.

Due to the correlation between ΔDEBT and ΔBAL , we never include them in the same regression. We excluded ΔREER^{t+1} as a regressor because it had too few observations. In addition, we perform the analysis separately for the years when the forecasts are made for, which means we have a different table with the eight regressions for forecasts for years $t, t+1, t-1$ and $t-2$. We do this due to the correlation of the majority of the variables from one year to another. VIX, FRI and the short-term interest rate are present in all regressions, since they are control variables, and some forecast variables are repeated in different regressions in order to test their impact in more than one way. In order to admit residual heteroscedasticity, we always use the White diagonal covariance matrix.

We use instrumental variables for ΔDEBT and ΔBAL , regarding forecasts for year t and $t+1$, since they are correlated with the YIELDS. Every year, governments have to make interest payments to bond owners, an expense that it is accounted for in the budget balance and, consequently, in public debt. Therefore, the higher the interest rate demanded by investors in the bond's auction, the higher will be the budget deficit and consequently the stock of future debt. Moreover, forecasts for the fiscal variables for t and for $t+1$ are also likely to be influenced by the current 10-year secondary market bond yields.

Additionally, we have performed the Wu-Hausman's endogeneity test for ΔYR , also for the forecasts for year t and $t+1$, to exclude a possible effect of the 10-year sovereign yields on the country's economic growth. Indeed, higher yields may push public balances to critical values, forcing governments to adopt somewhat more austere programs, reducing their expenses or increasing their revenues, mostly through higher taxation. Either way, these are negative stimulus to the economy, and may have a contractionary effect on real GDP. Finally, we also perform the Hausman's test, to verify if it is more appropriate to use fixed or random effects.³

[Table 1]

³ We report the results for years t and $t+1$, the most significant ones, for more results see the working paper version.

For forecasts concerning the year of their release, we have public debt and the budget balance corrections as significant. GDP growth rate corrections have statistical significance in two of the seven regressions where they are included, having a positive effect on yields, and real effective exchange rate in one of the four regressions, having a negative coefficient. The constant term, short-term interest rate and FRI also have an impact on the yields.

[Table 2]

Regarding the forecasts for the next year, fiscal variables remain statistic significant. Current account balance corrections appear as significant in one of the regressions, having a positive but smaller impact than the fiscal variables. The constant term, short-term interest rate and FRI are significant again.

In the results obtained with forecasts for year $t-1$, only budget balance is significant. Public debt no longer has an impact, probably because it is difficult to hide the true value of this ratio, when comparing to budget balance. The constant term, short-term interest rate and VIX remain significant, and VIX starts to appear as well.

Finally, in the case of forecasts for year $t-2$, none of the fiscal variables is significant. We find once more that the constant term, short-term interest rate and FRI are significant, as in all the tables above. Moreover, in this case VIX is also significant in all regressions, probably because investors do not pay attention to corrections in forecasts of so far back, thus VIX gains significance.

Overall, we observe that the constant term, Δ BAL, Δ DEBT, I and FRI are significant in most of the specifications. The fiscal variables, Δ BAL and Δ DEBT, are the two forecasts' corrections in which investors focus on. Hence, we may say that investors pay attention to countries' fiscal behaviour, demanding higher yields when the public debt ratio increases and the budget balance decreases, meaning investors penalize countries which engage in an expansionary fiscal policy financed by debt issuance.

Looking at the results, we can conclude that investors pay more attention to corrections made in forecasts for current and next year than to corrections made in forecasts for one and two years back. This may occur due to investor's confidence in EC's forecast accuracy (in fact, corrections for previous years tend to be smaller), or a higher investor's preference for values of fiscal variables for current and next years. In terms of policy implication, if the more accurate values are only obtained afterwards, there will only be a penalization for worst budget balances, and it will be lower than if budget balances' data were corrected before.

The coefficient for the short-term interest rate is positive. When a central bank increases these rates, it is engaging in contractionary monetary policy, thus one can expect a deceleration in economic activity, which may worsen budget balances and compromise the country's ability to pay the debt, thus bringing the yields up. The coefficient for the FRI is negative. The FRI is calculated based on the Fiscal Rule Strength Index, which evaluates the quality and visibility of a country's institutional

features, essential to the correct application of the fiscal rule. The higher their quality and visibility, the higher is the probability and credibility of following the rule, thus lower are the yields demanded. If investors believe the government will oblige to the limits imposed, then there is higher credibility that fiscal imbalances will be quickly corrected.

The constant term may be interpreted as a risk premium demanded by investors, related to the probability of default. At the aggregate level, it is, on average, 3.635, but as we will see ahead it differs quite a lot across countries, depending on the perceived risk attributed to each one.

Finally, real GDP growth rate forecast's corrections are also significant for years t and $t-2$. It could be expected that this variable would be as meaningful as the fiscal variables, as it is a vital indicator of a country's economic viability and debt sustainability. In spite of its relevant value as an indicator of the state of the economy, real GDP growth rates forecasts are the most volatile⁴, as they depend on external and non-controllable factors, among others. Hence, investors may not always react to small corrections in this variable's forecast, as they are very frequent, or may actually anticipate some errors (for example, they may anticipate that forecasts are too optimistic). Another possible explication will be given ahead, after performing the SUR analysis. Indeed, if corrections in GDP growth rate forecasts have opposite effects in the countries' yields, then when we estimate for the entire panel these effects may cancel each other, leading to the statistic insignificance of these corrections. On the one hand, higher growth increases firm's profits, investment returns and, consequently, stocks dividends, which makes the stock market more profitable and attractive, leading to bond selling, decrease in bond's prices and increase in bond's yields, in order to attract investors again (a positively sloped yield curve also tends to reflect growth expectations). On the other hand, higher growth can suggest lower debt and budget balance ratios to GDP, implying a lower probability of default, which makes the country's sovereign bonds safer investments and, as a consequence, the yields demanded are lower.

4.2. Robustness tests

Although there are EC's forecasts until 2012:1, the FRI only has data until 2010:2. Consequently, in the results shown above, three forecast's releases were not included (spring and autumn of 2011, and spring of 2012). In order to overcome this problem, we did two robustness tests, to see if the results obtained were still valid: first, we added one observation to the FRI, making the value for this variable in 2011 equal to the one verified in 2010; second, we removed the FRI from the sample. All econometric details (instrumental variables, random or fixed effects, YR endogeneity and White covariance matrix) remain valid (results are available on request).

Comparing the results with one extra FRI observation with the initial baseline specification, we observe that fiscal variables still remain the most important variables among the forecasts.

⁴ See, for example, Castro, Pérez and Vives (2011), Merola and Pérez (2012) and Mora and Martins (2007).

However, public debt increases its importance, being significant for all years (before it was only significant for years t and $t+1$), and the magnitude of the budget balance coefficient is lower, it only appears significant in forecasts for year $t-1$, and before it was also for years t and $t+1$. The real GDP growth rate never appears as significant, as well as the current account balance. On the contrary, inflation now appears as significant for years t , $t+1$ and $t-2$, when it used to be significant only for $t-2$, and real effective exchange rate has a significant impact, regarding forecasts for years t and $t+1$, like current account balance, in forecasts for year $t+1$.

Hence, adding the year 2011 to our sample allows keeping the main conclusions, but changes some of the results. This may happen due to instability and uncertainty of this year (in 2011 Portugal asked for a financial assistance, implementing the EC/ECB/IMF Economic Adjustment Programme, Greece asked for a second financial loan, Italian and Spanish bonds started to be under pressure), which lead to a bigger suspicious by the investors, not relying so much on public balance and GDP growth rate forecasts, as they tend to undergo several ex-post corrections.

As stated above, we also tested the same regressions without the FRI data, which allows for three more time series observations per country. The results (available on request) go in the same direction than those of the first robustness test.

These results seem to confirm the idea that the instability and uncertainty of 2011 and 2012 may alter somehow the results obtained in the initial panel. The disbelief in government's accounts led investors to overlook the budget balance corrections, as they do not believe they are very credible in that context, and start to give more importance to public debt. In addition, countries began to rely on exportations to grow, as their internal demand diminished a lot, thus real effective exchange rate increased its importance as an indicator of the country's economic evolution.

4.3. Country estimation – SUR

In addition to our panel analysis, we have performed an individual analysis for the countries. Investors may react differently to corrections in forecasts, as they give different credibility to each country, once they have different characteristics.

We have estimated a system of equations, one for each country, to find the individual coefficients. For that purpose, we used the Seemingly Unrelated Regressions (SUR) model. We will use this model in two different specifications, due to the correlation between public debt and budget balance, as mentioned above:

$$(2) \text{YIELD}_s = \beta_0 + \beta_1 * \Delta \text{DEBT}_{i,s}^T + \beta_2 * \Delta \text{INF}_{i,s}^T + \beta_3 * \Delta \text{REER}_{i,s}^T + \beta_4 * \Delta \text{YR}_{i,s}^T + \beta_5 * I_{i,s} + \beta_6 * \text{VIX}_{i,s}$$

$$(3) \text{YIELD}_s = \beta_0 + \beta_1 * \Delta \text{BAL}_{i,s}^T + \beta_2 * \Delta \text{CA}_{i,s}^T + \beta_3 * \Delta \text{REER}_{i,s}^T + \beta_4 * \Delta \text{YR}_{i,s}^T + \beta_5 * I_{i,s} + \beta_6 * \text{VIX}_{i,s}$$

where $T = \{t, t+1, t-1, t-2\}$ refers to the year of the forecast. From equation (2) we will create a system of fourteen regressions, one for each country (Luxembourg is excluded, because it has very few observations), and we do the same with equation (3). Once again, we separate the regressions through year of forecast, so we will have eight systems, regarding forecasts for year $t, t+1, t-1$ and $t-2$ for both regressions. Notice that we remove the FRI as a regressor, although it was significant in the panel. We need to do this because the FRI is a constant for Greece, and almost a constant for Belgium and Netherlands, which causes collinearity problems.

The results of the estimations for years t and $t+1$ for regression (2) and (3) are reported in tables 3, 4, 5, and 6.⁵

[Tables 3, 4, 5, 6]

Looking at the results, we observe that the coefficients and the significant variables naturally vary across countries. In addition, while in the initial results corrections to public debt and budget balance, the short-term interest rate and the constant term were the variables which stood out, now corrections in the real effective exchange rate and real GDP growth rate are also important determinants of the 10-year bond yields. In some countries, current account balance and inflation corrections also have a significant impact on yields.

As it might be expected, the estimated coefficients in Greece, Ireland and Portugal tend to be higher than in other countries. We seem to confirm that a country's credibility is an essential factor in determining its funding costs, due to the risk premium demanded, but also because countries with lower credibility tend to have yields that are more reactive to forecasts' corrections.

After making the individual analysis, it is visible that the real effective exchange rate and real GDP growth rate corrections are not so important in the panel results because they have opposite effects in some countries.

5. Conclusion

In our study we have assessed the relevance of macro and fiscal forecast vintages for the explanation of sovereign yield developments in a panel of 15 EU countries. Our analysis covers the period from 1999:1 till 2012:1.

From our work, we can draw an important conclusion: corrections in the EC's forecasts do impinge on the 10-year sovereign bond yield spreads, particularly the corrections in fiscal variables (public debt and budget balance), but this impact is different across countries, being more pronounced in countries with less favourable economic conditions.

It seems that whether or not macro and fiscal forecasts are consistently seen as credible by the markets plays a relevant work. On the one hand, the credibility that investors give to EC's forecasts is

⁵ The results of forecasts for years $t-1$ and $t-2$ are also available from the authors.

relevant, and on the other hand the credibility that they give to the country and, consequently, to governments' forecasts is also paramount.

As we have seen, higher credibility means yields will react less to changes in forecasts. Hence, in spite of the incentive that governments have to report less accurate forecasts, as the penalization is higher in corrections for the current and next years than for previous years, if it lowers its credibility, it may be worse than revealing right way the true results.

A relevant policy implication is that if more accurate values are only known afterwards, the market penalization for worst budget balances will be lower than if budget balances' data was corrected ex-ante. This implies the need for a better perception of the forecast errors by market participants, which could imply additional scepticism regarding the initial vintage forecasts, and already an increase in the yields at the time of probably too optimistic 1st year vintage forecasts.

We also saw evidences that the sovereign debt crisis altered the variables to which investors pay attention. After including 2011 and 2012 forecasts, the budget balance lost statistical significance, public debt became a more relevant determinant, and the real effective exchange rate started to be significant as well. Also, the constant term increased, indicating that investors demanded a higher risk premium, due to higher risk and uncertainty in the bond market.

However, it is important to notice that there are some limitations in our analysis. In fact, the number of observations is not very large, which may bias our results, especially when we perform the SUR analysis. As follow up work it would be useful to separate the data during the sovereign crisis, in order to understand its consequences on investors' reactions. However, that it is not possible, due to the yet low number of forecasts made after the beginning of the crisis, but it stays as a possible future research development.

References

- Alexopoulou, I., Bunda, I., Ferrando, A. (2009). "Determinants of government bond spreads in new EU countries", ECB Working Paper 1093.
- Afonso, A., Arghyrou, M., Kontonikas, A. (2012). "The determinants of sovereign bond yield spreads in the EMU", Department of Economics, ISEG-UTL, Working Paper 36/2012/DE/UECE.
- Afonso, A., Gomes, P. (2010). "Do fiscal imbalances deteriorate sovereign debt rating?", *Revue Économique*, 62 (6), 1123-1134.
- Afonso, A., Rault, C. (2010). "Long-run determinants of sovereign yields", CESifo Working Paper 3155.
- Afonso, A. (2010). "Long-term Government Bond Yields and Economic Forecasts: Evidence for the EU", *Applied Economics Letters*, 17 (15), 1437-1441.
- Akitoby, B., Stratmann, T. (2006). "Fiscal policy and financial markets", IMF Working Paper 16.
- Amira, K. (2004). "Determinants of sovereign Eurobonds yield spreads", *Journal of Business Finance and Accounting*, 31(5-6), 795-821.

- Baldacci, E., Kumar, M. (2010). “Fiscal Deficits, Public Debt and Sovereign Debt Yields”, IMF Working Paper 184.
- Bernoth, K., Wolff, G. (2008). “Fool the markets? Creative accounting, fiscal transparency and sovereign risk premia”, *Scottish Journal of Political Economy*, 55 (4), 465-487.
- Canzoneri, M., Cumby, R., Diba, B. (2003). “Should the European Central Bank and the Federal Reserve be concerned about fiscal policy?” *Proceedings*, 333-389, Federal Reserve Bank of Kansas City.
- Castro, F., Pérez, J., Vives, M. (2011). “Fiscal data revisions in Europe”, Banco de España, Documentos de Trabajo N° 1106.
- Dell’Erba, S., Sola, S. (2011). “Fiscal Policy, Interest Rates and Risk Premia in Open Economy”, The Graduate Institute of International and Development Studies.
- EC (2011). “Public Finances in EMU – 2011”, European Commission.
- Faini, R. (2006). “Fiscal policy and interest rates in Europe”, *Economic Policy*, 21(47), 443-489.
- Frankel, J. (2011). “Over-optimism in forecasts by official budget agencies and its implications”, *Oxford Review of Economic Policy*, 27 (4), 536-562.
- Grenouilleau, D., Melander, A., Sismanidis, G. (2007). “The track record of the Commission’s forecasts – an update”, Directorate General for Economic and Financial Affairs, European Commission.
- Gruber, J., Kamin, S. (2010). “Fiscal positions and government bond yields in OECD countries”, Board of Governors of the Federal Reserve System, International Finance Discussion Papers.
- Hischer, J., Nosbusch, Y. (2010). “Determinants of sovereign risk: macroeconomic fundamentals and the pricing of sovereign debt”, *Review of Finance*, 14, 235-262.
- Jonung, L., Martin, L. (2006). “Improving fiscal policy in the EU: the case for independent forecasts”, *Economic Policy*, 21 (47), 491-534.
- Laubach, T. (2009). “New Evidence on the Interest Rate Effects of Budget Deficits and Debt”, *Journal of the European Economic Association*, 7 (4), 1-28.
- Martins, J., Mora, L. (2007). “How reliable are the statistics for the Stability and Growth Pact?”, Banco de España, Notas Estadísticas N.º 4.
- Merola, R., Pérez, J. (2012). “Fiscal forecast errors: governments vs independent agencies”, Banco de España Working Paper 1233.
- Moulin, L., Wierds, P. (2006). “How credible are multiannual budgetary plans in the EU?”, Banca di Italia.
- Porter-Hudak, S., Quigley, M. (1994). “A new approach in analyzing the effect of deficit announcements of interest rates”, *Journal of Money, Credit and Banking*, 26 (4), 894-902.
- von Hagen, J., Wolff, G. (2006). “What do deficits tell us about debt? Empirical evidence on creative accounting with fiscal rules in the EU”, *Journal of Banking & Finance*, 30(12), 3259-3279.

Table 1 – Estimation results for 10-year yields: forecasts for year t

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
C_{it}	3.526***	3.494***	3.555***	3.662***	3.523***	3.460***	3.580***	3.639***
	(0.159)	(0.166)	(0.169)	(0.177)	(0.254)	(0.262)	(0.267)	(0.174)
ΔBAL_{it}					-0.398*	-0.409*	-0.442*	
					(0.210)	(0.222)	(0.228)	
ΔCA_{it}				0.019		-0.027		0.013
				(0.020)		(0.037)		(0.026)
ΔDEBT_{it}	0.135**	0.132**	0.150*	0.077				
	(0.062)	(0.066)	(0.078)	(0.077)				
ΔINF_{it}	0.299		0.243				0.364	0.111
	(0.206)		(0.189)				(0.246)	(0.141)
ΔREER_{it}	-0.017	-0.020				-0.031		-0.041*
	(0.027)	(0.028)				(0.034)		(0.022)
ΔYR_{it}	0.114	0.178	0.152*	-0.166	0.194*	0.157	0.131	
	(0.088)	(0.112)	(0.090)	(0.207)	(0.108)	(0.119)	(0.099)	
I_{it}	0.298***	0.328***	0.314***	0.342***	0.337***	0.352***	0.310***	0.223***
	(0.038)	(0.039)	(0.039)	(0.040)	(0.045)	(0.049)	(0.046)	(0.058)
VIX_{it}	-0.003	-0.002	-0.001	-0.011	0.001	-0.004	-0.001	0.007*
	(0.006)	(0.005)	(0.007)	(0.008)	(0.006)	(0.006)	(0.007)	(0.003)
FRI_{it}	-0.020	-0.084	-0.172***	-0.189***	-0.164	-0.105	-0.129	-0.053
	(0.140)	(0.142)	(0.054)	(0.054)	(0.103)	(0.099)	(0.095)	(0.112)
R-square	0.357	0.329	-0.097	0.185	-0.057	-0.048	-0.077	0.315
N	15	15	15	15	15	15	15	15
Obs	303	303	349	314	349	302	349	302
Endogeneity	0.396	0.493	0.204	0.099	0.802	0.879	0.794	
Hausman	0.005	0.003	0.539	0.600	0.763	0.191	0.825	0.070

Note: the asterisks *, ** and *** represent significance at 10, 5 and 1% level, respectively. The values present between parenthesis are the standard error. *IV* indicates if instrumental variables were used in the regression, *N* is the number of countries included in the sample, *Obs* is the number of observations, *Endogeneity* is the p-value obtained by performing the Wu-Hausman endogeneity test for ΔYR, and *Hausman* is the p-value for the Hausman's random effect test.

Table 2 – Estimation results for 10-year yields: forecasts for year $t+1$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IV	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Ci_t	3.581***	3.664***	3.633***	3.681***	3.881***	3.843***	3.795***	3.629***
	(0.207)	(0.224)	(0.203)	(0.202)	(0.378)	(0.405)	(0.314)	(0.166)
ΔBAL_{i,t+1}					-0.456*	-0.334*	-0.373*	
					(0.259)	(0.198)	(0.209)	
ΔCA_{i,t+1}				0.028		0.061		0.056**
				(0.018)		(0.038)		(0.027)
ΔDEBT_{i,t+1}	0.099*	0.085*	0.094*	0.085*				
	(0.053)	(0.052)	(0.050)	(0.051)				
ΔINF_{i,t+1}	0.200		0.190				0.207	-0.024
	(0.164)		(0.140)				(0.170)	(0.063)
ΔREER_{it}	-0.036	-0.038				-0.047		-0.039*
	(0.029)	(0.031)				(0.037)		(0.021)
ΔYR_{i,t+1}	0.048	0.020	0.098	-0.004	0.185	-0.017	0.106	
	(0.101)	(0.106)	(0.092)	(0.097)	(0.178)	(0.179)	(0.168)	
I_{it}	0.335***	0.342***	0.323***	0.334***	0.328***	0.310***	0.293***	0.244***
	(0.048)	(0.048)	(0.047)	(0.046)	(0.051)	(0.050)	(0.054)	(0.043)
VIX_{it}	-0.011	-0.011	-0.004	-0.010	-0.013	-0.016	-0.008	0.006*
	(0.009)	(0.010)	(0.008)	(0.010)	(0.014)	(0.013)	(0.010)	(0.003)
FRI_{it}	-0.006	-0.173**	-0.157	-0.177***	-0.225**	-0.150	-0.130	-0.076
	(0.192)	(0.069)	(0.171)	(0.051)	(0.089)	(0.120)	(0.206)	(0.106)
R-square	0.302	0.197	0.234	0.215	-0.412	-0.186	-0.131	0.319
N	15	15	15	15	15	15	15	15
T	303	303	349	314	349	302	349	302
Endogeneity	0.945	0.924	0.728	0.295	0.466	0.628	0.697	
Hausman	0.001	0.103	0.089	0.231	0.101	0.169	0.028	0.000

Note: the asterisks *, ** and *** represent significance at 10, 5 and 1% level, respectively. The values present between parenthesis are the standard error. *IV* indicates if instrumental variables were used in the regression, *N* is the number of countries included in the sample, *Obs* is the number of observations, *Endogeneity* is the p-value obtained by performing the Wu-Hausman endogeneity test for ΔYR , and *Hausman* is the p-value for the Hausman's random effect test.

Table 3 - Individual results of estimations of forecasts for year t , regression (2)

	$C_{i,t}$	$DEBT_{i,t}$	$INF_{i,t}$	$REER_{i,t}$	$YR_{i,t}$	$I_{i,t}$	$VIX_{i,t}$	R-square	Obs
AT	3.120*** (0.198)	-0.008 (0.015)	-0.127* (0.067)	-0.043 (0.031)	-0.095 (0.058)	0.415*** (0.044)	0.000 (0.007)	0.700	24
BE	3.312*** (0.208)	-0.047*** (0.016)	0.006 (0.046)	-0.080*** (0.023)	-0.141** (0.057)	0.302*** (0.049)	0.012 (0.007)	0.599	25
DE	2.801*** (0.273)	0.018 (0.017)	-0.038 (0.074)	0.014 (0.011)	0.032 (0.040)	0.550*** (0.064)	-0.013 (0.010)	0.678	25
DK	3.568*** (0.352)	-0.036*** (0.013)	0.343 (0.323)	-0.102 (0.105)	-0.146 (0.220)	0.313** (0.147)	0.003 (0.031)	0.771	13
ES	4.013*** (0.298)	0.018 (0.047)	0.230** (0.110)	-0.102** (0.040)	-0.194 (0.141)	0.117 (0.078)	0.005 (0.011)	0.283	25
FI	2.852*** (0.189)	0.119*** (0.016)	0.052 (0.068)	-0.052** (0.025)	0.010 (0.035)	0.520*** (0.046)	-0.005 (0.007)	0.817	25
FR	3.143*** (0.199)	0.038* (0.020)	-0.030 (0.064)	-0.008 (0.019)	0.128* (0.070)	0.413*** (0.046)	-0.001 (0.007)	0.686	25
GB	3.287*** (0.242)	0.056** (0.027)	0.039 (0.086)	0.066*** (0.012)	0.073 (0.097)	0.355*** (0.034)	-0.005 (0.009)	0.763	25
GR	9.080*** (1.895)	-0.256*** (0.041)	0.436 (0.420)	-0.322 (0.212)	-1.082** (0.431)	-1.431*** (0.519)	0.041 (0.066)	0.612	25
IE	5.799*** (0.658)	0.080*** (0.020)	0.571*** (0.209)	-0.069 (0.055)	0.027 (0.111)	-0.526*** (0.178)	0.022 (0.024)	0.474	25
IT	3.995*** (0.277)	-0.016 (0.032)	0.208 (0.127)	-0.066** (0.033)	-0.089 (0.105)	0.085 (0.072)	0.017* (0.010)	0.247	25
NL	2.970*** (0.256)	0.008 (0.015)	-0.041 (0.059)	0.013 (0.024)	-0.004 (0.045)	0.474*** (0.059)	-0.004 (0.009)	0.643	25
PT	5.823*** (0.798)	0.035 (0.048)	0.959*** (0.256)	-0.277*** (0.076)	-0.063 (0.225)	-0.711*** (0.207)	0.052* (0.028)	0.492	25
SE	2.671*** (0.210)	0.039 (0.034)	0.156 (0.136)	-0.013 (0.024)	0.350*** (0.095)	0.632*** (0.062)	0.000 (0.007)	0.838	20

Note: the asterisks *, ** and *** represent significance at 10, 5 and 1% level, respectively. The values present between parenthesis are the standard error. *Obs* is the number of observations.

Table 4 - Individual results of estimations of forecasts for year $t+1$, regression (2)

	$C_{i,t}$	$DEBT_{i,t+1}$	$INF_{i,t+1}$	$REER_{i,t}$	$YR_{i,t+1}$	$I_{i,t}$	$VIX_{i,t}$	R-square	Obs
AT	2.971*** (0.207)	0.011 (0.012)	-0.331*** (0.118)	-0.037 (0.036)	0.174* (0.093)	0.444*** (0.047)	0.006 (0.008)	0.686	24
BE	3.318*** (0.211)	-0.019 (0.012)	0.008 (0.088)	-0.056*** (0.020)	-0.103 (0.084)	0.309*** (0.051)	0.010 (0.008)	0.584	25
DE	2.269*** (0.276)	0.024* (0.013)	0.238** (0.100)	0.029** (0.013)	0.155* (0.091)	0.574*** (0.066)	-0.008 (0.010)	0.702	25
DK	2.658*** (0.265)	0.091** (0.037)	-1.442*** (0.440)	-0.150** (0.064)	1.600*** (0.467)	0.519*** (0.123)	0.025 (0.022)	0.847	13
ES	4.037*** (0.336)	-0.011 (0.021)	0.222 (0.156)	-0.095** (0.037)	-0.200 (0.130)	0.054 (0.088)	0.011 (0.013)	0.192	25
FI	2.669*** (0.203)	0.073*** (0.014)	-0.220* (0.124)	-0.024 (0.023)	0.299*** (0.089)	0.527*** (0.046)	0.004 (0.007)	0.810	25
FR	3.029*** (0.185)	0.043*** (0.011)	0.260 (0.109)	-0.037* (0.019)	0.207*** (0.069)	0.436*** (0.044)	0.000 (0.007)	0.741	25
GB	3.030*** (0.288)	0.024 (0.016)	-0.152 (0.147)	0.073*** (0.015)	0.209* (0.117)	0.381*** (0.038)	0.004 (0.010)	0.781	25
GR	9.761*** (1.983)	-0.119*** (0.041)	0.269 (0.949)	-0.630*** (0.214)	-1.037** (0.499)	-1.692*** (0.554)	0.036 (0.071)	0.535	25
IE	5.162*** (0.707)	0.098*** (0.027)	1.562*** (0.474)	-0.020 (0.061)	0.197 (0.168)	-0.748*** (0.211)	0.032 (0.026)	0.453	25
IT	3.790*** (0.269)	0.022 (0.020)	1.235*** (0.250)	-0.053* (0.030)	-0.191 (0.130)	0.066 (0.068)	0.024** (0.010)	0.385	25
NL	2.874*** (0.253)	0.016 (0.010)	0.005 (0.015)	0.006 (0.020)	0.169*** (0.062)	0.499*** (0.059)	0.000 (0.009)	0.658	25
PT	5.044*** (0.811)	0.162*** (0.042)	2.318*** (0.532)	-0.311*** (0.085)	0.671** (0.323)	-0.466** (0.206)	0.049 (0.029)	0.518	25
SE	2.792*** (0.239)	-0.055** (0.027)	-0.249 (0.173)	0.005 (0.028)	-0.298** (0.141)	0.694*** (0.071)	-0.020** (0.008)	0.810	20

Note: the asterisks *, ** and *** represent significance at 10, 5 and 1% level, respectively. The values present between parenthesis are the standard error. *Obs* is the number of observations.

Table 5 - Individual results of estimations of forecasts for year t , for regression (3)

	$C_{i,t}$	$BAL_{i,t}$	$CA_{i,t}$	$REER_{i,t}$	$YR_{i,t}$	$I_{i,t}$	$VIX_{i,t}$	R-square	Obs
AT	3.108*** (0.202)	-0.114 (0.076)	0.032 (0.035)	-0.032 (0.040)	-0.034 (0.060)	0.390*** (0.044)	0.002 (0.007)	0.707	24
BE	3.452*** (0.206)	-0.036 (0.045)	0.002 (0.021)	-0.077*** (0.025)	-0.068 (0.047)	0.290*** (0.049)	0.006 (0.007)	0.574	25
DE	2.840*** (0.262)	-0.171* (0.091)	0.054 (0.048)	0.027 (0.019)	0.090 (0.077)	0.506*** (0.062)	-0.011 (0.009)	0.703	25
DK	3.282*** (0.310)	-0.260 (0.163)	-0.150 (0.116)	-0.114* (0.079)	0.006 (0.258)	0.305** (0.134)	0.020 (0.026)	0.759	13
ES	4.026*** (0.283)	0.213*** (0.055)	0.013 (0.016)	-0.117*** (0.031)	-0.357*** (0.086)	0.071 (0.073)	0.013 (0.010)	0.336	25
FI	2.858*** (0.215)	-0.177** (0.069)	-0.046 (0.035)	-0.081*** (0.028)	0.020 (0.056)	0.526*** (0.052)	-0.003 (0.008)	0.746	25
FR	3.214*** (0.181)	-0.168*** (0.050)	-0.041 (0.031)	-0.057*** (0.019)	0.059 (0.053)	0.392*** (0.042)	-0.005 (0.007)	0.729	25
GB	3.372*** (0.217)	-0.145*** (0.054)	0.033 (0.056)	0.041*** (0.010)	0.215** (0.101)	0.324*** (0.028)	-0.004 (0.008)	0.783	25
GR	8.554*** (2.051)	0.219 (0.188)	-0.456** (0.222)	-0.851*** (0.192)	-0.623 (0.500)	-1.576*** (0.561)	0.065 (0.075)	0.529	25
IE	5.595*** (0.742)	-0.095*** (0.022)	0.105 (0.140)	-0.079 (0.053)	0.139* (0.076)	-0.440** (0.194)	0.027 (0.027)	0.350	25
IT	4.048*** (0.264)	0.301** (0.131)	0.187*** (0.069)	-0.050 (0.036)	-0.169* (0.099)	0.091 (0.069)	0.018* (0.009)	0.319	25
NL	3.003*** (0.244)	-0.049 (0.060)	-0.039 (0.028)	-0.008 (0.038)	-0.033 (0.070)	0.469*** (0.057)	-0.007 (0.009)	0.672	25
PT	5.779*** (0.939)	0.116 (0.219)	0.167 (0.119)	-0.321*** (0.091)	0.175 (0.245)	-0.575** (0.239)	0.051 (0.033)	0.387	25
SE	2.707*** (0.190)	-0.149 (0.097)	-0.097 (0.066)	-0.021 (0.021)	0.279*** (0.082)	0.677*** (0.057)	-0.006 (0.006)	0.861	20

Note: the asterisks *, ** and *** represent significance at 10, 5 and 1% level, respectively. The values present between parenthesis are the standard error. *Obs* is the number of observations.

Table 6 - Individual results of estimations of forecasts, year $t+1$, regression (3)

	$C_{i,t}$	$BAL_{i,t+1}$	$CA_{i,t+1}$	$REER_{i,t}$	$YR_{i,t+1}$	$I_{i,t}$	$VIX_{i,t}$	R-square	Obs
AT	2.874*** (0.197)	-0.138*** (0.049)	0.059* (0.030)	-0.025 (0.039)	0.237** (0.100)	0.411*** (0.044)	0.011 (0.007)	0.750	24
BE	3.385*** (0.210)	-0.032 (0.031)	0.014 (0.018)	-0.061*** (0.017)	-0.047 (0.062)	0.308*** (0.051)	0.006 (0.007)	0.587	25
DE	2.694*** (0.265)	-0.063 (0.043)	0.094** (0.040)	0.024 (0.020)	0.108 (0.101)	0.537*** (0.064)	-0.009 (0.009)	0.705	25
DK	3.079*** (0.337)	-0.266 (0.220)	-0.109 (0.113)	-0.148* (0.082)	0.527 (0.537)	0.325** (0.148)	0.024 (0.031)	0.696	13
ES	3.975*** (0.318)	0.118*** (0.038)	0.005 (0.014)	-0.074** (0.034)	-0.242** (0.100)	0.083 (0.080)	0.012 (0.012)	0.233	25
FI	2.756*** (0.220)	-0.180*** (0.040)	-0.023 (0.030)	-0.074*** (0.025)	0.224** (0.089)	0.515*** (0.050)	0.001 (0.008)	0.753	25
FR	3.148*** (0.180)	-0.078*** (0.029)	-0.030 (0.027)	-0.050*** (0.017)	0.121* (0.065)	0.398*** (0.042)	-0.002 (0.007)	0.735	25
GB	3.039*** (0.249)	-0.049 (0.042)	-0.050 (0.061)	0.051*** (0.012)	0.175* (0.101)	0.370*** (0.032)	0.003 (0.009)	0.778	25
GR	9.165*** (1.980)	-0.024 (0.226)	-0.791*** (0.206)	-1.134*** (0.219)	0.297 (0.437)	-2.132*** (0.551)	0.110 (0.073)	0.549	25
IE	5.315*** (0.819)	0.202* (0.115)	-0.062 (0.143)	-0.061 (0.064)	-0.071 (0.138)	-0.466** (0.205)	0.047 (0.030)	0.276	25
IT	4.028*** (0.300)	0.033 (0.052)	0.064 (0.043)	-0.051** (0.025)	-0.107 (0.102)	0.085 (0.075)	0.018* (0.011)	0.202	25
NL	2.942*** (0.239)	-0.051 (0.034)	-0.036 (0.028)	-0.011 (0.029)	0.130* (0.072)	0.473*** (0.054)	-0.003 (0.009)	0.683	25
PT	5.670*** (0.899)	0.178 (0.205)	0.090 (0.136)	-0.155 (0.097)	-0.588** (0.258)	-0.495** (0.226)	0.026 (0.033)	0.404	25
SE	2.799*** (0.224)	0.242* (0.135)	0.060 (0.073)	-0.016 (0.026)	-0.423** (0.213)	0.690*** (0.065)	-0.018** (0.008)	0.816	20

Note: the asterisks *, ** and *** represent significance at 10, 5 and 1% level, respectively. The values present between parenthesis are the standard error. *Obs* is the number of observations.