Over-Optimistic Official Forecasts in the Eurozone and Fiscal Rules

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Abstract

Why do countries find it so hard to get their budget deficits under control? Systematic patterns in the errors that official budget agencies make in their forecasts may play an important role. Although many observers have suggested that fiscal discipline can be restored via fiscal rules such as a legal cap on the budget deficit, forecasting bias can defeat such rules. The members of the eurozone are supposedly constrained by the fiscal caps of the Stability and Growth Pact. Yet ever since the birth of the euro in 1999, members have postponed painful adjustment by making overly optimistic forecasts of future growth and budget positions and arguing that the deficits will fall below the cap within a year or two. The new fiscal compact among the euro countries is supposed to make budget rules more binding by putting them into laws and constitutions at the *national* level. But what is the record with such national rules?

Our econometric findings are summarized as follows:

- Governments' budget forecasts are biased in the optimistic direction, especially among the Eurozone countries, especially when they have large contemporaneous budget deficits, and especially during booms.
- Governments' real GDP forecasts are similarly over-optimistic during booms.
- Despite the well-known tendency of eurozone members to exceed the 3% cap on budget deficits, often in consecutive years, they almost never forecast that they will violate the cap in the coming years. This is the source of the extra bias among eurozone forecasts. If euro area governments are not in violation of the 3% cap at the time forecasts are made, forecasts are no more biased than other countries.
- Although euro members without national budget balance rules have a larger over-optimism bias than non-member countries, national fiscal rules help counteract the wishful thinking that seems to come with euro membership. The reason is that when governments are in violation of the 3% cap the national rules apparently constrain them from making such unrealistic forecasts.
- Similarly, the existence of an independent fiscal institution producing budget forecasts at the national level reduces the over-optimism bias of forecasts made when the countries are in violation of the 3% cap.

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1. Introduction

Fiscal rules are increasingly proposed as a means of reining in excessive budget deficits. By now it is clear to all that the Stability and Growth Pact has failed to keep budget deficits and debt levels of eurozone members within the limits specified: originally 3 per cent of GDP and 60 per cent of GDP, respectively. In response to the euro crisis that began in 2010, German Chancellor Angela Merkel has proposed and won acceptance for a new Fiscal Compact among the euro states. The goal of the compact is to strengthen fiscal rules among euro members, in particular by writing them into laws and constitutions at the national level.

In any effort to revise or strengthen fiscal rules, it would help to know why some rules have failed in the past, such as the SGP itself, and what the record with national rules of various sorts is: limits on spending vs. deficits, conditional or unconditional, with or without independent fiscal agencies, and so forth.

One factor behind excessive budget deficits worldwide is a tendency for official forecasts of growth rates, tax receipts, and budget balances to be overly optimistic. It stands to reason that a government that foresees, or claims to foresee, healthy surpluses in coming years is less likely today to take the difficult steps that might be necessary to strengthen the budget, such as cutting spending and raising tax rates.

The bias toward optimism in fiscal forecasts among the 24 countries included in this study is .28% of GDP at the one year horizon, .93% of GDP at the two year horizon, and 1.90% at the three-year horizon. For the 17 European countries, the bias is even higher, despite the rules of the SGP (or perhaps because of them): .52% at the one year horizon, 1.29% at the two year

horizon and 2.4% at the three year horizon.[1] An important component of the over-optimism in official forecasts of the budget deficit is over-optimism in official forecasts of GDP.[2]

1.1 Literature Review

Fiscal rules

Many experts and some elected officials have suggested that annual deficits and long-term debt can best be held in check through fiscal policy rules or mechanisms such as deficit or debt caps.[3] Some countries have already enacted laws along these lines. The most important and most well-known example is the fiscal rules of the euro zone, which supposedly limit budget deficits to 3 per cent of GDP and debts to 60% of GDP.[4] (The Maastricht Treaty specified these fiscal rules as criteria for determining what countries are admitted to the eurozone. The Stability and Growth Pact supposedly dictated that member countries must continue to meet the criteria.) Some euro countries have enacted budget rules at the national level.

Other countries have also adopted fiscal rules and other similar institutions.[5] In a recent IMF Working Paper, Schaechter, et. al. (2012) create a new database of national and supranational fiscal rules across 81 countries from 1985 to 2012. The authors report that while only five countries had fiscal rules in place in 1990, 76 countries had them in place by the end of March 2012. The success of these measures, however, depends on making accurate forecasts of

1 The average are the unweighted averages of each of the country means. Each country mean receives the same weight, even if some countries have more observations.
2 These findings are documented by Frankel (2012) and other authors cited in the literature review below.
3 Anderson and Minarik (2006), Persson and Tabellini (2004), Poterba (1997), Wyplosz (2005), IMF Fiscal Affairs Department (2009).
4 Buti, Franco and Ongena (1998) or Debrun, et al (2008).
5 Alesina, Hausmann, Hommes, and Stein (1999), Kopits (2001), Kopits, Symansky (1998), Milesi-Ferretti (2004). Indeed, according to the IMF, more than 80 countries claim to have some sort of fiscal rule, most of them purporting to put limits on the deficit or debt !

government spending and revenues. Getting those forecasts right has proven to be difficult for most governments.

Research on Official Fiscal Forecasting

Econometric studies have already shown that government budget forecasts in many countries are overly optimistic on average, often because official estimates of economic growth are overly optimistic.

Auerbach (1994) finds overly optimistic official U.S. forecasts in the decade up to 1993. McNees (1995) finds an optimistic bias in official forecasts of long-term American growth through 1994. Auerbach (1999) again finds a tendency for US Office of Management and Budget (OMB) forecasts to overestimate revenues during the period 1986-93, but found a tendency to *underestimate* revenues during the subsequent period, 1993-99. McNab, Rider, and Wall (2007) find that OMB's one-year ahead forecasts of US tax receipts were biased over the period 1963-2003 and suggest that the bias may have been strategic on the part of various administrations seeking to achieve particular goals, such as overstating budget balance when the administration is seeking to increase spending or cut taxes. Frendreis and Tatalovich (2000) show that US administrations (OMB) are less accurate in estimating growth, inflation and unemployment than is the independent Congressional Budget Office or the Federal Reserve Board. They find partisan bias, interpreted as Republican administrations over-forecasting inflation and Democratic administrations over-forecasting unemployment.

Forni and Momigliano (2004) find optimism bias among OECD countries in general. Ashiya (2005, 2007) shows that official Japanese growth forecasts are biased upwards and are significantly less accurate than private sector forecasts. According to O'Neill (2005) and Mühleisen, et al, (2005), Canada underestimated its budget deficits in the late 1980s and early

1990s, but subsequently overestimated them (1994-2004), perhaps to reduce the risk of missing its target of a balanced budget under its strengthened institutional framework.

Jonung and Larch (2006) find that budget agencies in the EU systematically overestimate the economic growth rate. The tendency toward overly optimistic forecasts is especially strong in Italy and Germany. The UK is an exception. Strauch, et al (2009) find a statistically significant optimism bias for some euro members: Germany, Italy, Greece, Luxembourg, and Portugal for the period 1991-2004. The UK, Finland and Sweden, on the other hand, tend to overestimate their deficits. In light of this difference, it is suggestive that the UK and Sweden were not trying to get into the euro, which would have required meeting the fiscal criteria of the 1992 Maastricht Treaty, while the others were trying to get in, and are now there and thus subject to the Stability and Growth Pact (SGP).[6] Brück and Stephan (2006) explicitly conclude that Eurozone governments have manipulated deficit forecasts before elections since the introduction of the SGP. Most of these authors argue that the systematic over-optimism in ex ante forecasts translates directly into larger ex post deficits, and particularly to deficits larger than targeted under the SGP.

Similarly, Beetsma et al (2009) find that realized budget balances among SGP countries on average fall short of official ex ante plans. Marinheiro (2010) adds another complete business cycle to the data under the SGP, and again finds that the forecasts of European fiscal authorities are systematically too optimistic. This evidence is not consistently strong across the set of 15 EU countries, but the bias is high for France, Italy and Portugal at all forecast horizons.[7] Beetsma et al (2011) decompose the overall optimism bias in the budget forecasts of EU governments into the component that arises between initial plans and the first release of actual

[6] Indeed, Sweden's strategy for staying out could have been to feign fiscal imprudence!
[7] He proposes delegating the macroeconomic forecasting to supranational authorities, such as the EU Commission or the IMF.

budget numbers and the component that arises between the first release and the final revised budget numbers.

One of the present authors (Frankel, 2011, 2112) recently studied forecasts of real growth rates and budget balances made by official government agencies in 33 countries. A number of striking findings emerge. (i) The official forecasts have an upward bias, which is stronger at longer horizons. On average the gap between the forecast of the budget balance and the realized balance is 0.2 percent of GDP at the one-year horizon, 0.8 percent at the two-year horizon, and 1.5 percent at the three-year horizon. (ii) One reason for the optimism bias in official budget forecasts is an optimism bias in forecasts of economic growth. The country's growth rate is an important determinant of the budget balance at all three time horizons, so over-optimism in predicting growth is linked to over-optimism in predicting budget balances. On average, the upward bias in growth forecasts is 0.4 percent when looking one year ahead, 1.1 percent at the two-year horizon, and 1.8 percent at three years. (iii) The bias is stronger in booms than in normal times. These findings can help to explain excessive budget deficits, and especially the failure to run surpluses during periods of high output: if a boom is expected to last indefinitely, then saving for a rainy day is unnecessary.

Many believe that better fiscal policy can be obtained by means of rules such as ceilings for the deficit. But Frankel (2011) also finds: (iv) countries subject to a budget rule, in the form of euroland's Stability and Growth Path, make official forecasts of growth and budget deficits that are *even more biased* and more correlated with booms than do other countries. This effect may help explain frequent violations of the SGP.

2. Data on Official Budget Forecasts

The primary data for this paper come from an expanded version of the dataset used in Frankel (2011). The dataset is composed of the official government forecasts in documents for 34 countries.[8] Of these we have at least one full decade of budget data for 24 countries. The countries with less than a decade of fiscal forecasting data are primarily Central and Eastern European countries that only began publicly providing forecasts when they began submitting Stability and Convergence Programs to the European Commission in 2005. These short time series are almost entirely concentrated around the period of the global financial crisis, 2008-2012; we exclude them from the analysis to avoid results that might be driven solely by this single unusual historical episode.

Of the remaining 24 countries, the 17 European countries[9] are the main focus of our analysis. The 7 non-European countries[10] will be used occasionally, as a standard of comparison. Beginning in 1999, the data for all European Union countries come from the Stability and Convergence Programs that EU members are required to submit annually to the European Commission as part of the Stability and Growth Pact (SGP). Prior to that, forecasts were taken directly from national budgets. The dataset contains not only forecasts of the overall budget balance, but also forecasts of real GDP growth, revenues as a percentage of GDP, expenditures as a percentage of GDP, and the inflation rate. In the Stability and Convergence Programs, EU countries are required to provide forecasts at least three years ahead, but the forecasting horizon is often shorter in other countries' budget processes. For instance, Norway only forecasts its budget balance one year ahead. More information on the official budget

[8] A list of country coverage can be found in the appendix
[9] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.
[10] Australia, Canada, Chile, Mexico, New Zealand, South Africa, and the United States.

forecast as well as the data on the realizations of these macroeconomic variables can be found in the appendix.

The budget balance forecast data used in the analysis are summarized in Table A1 of the appendix. In the table, it can be seen that budget forecast errors exhibit heterogeneous patterns across countries. Figures 1 and 2 plot the mean one and two year horizon forecast error for each of the countries in sample. The forecast error is defined as forecast budget balance minus actual budget balance, so positive numbers indicate over-optimistic forecasts. In both cases, Greece, Ireland and Portugal are the countries that have the most over-optimistic forecasts. Figure 3 plots the mean budget balance forecast error by year for European countries. The figure shows that while budget forecast errors were particularly large in the wake of the global financial crisis beginning in 2008, budget balances are generally over-optimistic throughout the full sample period. Again, the over-optimism increases with the forecast horizon. Figure 4 plots the equivalent figure for real GDP forecast errors for the European countries.

3. Influences on Official Forecasts

In order to understand the sources of budget forecast errors, it is useful to begin by examining how forecasts are affected by macroeconomic variables available contemporaneously, that is, at the time the forecasts are made. To study forecast bias we compare how macro variables explain forecast budget balance improvements and actual changes in the budget balance. [11] We define the *i*-year budget balance improvement (BBI_{t+i}) as the change in the budget balance (*BB*) between time *t* and *t+i*:

[11] In this paper, we use the revised versions of macroeconomic statistics rather than the statistics that were contemporaneously available because of data availability. For analysis of budget forecast errors using real-time data see Beetsma et. al. (2009).

$$BBI_{t+i} = BB_{t+i} - BB_t$$

The Forecast Budget Balance Improvement ($FBBI_{t+i}$) is defined equivalently, with the forecast of the year $t+i$ budget balance replacing BB_{t+i}.

Here, we limit ourselves to two explanatory variables: the current budget balance (BB_t) and the output gap (OG_t). To calculate the output gap, log real GDP is HP filtered and the output gap is defined as the cyclical component, that is, log GDP minus the trend component (times 100). Table 1 looks only at European countries. We regress Forecast and Actual Budget Balance Improvements on the current output gap and budget balance:

$$BBI_{t+i} = \beta_0 + \beta_1 BB_t + \beta_2 OG_t + \varepsilon_{t+i} .$$

The main finding in these regressions is that governments forecast too much mean reversion, with β_1 strongly negative and significant for forecast improvements but much less so for actual improvements. The magnitude of β_1 increases with the forecast horizon.

In addition, an excess of current output above trend portends a deterioration in the budget balance in the subsequent year (presumably due to reversion in output), which is not at all captured in the forecast. We find that these two macroeconomic variables – the current budget deficit and output -- explain a large fraction of forecast budget balance improvements: for European countries the R^2 is 0.41 at the one-year forecast horizon, 0.56 at the two-year forecast horizon, and 0.66 at the three-year horizon. While official government forecasts predict that deficits will be short-lived, the actual budget balance improvements have much lower β_1 coefficients.

In Table 2, rather than including just the simple budget balance at the time the forecast was made, BB_t, we allow the coefficient on the contemporaneous budget balance to differ depending on whether the budget is in surplus or deficit. Defining $Surplus_t$ as an indicator

variable that takes the value of 1 when BB_t is greater than or equal to 0, and $Deficit_t$ as an indicator variable that takes the value 1 when BB_t is less than 0, we run the regression:

$$BBI_{t+i} = \beta_0 + \beta_1 Surplus_t * BB_t + \beta_2 Deficit_t * BB_t + \beta_3 OG_t + \varepsilon_{t+i} .$$

The key finding is that at the one year horizon, the coefficient β_2 on $Deficit_t * BB_t$ is negative and very strongly significant, but the coefficient β_1 on $Surplus_t * BB_t$ is insignificantly different than zero. In the short-term, we therefore see that countries forecast deficits to disappear but do not do so for surpluses.

In column 2, we see that this prediction is qualitatively correct, as large deficits do predict budget balance improvements but surpluses do not. However, the β_2 coefficient for the forecast improvement is nearly three times as large as for the actual improvements, meaning that while deficits tend to be reduced in the short run, they are not reduced as much as they are forecast to. Interestingly, at the two year horizon, surpluses and deficits are forecast to be nearly equally mean-reverting, while at the three year horizon deficits are forecast to contract more quickly than surpluses. Thus, while government forecasts claim that deficits will be quickly eliminated, and this tendency explains a large amount of the variation in their forecasts, in reality these measures are poor predictors of the evolution of the budget deficit.

In appendix Table A4, we run a version of the regressions in Table 1 on forecast and actual real GDP growth levels. We find that while the output gap has very little explanatory power for government real GDP growth forecasts, it actually has quite a bit of explanatory power for actual GDP growth. The output gap at the time forecasts are prepared enters strongly negatively. This result should be interpreted with some caution as our measure of the output gap uses future information as it is calculated using the HP filter.

3.1 Forecast Errors

In this section, we focus explicitly on how current macroeconomic conditions relate to future forecast errors. We define the *i* year ahead budget balance forecast errors BBE_{t+i} as the forecast budget balance value minus the actual budget balance.

$$BBE_{t+i} = FBB_{t+i,t} - BB_{t+i}$$

In the above expression BBE_{t+i} indicates the realized *i* year ahead forecast error, $FBB_{t+i,t}$ is the budget balance forecast for period $t+i$ made in period *t*, and BB_{t+i} is the realized budget balance in period $t+i$. Much of the remainder of this paper will focus on understanding when countries are systematically over-optimistic in their official budget forecasts (a high value of BBE_{t+i}). We begin this exercise in the first three columns of Table 3 by seeing whether macroeconomic variables known at the time the forecast is made (time *t*) can predict the size of budget forecast errors.

$$BBE_{t+i} = \beta_0 + \beta_1 BB_t + \beta_2 OG_t + \varepsilon_{t+i} .$$

In columns 1-3 of Table 3 we see that large budget deficits at the time a forecast is made on average correspond to forecasts that prove to be over-optimistic. This bias increases with the forecast horizon. In addition, we find further support for the conclusion of Frankel (2011) that official forecasts are especially subject to wishful thinking during booms, defined here as output being above trend.[12] For European countries, a 1% increase in the output gap at the time a forecast is made is associated with a budget forecast that is 0.6% of GDP too optimistic at the one year horizon, 1.4% at the two year horizon and 1.9% at the three year horizon.

[12] Because the Output Gap is constructed using the HP filter, future data is used in constructing the contemporary output gap so these are not true predictive regressions. However, these results are generally robust to replacing the output gap with recent GDP growth.

In Table 4, we once again introduce dummy variables for surpluses and deficits to see if surpluses and deficits differentially affect budget forecast errors:

$$BBE_{t+i} = \beta_0 + \beta_1 \, Surplus_t * BB_t + \beta_2 \, Deficit_t * BB_t + \beta_3 OG_t + \varepsilon_{t+i} \, .$$

We find that at all three horizons, β_2 is negatively and strongly significant, confirming that countries with larger budget deficits are more over-optimistic in their forecasts. At the two year horizon, we again find that countries forecast that their surpluses will shrink more quickly than they do.

Tables A5 and A6 (reported in the appendix) perform the same exercise for two different subsamples: euro area countries and non euro countries. Larger current budget deficits are associated with significantly more over-optimistic budget forecasts at all horizons over both the 1999-2007 and 1999-2011 time periods for euro area countries. So the crises of 2008-2011 are not driving these results.[13] The current output gap is a robust predictor of over-optimistic budget forecasts for both euro area and non-euro area countries, over either period.

In Columns 4-6 of Table 3, we repeat this exercise for GDP growth forecast errors. Defining the real GDP growth forecast error as:

$$GDPE_{t+i} = FGDPR_{t+i,t} - GDPR_{t+i} \, ,$$

where $FGDPR_{t+i,t}$ is the time t forecast of real GDP growth rate in year $t+i$, and $GDPR_{t+i}$ is the actual real GDP growth rate in period $t+i$, we regress $GDPE_{t+i}$ on the contemporaneous output gap and budget balance to see if these current variables can explain the forecasting bias. As was the case for budget deficits, a large positive output gap is a strong predictor of over-optimistic forecasts; booms are unrealistically extrapolated into the future. A contemporary budget deficit is a weaker predictor of over-optimism and is only significant at the two year horizon.

[13] . Larger budget deficits are only a predictor of over-optimism at the two year horizon from 1999-2011 for non-euro area countries.

Governments predict that booms will continue longer than they actually do. Those countries with budget deficits have a tendency to wish them away via future growth prospects.

4. Over-optimism and the Stability and Growth Pact

Next, we explore how exactly the Stability and Growth Pact (SGP) rules relate to over-optimism in the euro area. Because the SGP forbids EU members to exceed a deficit of 3% of GDP we hypothesize that governments will be reluctant to forecast breaches of this limit and will instead shade their forecasts into the permissible range and then if necessary blame their subsequent violation on events outside their control. While all signatories of the Maastricht Treaty technically agree to abide by the SGP limits on deficits and debt, only euro area countries face the threat of sanctions for violations (in theory) or political pressure and embarrassment (in practice). We therefore treat euro area members as the only countries for whom the SGP limits are relevant.

Figure 5 offers visual support for the idea that the SGP makes countries less willing to forecast deficits greater than 3% of GDP but not necessarily less likely to violate the limit. In all four panels, the vertical red line indicates a budget deficit of 3% of GDP. In the upper left hand panel, we see that prior to the global financial crisis, only once did a euro area country forecast a violation of the 3% limit at the two year horizon, yet there is no such discontinuity for actual budget deficits (upper right hand panel). For comparison, we include a similar histogram of two year forecasts for countries outside the euro area, and the corresponding realizations in the lower right panel. In Table A7, in the appendix, we contrast forecast and actual violations of the 3% deficit/GDP limit for Euro area and non Euro area countries from 1999-2007. At all forecast

horizons, euro area countries were less likely to forecast deficits over 3% *even though they actually violated the limit more frequently*.

To examine more systematically this idea that countries bound by the Stability and Growth Pact try to avoid or postpone reprimands by means of overly optimistic forecasts, in Table 5 we begin by regressing budget forecast errors on the contemporaneous output gap OG_t and a dummy variable for membership in the euro area $Euro_t$.[14] In the first specification we omit year fixed effects (columns 1 and 4) and in the second we include them (columns 2 and 5). As can be seen in these baseline regressions, membership in the euro area alone is associated with an increase in budget forecast over-optimism, though the increase is not statistically significant at the 5% level.

In columns 3 and 6, we regress budget forecast errors on the contemporaneous output gap OG_t , a dummy variable for violation of the Excessive Deficit Procedure limit EDP_t that is 1 if the country's most recent budget deficit violates the 3% cap, a dummy variable $Euro_t$ that is 1 if the country was a member of the euro area at the time the forecast was made, and interaction terms. We also include year fixed effects to control for common time-varying shocks $\lambda_{t.}$

$$BBE_{t+i} = \beta_0 + \lambda_{t.} + \beta_1 OG_{t\ .} + \beta_2 EDP_t + \beta_3 Euro_t + \beta_4 Euro_t * OG_{t\ .} + \beta_5 Euro_t * EDP_t + \varepsilon_{t+i} \ .$$

The main result concerns the interaction between the dummy variable for membership in the euro area and a violation of the EDP at the time the forecast was made (β_5). This coefficient is large and positive in each specification at the one and two year horizons: when Euro area countries are in violation of the EDP at the time a forecast is made, their *one year forecasts are biased by over 1.5% of GDP more than non-euro violators of the EDP limit*. At the two year

[14] Because the large majority of the three-year horizon forecast data we have comes from Stability and Convergence Programs, in this section we only look at forecast errors at the one and two year horizon to ensure we have sufficient observations from countries outside the euro area.

horizon, the point estimate is over 2% of GDP. In other words, even controlling for year fixed effects, the level of the output gap, and a dummy for the common bias coming from deficits larger than 3% of GDP, euro area countries that make their budget forecasts while in violation of the deficit limit have forecasts that are 1.6% of GDP more over-optimistic at the one year horizon than non-euro countries exceeding the 3% criterion. At the two year horizon, the effect is even stronger, with Euro area countries that violate the EDP at the time a forecast is made having forecast errors over 2% of GDP more over-optimistic than other countries with deficits that large.

This result provides an enlightening interpretation of the result in Frankel (2011) that Euro area countries are overall more over-optimistic in their budget deficits: in these regressions, euro area forecast errors are comparable to non-euro area forecasts except that when the limits set out in the EDP are breached euro members have very large over-optimistic forecast errors. These regressions provide support for the idea that when faced with fiscal rules like the SGP, countries find it tempting to adjust their forecasts to meet the criteria, rather than taking the painful actions needed to meet the criteria in reality.

These bias estimates are quite large. They reflect in part the fact that these countries were hit particularly hard during the 2009 financial crisis. Nevertheless, the fact that these countries missed their forecasts so much more than other countries is quite interesting, especially since the year fixed effects take out the mean effect of the global financial crisis on government budgets.

5. National Fiscal Rules

In this section, we examine the impact of national fiscal rules on official forecast errors. Even though the eurozone's fiscal compact was only agreed in late 2011, many of the members already had rules at the national level. It should be possible to learn from their experience.

The fiscal constraints of the SGP provide a clear motivation for wishful thinking in the forecasts, in order to avoid the political embarrassment of reprimands if not outright sanctions from a supranational monitoring authority. It is not clear a priori if we should expect the same sort of pattern for national rules. On the one hand, the country is "grading its own homework." Rather than the sovereign being monitored and disciplined by an external authority removed from domestic politics, national fiscal rules are enforced by branches of the same government that does the forecasting. On the other hand, national law and especially national constitutions are often thought to take legal precedence over international agreements.

5.1 Fiscal Rule Index

Before turning to the examination of the impact of different types of fiscal rules on budget balance forecast errors, we briefly describe the indices we use to measure the strength of national fiscal rules. The underlying data on the classification of these rules come from the European Commission's (EC) "Numerical Fiscal Rules in the EU Member States."[15] The database provides the data at varied levels of aggregation. At the finest level, it provides details on every individual fiscal rule in each EU member state from 1990 through 2010 (107 individual rules). The European Commission classifies each fiscal rule as either a budget balance rule (BBR), debt rule (DR), expenditure rule (ER) or revenue rule (RR). For each rule, the EC also provides a numerical "Fiscal Rule Strength Index" (FRSI). This index is a weighted average of

[15] Available at http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm . The data on national fiscal rules in euroland were also applied to this problem by Zlatinova and Otto (2012).

five rule criteria: Statutory base of the rule, how much room the rule allows in setting or revising objectives, the nature and independence of the monitoring and enforcement body, the enforcement mechanisms of the rule, and visibility of the rule in the media.[16]

In order to construct an aggregate Fiscal Rule Index (FRI) for each country, the EC then multiplies the FRSI by the fraction of general government finances covered by the rule. If only one rule is in force in a country in a given year, this product of the FRSI and the fraction of finances covered is the Fiscal Rule Index (FRI) for the year. If, however, multiple rules apply to the same government sector[17], they are ranked by the product of the fraction of government finances they cover and their FRSIs; the strongest rule covering each government sector is given a weight of 1, the second 1/2, the third 1/3, and so on. These weighted rules[18] are then summed to form the FRI. In the EC index, budget balance rules, debt rules, revenue rules, and expenditure rules are all treated equally in the construction of the aggregate FRI.

These types of rules are conceptually different. Thus, rather than use the composite FRI constructed by the EC, which is what Zlatinova and Otto (2012) do, we construct separate FRI's for budget balance, debt, expenditure and revenue rules. We follow the same process used by the EC in constructing the aggregate index in constructing our four separate indices. We then normalize each of the indices to run between 0 and 1. For budget balance rules, the United Kingdom's budget balance rule in place from 1997-2008 achieved the highest score in sample and is therefore given the value of one in our index.[19] The budget balance rule index thus runs from 0 (no budget balance rule) to rules comparably strong as the United Kingdom's "Golden

[16] The FRSI indices use the random weights method as in Sutherland et. al. (2005).
[17] Each rule is classified by the government sector that it covers: the central government, regional governments, local governments and social security. A rule can also be classified as covering multiple sectors or the general government. If one rule covers the general government sector and a second rule covers only certain sectors, the rule covering the individual sector is discounted as it were the second rule covering that specific sector.
[18] The weighted rules are (rule weight) X (coverage of general government finances) X (FRSI).
[19] The so-called "Golden Rule" restricted the general government to borrow only to finance investment rather than current spending.

Rule." The countries for which we have data on national fiscal rules and sufficient budget forecast data[20] to include in the regressions are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. Regression results that includes specific national fiscal rules is limited to these countries, which are called "EC dataset countries" in the regressions.

Figure 6 plots these FRI for budget balance rules, revenue rules, expenditure rules, and debt rules for all of the countries on which we have data.

5.2 Budget Balance Rules

Having constructed these indices, we next examine the impact of national budget balance rules on budget forecast errors. In the first two columns of Table 6, we regress the one and two year budget balance forecast errors on the output gap, the budget balance FRI (*BBR FRI*$_t$) and an interaction term. We find that stronger national budget balance rules are associated with a statistically insignificant reduction in the amount of over-optimism in budget forecasts. In columns 3 and 4, we mirror the Euro regressions of Table 5 by adding a dummy variable for a deficit greater than 3% of GDP (EDP_t) and an interaction between this dummy and the budget balance fiscal rule index. Whereas euro area countries that violate the excessive deficit procedure at the time they are making budget forecasts make much more over-optimistic forecasts, the effect is reversed when it comes to national budget balance rules (albeit statically insignificantly different from zero). Thus, while all countries with budget balances greater than 3% of GDP generally have over-optimistic forecasts, *this bias is reduced but not eliminated by stronger*

[20] As in the previous sections, we require at least 10 budgets.

national fiscal rules. This effect is in the opposite direction from the case of the supranational SGP, although the 3% level is generally not the target of national budget balance rules.

5.3 Budget Balance Rules and the SGP

The final issue we address in this section is how exactly national budget balance rules interact with the SGP. To examine this question, in the first two columns of Table 7 we regress budget balance forecast errors on the contemporaneous output gap, the budget balance fiscal rule index, a dummy for membership in the euro area and an interaction between national budget balance rules and euro area membership.

$$BBE_{t+i} = \beta_0 + \lambda_t + \beta_1 OG_t + \beta_2 BBR\ FRI_t + \beta_3 Euro_t + \beta_4 Euro_t * BBR\ FRI_t + \varepsilon_{t+i}.$$

The main result is that while membership in the euro area is associated with more over-optimistic budget balance forecasts, this effect is reduced when euro area membership is combined with national budget balance rules. Although the direct effect of budget balance rules, without conditioning on euro membership, is statistically insignificant (Table 6), the results of the first two columns of Table 7 imply that national fiscal rules help reduce over-optimism when counteracting the effect of a supranational rule.

The last four columns of Table 7 attempt to understand why national fiscal rules are effective in reducing the bias in euro area forecasts. Since the over-optimism bias in the euro area is mainly present when countries are already in violation of the statutory limit, we examine whether national fiscal rules are effective in eliminating this specific bias. To do so, we look at the coefficient on an interaction variable of $Euro_t*BBR\ FRI_t*EDP_t$, a dummy variable for membership in the euro area, the budget balance FRI, and a dummy variable for violation of the 3% limit. In columns 3 and 4, we include this interaction along with $Euro_t*EDP_t$, a dummy for

euro membership, a dummy for violation of the EDP and the output gap. We find that the coefficient on the $Euro_t*EDP_t$ variable is large, positive, and significant, confirming the earlier result that euro area member forecasts are particularly biased when made at a time when the deficit is larger than the 3% cap. However, this effect is greatly reduced if the country has fiscal rules, as seen by the coefficient on $Euro_t*BBR\ FRI_t*EDP_t$. Based on the point estimates, if a euro country violating the EDP limit were to go from having no fiscal rule to adopting a rule as strong as Britain's Golden Rule, we estimate that forecast bias, at the one year horizon, would be no more optimistic than that of a non-euro area country not in violation of the EDP limit (.980+2.646-3.771). This is also the case for the two year horizon, which is particularly interesting because even non-euro area countries have very biased forecasts when they have deficits large enough that they would violate the 3% limit (the coefficient on the EDP dummy is over 2). Therefore, strong fiscal rules can counteract not just the bias among euro area countries, but also the bias that other countries with comparably large deficits face. In columns 5 and 6 we repeat the analysis of columns 3 and 4 but include all possible interaction terms of EDP violation, budget balance rules, and Euro area membership. The coefficients are nearly unchanged from columns 3 and 4, though the individual coefficients lose some significance.

6. Independent fiscal institutions and the SGP

In this section, we consider the effect of combining budget balance rules with independent government forecasts. As described in Frankel (2012), the Chilean government has been successful in combining fiscal rules with a legal requirement to use forecasts of a panel of independent experts in the government budget process. The European Commission has a database on the role of independent fiscal institutions in the budgetary processes across EU

member states.[21] Unfortunately it is not possible to create a proper time series as in the case of the national budget balance rules.[22]

For each EU member, if the country has an independent fiscal institution the database includes its date of creation, whether the government is required to consult with it during the budgetary process, whether it is generally consulted despite the lack of a legal obligation, whether it provides an analysis of fiscal policy with or without normative judgment, whether it provides independent macroeconomic or budgetary forecasts, how the government is required to use its forecasts during the budgetary process, and several other pieces of information.

In Table 8 we limit ourselves to using only one dimension of the database: whether a country has an independent fiscal institution that provides independent forecasts of the general government budget balance. While we would have liked to examine the impact of the government being legally bound to use these forecasts, as in Chile, no country in the European Union has a legal or constitutional obligation to use the independent forecasts.[23]

Therefore, we are limited to analyzing the effect that the existence of an independent fiscal institution making independent forecasts has on the government's own forecasts. In Table 8, $IND\ FBB_t$ is a dummy variable that takes the value 1 if the country has an independent fiscal institution that provides independent budget balance forecasts at time t.[24] In Columns 3-4 of Table 8, conditional on the current output gap and budget balance, the forecasting bias associated

[21] Available at http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/independent_institutions/index_en.htm. The European Commission defines independent fiscal institutions as "non partisan public bodies, other than the central bank, government or parliament that prepare macroeconomic forecasts for the budget, monitor fiscal performance and/or advise the government on fiscal policy matters." The EC notes that one of the benefits of these institutions is that they "can provide macroeconomic forecasts for the budget preparation that do not suffer from the optimistic biases often found in official government forecasts."

[22] Other than through the dates the independent fiscal institutions were founded, the database does not include whether the tasks performed by the institution or its legal position has changed since its inception. Therefore, we assume that these characteristics are unchanged since the institutions were created.

[23] In Austria, the government needs to justify publicly deviations from the forecasts of the Austrian Institute of Economic Research.

[24] In constructing this variable, we assume that if the independent fiscal institution provides independent forecasts as of 2010 that it provided these forecasts since the institution's creation.

with euro membership appears to be reduced in countries where independent fiscal institutions provide independent budget balance forecasts. Without conditioning on the present budget balance (Columns 1 and 2), the sign is the same and the magnitude is economically significant, though not statistically so.

In columns 5 and 6, we examine whether independent forecasts can be helpful in overcoming the tendency of euro area countries to offer more biased budget forecasts when they are in violation of the 3% SGP limit. In Columns 5 and 6, we see this is in fact the case: although euro area countries violating the EDP at the time a forecast is made ($Euro_t * EDP_t$) offer more optimistic forecasts, this bias is reduced for euro area countries violating the EDP that have independent budget forecasts ($Euro_t * Ind\ FBB_t * EDP_t$). It is unclear why the direct effect of independent forecasts and violations of the EDP ($Ind\ FBB_t * EDP_t$) is so strong at the two year horizon. But even this strong effect is more than reversed by the effect for $Euro_t * Ind\ FBB_t * EDP_t$.

The regressions show that euro area governments making forecasts while in violation of the EDP with an independent fiscal institution that makes independent budget forecasts have a mean bias that is smaller by 2.9% of GDP at the one-year horizon and 2.6% of GDP at the two year horizon, compared to a euro area country violating the EDP without such an independent fiscal institution.

The causal interpretation of these results must be qualified: countries that place a high value on the integrity of the forecasts may be less inclined to bias their budget forecasts and may be more inclined to adopt national fiscal rules or create independent fiscal institutions compared to other countries.

7. Conclusion

Our two most important conclusions can be stated succinctly. First, Euro area countries appear to have responded to the 3% limit imposed by the Stability and Growth Pact by offering over-optimistic forecasts when they are most in danger of breaching the limit. Second, national budget balance rules or independent fiscal institutions that provide their own independent forecasts help to reduce this bias.

8. References

Alesina, Alberto, Ricardo Hausmann, Rudolf Hommes, and Ernesto Stein, 1999, "Budget Institutions and Fiscal Performance in Latin America," *Journal of Development Economics,* Vol. 59, 253–273.

Anderson, Barry, and Joseph Minarik, 2006, "Design Choices for Fiscal Policy Rules," *OECD Journal on Budgeting* vol.5, no.4, 159-208.

Ashiya, Mashahiro, 2005, "Twenty-two years of Japanese institutional forecasts," *Applied Financial Economics Letters* 1, no. 2, pp. 79-84.

Ashiya, Mashahiro, 2007, "Forecast Accuracy of the Japanese Government: Its Year-Ahead GDP Forecast is Too Optimistic," *Japan and the World Economy* 19, no. 1, January, 68-85.

Auerbach, Alan, 1994, "The U.S. Fiscal Problem: Where We are, How We Got Here and Where We're Going," *NBER Macroeconomics Annual 1994*, Volume 9, pp. 141-186.

----- 1999, "On the Performance and Use of Government Revenue Forecasts," *National Tax Journal*, vol.52, no.4, pp. 765-82.

Beetsma, Roel, Benjamin Bluhm, Massimo Giuliodori and Peter Wierts, 2011, "From First-Release to Ex-Post Fiscal Data: Exploring the Sources of Revision Errors in the EU," Centre for Economic Policy Research Discussion Paper 8413, June.

Beetsma, Roel, Massimo Giuliodori, and Peter Wierts, 2009, "Planning to Cheat: EU Fiscal Policy in Real Time," *Economic Policy* 24, 60, 753-804.

Brück, Tilman, and Andreas Stephan, 2006, "Do Eurozone Countries Cheat with their Budget Deficit Forecasts?" *Kyklos* 59, no. 1, Feb., 3-15.

Buti, M., D Franco and H Ongena, 1998, "Fiscal Discipline and Flexibility in EMU: The Implementation of the Stability and Growth Pact," *Oxford Review of Economic Policy*, 14 (3): 81-97.

Debrun, Xavier, Laurent Moulin, Alessandro Turrini, Joaquim Ayuso-i-Casals, and Manmohan Kumar, 2008, "Tied to the Mast? National Fiscal Rules in the European Union," *Economic Policy*, Vol 23, Issue 54, April: 297-362.

Forni, Lorenzo, and Sandro Momigliano, 2004, "Cyclical Sensitivity of Fiscal Policies Based on Real-Time Data", *Applied Economics Quarterly* 3, 50: pp. 299-326. Economic Research Department WP no. 540, Bank of Italy.

Frankel, Jeffrey, 2011. "Over-optimism in forecasts by official budget agencies and its implications." *Oxford Review of Economic Policy*, No. 4, Vol. 27, pp. 536-562.

Frankel, Jeffrey, 2012, "A Solution to Fiscal Procyclicality: The Structural Budget Institutions Pioneered by Chile," forthcoming in *Fiscal Policy and Macroeconomic Performance,* edited by Luis Felipe Céspedes and Jordi Galí, Series on Central Banking, Analysis, and Economic Policies, vol.17. NBER Working Paper No.16945.

Frendreis, John, and Raymond Tatalovich, 2000, "Accuracy and Bias in Macroeconomic Forecasting by the Administration, the CBO, and the Federal Reserve Board," *Polity* Vol. 32, No. 4 (Summer), pp. 623-632.

International Monetary Fund, 2009. "Fiscal Rules--Anchoring Expectations for Sustainable Public Finances." IMF Working Paper.

Jonung, Lars, and Martin Larch, 2006, "Improving Fiscal Policy in the EU: The Case for Independent Forecasts," *Economic Policy*, 21(47), pp. 491–534.

Kopits, George, 2001, "Fiscal Rules: Useful Policy Framework Or Unnecessary Ornament?" IMF.

Marinheiro, Carlos. 2010, "The Stability and Growth Pact, Fiscal Policy Institutions and Stabilization in Europe," *International Economics and Economic Policy*, Springer, vol. 5(1), July, pp. 189-207

McNab, Robert M., Mark Rider, Kent Wall, 2007, "Are Errors in Official US Budget Receipts Forecasts Just Noise?" Andrew Young School Research Paper Series Working Paper 07-22, April.

McNees, Stephen, 1995, "An Assessment of the "Official" Economic Forecasts," *New England Economic Review*.

Milesi-Ferretti , Gian Maria, 2004, "Good, Bad or Ugly? On the Effects of Fiscal Rules with Creative Accounting," *Journal of Public Economics*, 88, Issues 1-2, January, pp. 377-394.

Mühleisen, Martin, Stephan Danninger, David Hauner, Kornélia Krajnyák, and Bennett Sutton, 2005, "How Do Canadian Budget Forecasts Compare With Those of Other Industrial Countries?" IMF Working Paper 05/66, April.

O'Neill, Tim, 2005, *Review of Canadian Fiscal Forecasting: Processes and Systems*, Department of Finance, Canada, June. http://www.fin.gc.ca/toc/2005/oneil_-eng.asp

Persson, Torsten, and Guido Tabellini, 2004, "Constitutional Rules and Fiscal Policy Outcomes," *American Economic Review*, 94, Number 1, March, pp. 25-45.

Poterba, James, 1997, "Do Budget Rules Work?" in A.Auerbach ed., *Fiscal Policy: Lessons From Empirical Research* (Cambridge: MIT Press). pp.53-86.

Schaechter, Andrea, Tidiane Kinda, Nina Budina and Anke Weber, 2012, "Fiscal Rules in Response to the Crisis-Toward the 'Next-Generation' Rules. A New Dataset." IMF Working Paper 12/187, July.

Sutherland, Douglas, Robert Price, and Isabelle Journard, 2005, "Fiscal Rules for Sub-Central Governments: Design and Impact." OECD Working Paper 52, December.

Wyplosz, Charles, 2005, "Fiscal Policy: Institutions Versus Rules," *National Institute Economic Review* vol.191, no.1, January pp.64-78. CEPR Discussion Papers no. 3238.

Zlatinova, Snezhana, and Max Otto, 2012, "Fixing Budget Deficits in the EU: An Evaluation of Key Issues and Proposed Modifications for Fiscal Rules in the Eurozone," Second Year Policy Analysis, MPA/ID Program, Harvard Kennedy School, March.

Tables and Figures

All regression have Robust standard errors in parentheses, clustered are the country level
*** p<0.01, ** p<0.05, * p<0.1

Table 1: Budget Balance Forecasts and Realizations, Europe, All years

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	$FBBI_{t+1}$	BBI_{t+1}	$FBBI_{t+2}$	BBI_{t+2}	$FBBI_{t+3}$	BBI_{t+3}
BB_t	-0.289**	-0.0895**	-0.464***	-0.154	-0.582***	-0.127
	(0.104)	(0.0419)	(0.0645)	(0.111)	(0.0665)	(0.241)
OG_t	0.0743	-0.563***	0.0777	-0.274	-0.0148	1.014***
	(0.0906)	(0.107)	(0.101)	(0.235)	(0.0756)	(0.240)
Constant	-0.0414	-0.269	-0.118	-0.0706	0.317	-0.294**
	(0.290)	(0.154)	(0.170)	(0.119)	(0.205)	(0.109)
Observations	243	243	210	210	164	164
R-squared	0.411	0.136	0.562	0.042	0.664	0.047
Countries	17	17	16	16	15	15
Year FE	No	No	No	No	No	No

Table 2: Budget Balance Forecasts and Realizations, Europe, All years

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	$FBBI_{t+1}$	BBI_{t+1}	$FBBI_{t+2}$	BBI_{t+2}	$FBBI_{t+3}$	BBI_{t+3}
$Surplus_t*BB_t$	-0.0647	0.0148	-0.466***	0.0936	-0.452***	0.142
	(0.0569)	(0.0213)	(0.0643)	(0.206)	(0.0929)	(0.280)
$Deficit*BB_t$	-0.465***	-0.172***	-0.463***	-0.238	-0.672***	-0.314
	(0.0930)	(0.0469)	(0.0869)	(0.212)	(0.113)	(0.610)
OG_t	0.101*	-0.550***	0.0780	-0.315	-0.0511	0.938***
	(0.0568)	(0.0980)	(0.0948)	(0.276)	(0.0689)	(0.153)
Constant	-0.749**	-0.598**	-0.116	-0.434	0.0717	-0.805
	(0.264)	(0.214)	(0.223)	(0.500)	(0.299)	(1.019)
Observations	243	243	210	210	164	164
R-squared	0.522	0.152	0.562	0.049	0.671	0.051
Countries	17	17	16	16	15	15
Year FE	No	No	No	No	No	No

Table 3: Errors in Forecasting Budget Balance and Growth Europe

VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+2}	(3) BBE_{t+3}	(4) $GDPE_{t+1}$	(5) $GDPE_{t+2}$	(6) $GDPE_{t+3}$
BB_t	-0.199**	-0.346***	-0.401***	-0.0594	-0.161***	-0.124
	(0.0689)	(0.104)	(0.110)	(0.0450)	(0.0391)	(0.0928)
OG_t	0.637***	1.418***	1.875***	0.947***	1.010***	0.457***
	(0.114)	(0.292)	(0.409)	(0.0754)	(0.0878)	(0.146)
Constant	0.227	0.533**	1.360***	0.303*	0.534***	1.018***
	(0.230)	(0.199)	(0.287)	(0.154)	(0.121)	(0.180)
Observations	243	210	164	239	209	164
R-squared	0.190	0.343	0.368	0.453	0.326	0.055
Countries	17	16	15	17	16	15
Year FE	No	No	No	No	No	No

Table 4: Errors in Forecasting Budget Balance, Europe

VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+2}	(3) BBE_{t+3}
$Surplus_t*BB_t$	-0.0795	-0.295**	-0.175
	(0.0573)	(0.108)	(0.171)
$Deficit*BB_t$	-0.293***	-0.363**	-0.558***
	(0.0645)	(0.134)	(0.180)
OG_t	0.651***	1.409***	1.812***
	(0.113)	(0.281)	(0.452)
Constant	-0.150	0.459	0.932**
	(0.169)	(0.274)	(0.404)
Observations	243	210	164
R-squared	0.213	0.344	0.374
Countries	17	16	15
Year FE	No	No	No

Table 5: The Euro and Budget Balance Forecast errors

VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+1}	(3) BBE_{t+1}	(4) BBE_{t+2}	(5) BBE_{t+2}	(6) BBE_{t+2}
OG_t	0.436***	0.00956	0.0643	1.138***	0.420	0.0154
	(0.126)	(0.197)	(0.214)	(0.224)	(0.322)	(0.218)
EDP_t			0.986			1.492*
			(0.620)			(0.769)
$Euro_t$	0.491	0.732	-0.135	0.908*	0.480	-0.492
	(0.469)	(0.474)	(0.372)	(0.498)	(0.673)	(0.484)
$Euro_t*OG_t$			-0.208			0.346
			(0.213)			(0.339)
$Euro_t*EDP_t$			1.639**			2.078*
			(0.726)			(1.052)
Constant	0.218	0.290	1.871***	0.558*	1.162***	2.934***
	(0.231)	(0.206)	(0.480)	(0.278)	(0.336)	(0.473)
Observations	244	244	243	211	211	210
R-squared	0.064	0.254	0.375	0.244	0.393	0.519
Year FE	No	Yes	Yes	No	Yes	Yes

Table 6: National Budget Balance rules of the Excessive Deficit Procedure

VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+2}	(4) BBE_{t+1}	(6) BBE_{t+2}
OG_t	0.180	0.740	0.146	0.692
	(0.266)	(0.511)	(0.269)	(0.536)
$BBR\ FRI_t$	-1.423	-1.754	-0.0313	0.235
	(0.993)	(1.187)	(0.315)	(0.460)
$BBR\ FRI_t*OG_t$	-0.0703	-0.636	-0.222	-0.849
	(0.442)	(0.669)	(0.449)	(0.677)
EDP_t			2.652**	3.868***
			(1.075)	(1.194)
$BBR\ FRI_t*EDP_t$			-1.743	-2.285
			(1.386)	(1.568)
Constant	3.095***	4.278***	0.444	0.411
	(0.00781)	(0.0150)	(1.074)	(1.199)
Observations	218	196	218	196
R-squared	0.277	0.429	0.377	0.543
Year FE	Yes	Yes	Yes	Yes

Notes: EC dataset countries.

Table 7: National Budget Balances Rules, the Euro Area and the EDP

VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+2}	(3) BBE_{t+1}	(4) BBE_{t+2}	(5) BBE_{t+1}	(6) BBE_{t+2}
OG_t	0.105	0.470	-0.0281	0.282	-0.0569	0.263
	(0.206)	(0.333)	(0.206)	(0.350)	(0.203)	(0.354)
EDP_t			0.980	2.157**	0.905	2.150
			(0.658)	(0.779)	(0.893)	(1.280)
$BBR\ FRI_t$	0.306	-0.367			0.642	0.609
	(1.259)	(1.587)			(0.576)	(0.855)
$Euro_t$	1.699*	1.269	-0.205	-0.231	0.603	0.511
	(0.939)	(1.351)	(0.387)	(0.499)	(0.767)	(1.143)
$Euro_t*BBR\ FRI_t$	-2.925**	-2.660			-1.233	-1.111
	(1.175)	(1.664)			(1.061)	(1.628)
$Euro_t*EDP_t$			2.646**	2.509*	2.502*	2.324
			(1.051)	(1.326)	(1.246)	(1.664)
$BBR\ FRI_t*EDP_t$					0.676	0.612
					(0.886)	(2.031)
$Euro_t*BBR\ FRI_t*EDP_t$			-3.771*	-4.466**	-3.854*	-4.579
			(1.770)	(1.760)	(2.003)	(2.845)
Constant	3.097***	4.286***	2.121***	2.135**	2.197**	2.142
	(0.00605)	(0.00976)	(0.655)	(0.776)	(0.891)	(1.280)
Observations	218	196	218	196	218	196
R-squared	0.302	0.434	0.414	0.552	0.420	0.555
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: EC dataset countries.

Table 8: Independent Fiscal Institutions and Forecast Errors

VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+2}	(3) BBE_{t+1}	(4) BBE_{t+2}	(5) BBE_{t+1}	(6) BBE_{t+2}
OG_t	0.151	0.479	0.219	0.419	0.0309	0.294
	(0.204)	(0.338)	(0.251)	(0.411)	(0.204)	(0.346)
BB_t			-0.336***	-0.458***		
			(0.0497)	(0.0863)		
EDP_t					0.915	0.0785
					(0.765)	(0.667)
$IND\ FBB_t$	-0.0818	-0.451	1.006*	1.087	0.187	0.201
	(0.625)	(0.752)	(0.56)	(0.638)	(0.307)	(0.832)
$Euro_t$	1.244	1.036	1.291**	1.297*	0.112	2.235*
	(0.715)	(0.871)	(0.482)	(0.724)	(0.435)	(1.088)
$Euro_t$* $Ind\ FBB_t$	-1.393	-1.166	-2.270***	-2.624**	-0.55	-0.797
	(0.827)	(1.005)	(0.658)	(0.947)	(0.776)	(1.005)
$Euro_t$ * EDP_t					2.870**	2.13
					(1.199)	(1.729)
$Ind\ FBB_t$ * EDP_t					0.854	4.681***
					(0.989)	(0.686)
$Euro_t$* $Ind\ FBB_t$* EDP_t					-3.426**	-6.710***
					(1.481)	(1.506)
Constant	3.096***	4.286***	-0.732	-0.932	2.185**	2.057*
	(0.00597)	(0.00992_	(0.561)	(0.985)	(0.762)	(1.085)
Observations	218	196	218	196	218	196
R-squared	0.299	0.43	0.462	0.55	0.453	0.576
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: EC dataset countries.

Figures

Figure 1: Mean One year ahead budget forecast errors, European Countries

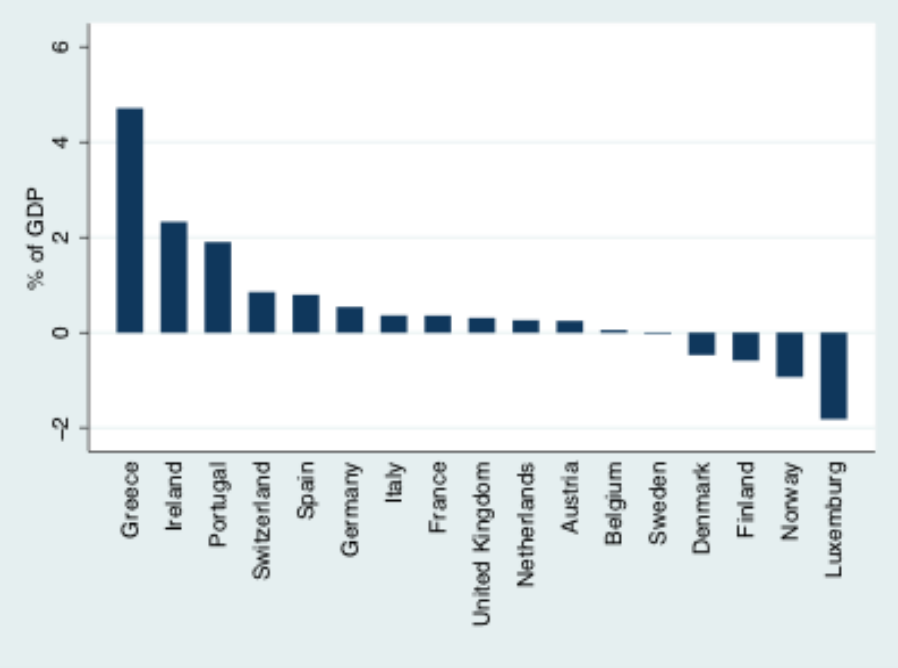

Figure 2: Mean Two year ahead budget forecast errors, European Countries

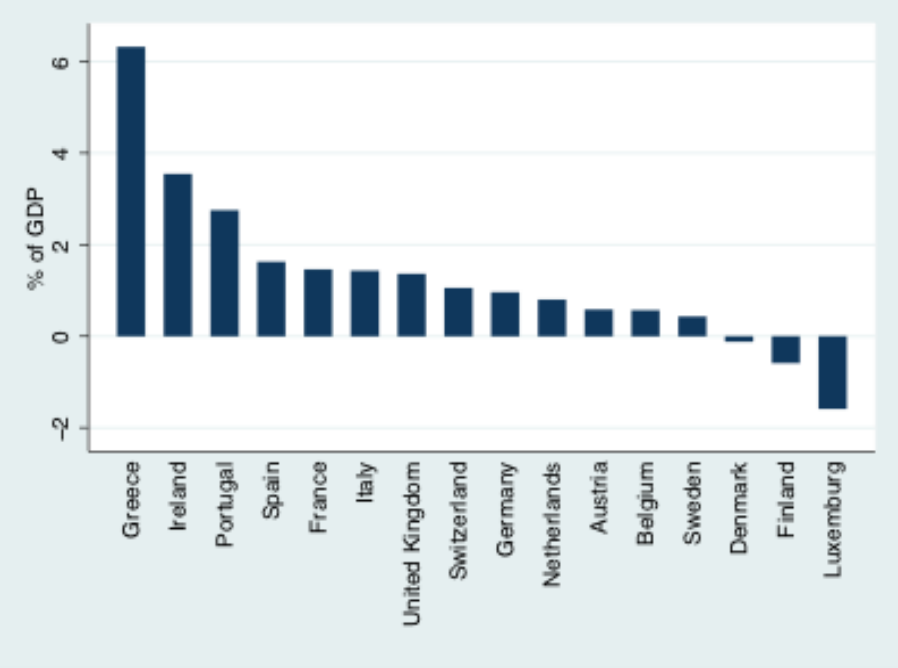

Figure 3: Mean Budget Forecast Error, European Countries

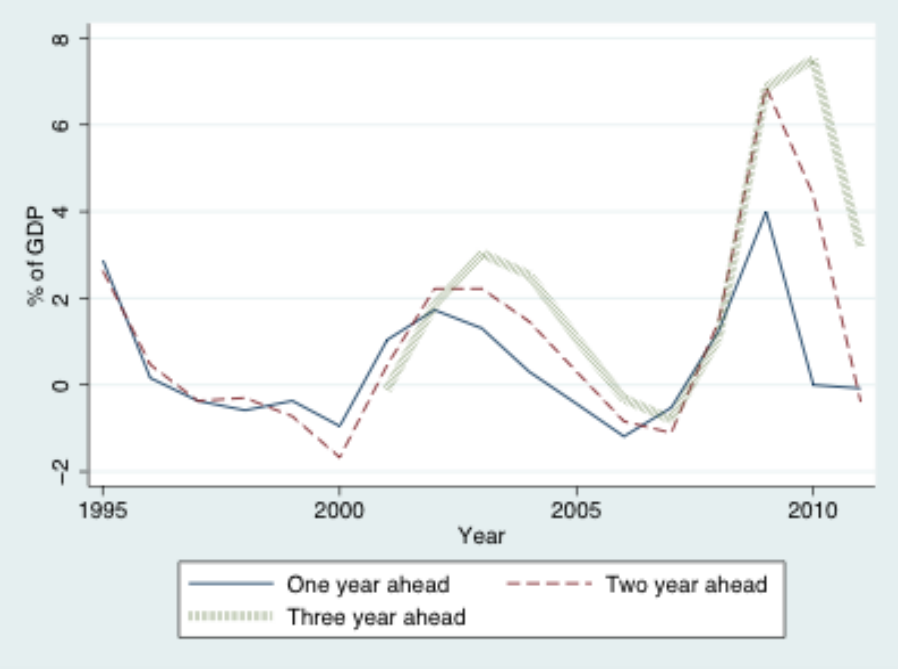

Figure 4: Mean Real GDP Growth Rate Forecast Error, European Countries

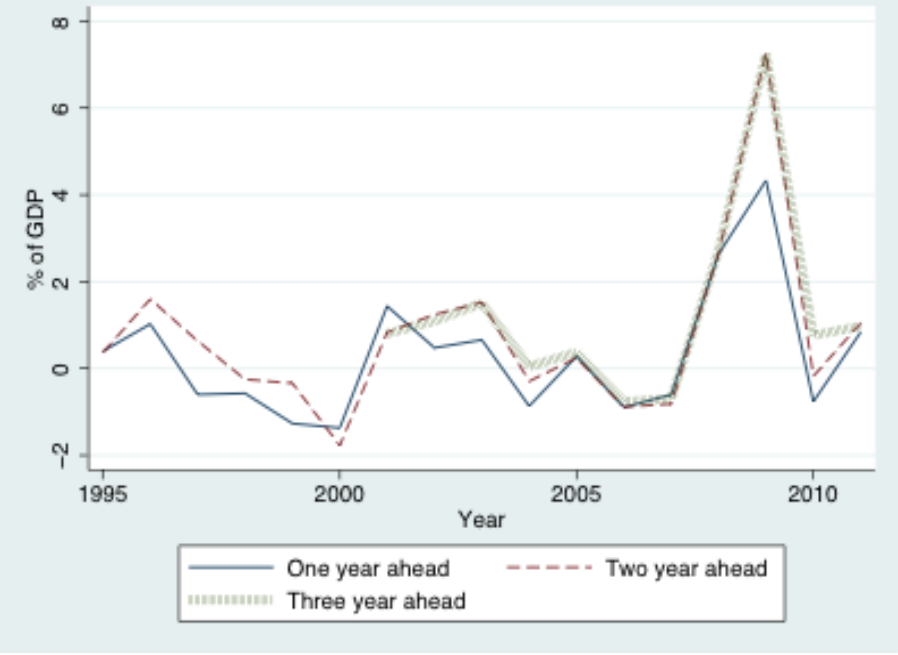

Figure 5: Budget balance forecasts and realizations: Euro Area v. Non-Euro Area pre-2008

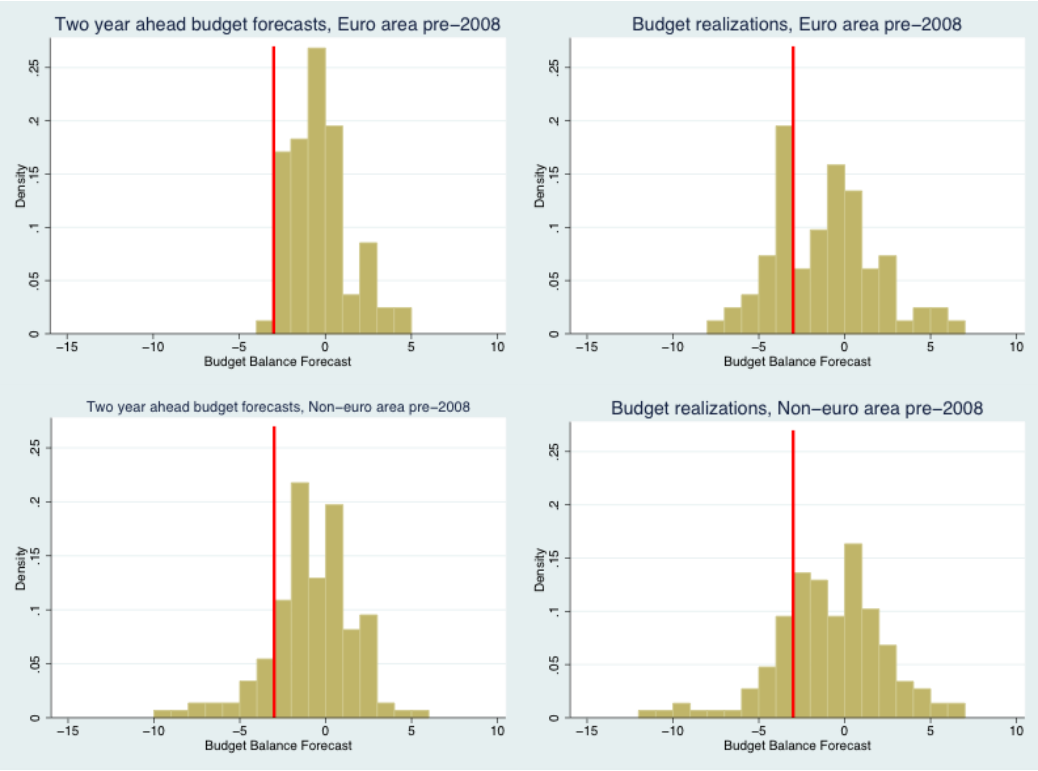

Figure 6: Fiscal Rules in the European Union

Appendix for "Over-optimistic Official Forecasts in the Eurozone and Fiscal Rules" by Jeffrey Frankel and Jesse Schreger

Tables

Table A1: Balance Forecast Errors (% of GDP)

Country		One Year	Two Year	Three Year
Australia	mean	-0.2	-0.3	1.2
1985 -2009	min	-2.8	-1.5	-1.1
	max	4.2	3.5	3.4
	obs	25	14	2
Austria	mean	0.2	0.6	1.1
1999 -2011	min	-1.3	-1.5	-2.1
	max	3.7	3.9	4.9
	obs	13	12	11
Belgium	mean	0.1	0.6	1.4
1999 -2011	min	-1.0	-2.2	-1.1
	max	2.5	5.9	6.3
	obs	13	12	11
Canada	mean	-0.9	-0.5	
1985 -2010	min	-2.4	-2.5	
	max	1.3	2.7	
	obs	25	22	0
Chile	mean	-1.5		
1977 -2009	min	-8.3		
	max	7.1		
	obs	33	0	0
Denmark	mean	-0.5	-0.1	0.4
1999 -2011	min	-3.3	-3.6	-3.3
	max	2.7	4.7	4.5
	obs	13	12	11
Finland	mean	-0.6	-0.6	0.3
1999 -2011	min	-2.5	-4.7	-3.1
	max	4.6	6.1	5.3
	obs	13	12	11
France	mean	0.4	1.5	2.6
1996 -2011	min	-1.1	-0.8	-0.1
	max	3.6	5.8	6.6
	obs	16	12	11
Germany	mean	0.5	1.0	1.5
1991 -2011	min	-2.3	-3.5	-2.2
	max	7.5	7.6	4.8
	obs	21	20	11
Greece	mean	4.7	6.3	7.6
2000 -2011	min	1.6	2.9	4.3
	max	11.9	14.8	14.4
	obs	12	11	10
Ireland	mean	2.3	3.5	5.5
1999 -2011	min	-3.5	-3.5	-4.0
	max	19.6	26.5	30.2
	obs	13	12	11
Italy	mean	0.4	1.4	3.1
1990 -2011	min	-4.0	-3.7	0.2

	max	3.1	7.8	6.8
	obs	22	21	11
Luxemburg	mean	-1.8	-1.6	-0.4
1999 -2011	min	-5.6	-4.8	-4.8
	max	1.9	2.6	4.5
	obs	13	12	11
Mexico	mean	0.4	0.3	0.5
1995-2009	min	-0.1	-0.6	0.1
	max	2.3	1.6	1.1
	obs	15	5	4
Netherlands	mean	0.3	0.8	1.7
1995 -2011	min	-2.6	-3.1	-2.1
	max	6.8	6.2	6.5
	obs	17	12	11
New Zealand	mean	0.0	-0.3	-0.8
1995 -2008	min	-2.5	-2.4	-0.8
	max	2.9	3.9	-0.8
	obs	14	13	1
Norway	mean	-0.9		
2002 -2011	min	-5.3		
	max	5.8		
	obs	10	0	0
Portugal	mean	1.9	2.8	4.0
1999 -2010	min	-0.6	-2.4	1.0
	max	6.3	8.7	9.4
	obs	12	12	11
South Africa	mean	-0.2	-0.6	-0.8
1998 -2009	min	-2.9	-3.9	-3.8
	max	5.6	5.5	4.5
	obs	12	11	10
Spain	mean	0.8	1.6	2.6
1999 -2011	min	-1.5	-2.2	-2.2
	max	5.7	12.4	12.1
	obs	13	12	11
Sweden	mean	0.0	0.4	1.5
1998 -2011	min	-3.7	-2.5	-2.7
	max	3.4	4.6	4.6
	obs	14	13	11
Switzerland	mean	0.8	1.1	
1990 -2005	min	-0.6	-1.1	
	max	2.7	3.1	
	obs	16	15	0
United Kingdom	mean	0.3	1.4	3.0
1997 -2011	min	-3.4	-3.9	-0.6
	max	3.4	9.1	9.8
	obs	15	13	11
United States	mean	0.4	1.3	2.1
1986 -2011	min	-2.2	-3.1	-3.6
	max	7.4	8.9	8.7
	obs	26	25	22

Note: The years refer to the years for which we have data on the one year ahead budget forecast error.

Table A2: Summary Statistics for Errors in Budget Balance Forecasts (% of GDP) by year

year	One year	Two Year	Three year
1997	-0.12	-0.11	-2.38
1998	-0.06	-0.42	-3.02
1999	-0.30	-0.78	-2.52
2000	-0.83	-1.59	-2.32
2001	0.62	0.06	-0.26
2002	1.44	1.77	1.85
2003	0.96	1.94	3.02
2004	-0.09	1.06	2.59
2005	-0.71	-0.03	1.01
2006	-1.37	-0.93	-0.45
2007	-0.88	-1.05	-0.90
2008	0.89	1.03	0.78
2009	3.88	6.22	6.35
2010	-0.03	4.34	7.57
2011	-0.05	-0.20	3.48

Table A3: Mean Budget Forecast Errors

Country	BBE_{t+1}	BBE_{t+2}	BBE_{t+3}
Australia	-0.24	-0.27	1.16
Austria	0.25	0.58	1.11
Belgium	0.05	0.57	1.45
Canada	-0.93	-0.53	
Chile	-1.54		
Denmark	-0.47	-0.12	0.44
Finland	-0.58	-0.58	0.31
France	0.36	1.46	2.57
Germany	0.54	0.96	1.52
Greece	4.71	6.32	7.60
Ireland	2.32	3.54	5.46
Italy	0.36	1.43	3.09
Luxemburg	-1.82	-1.58	-0.37
Mexico	0.41	0.27	0.46
Netherlands	0.26	0.80	1.74
New Zealand	0.05	-0.28	-0.80
Norway	-0.93		
Portugal	1.90	2.75	4.04
South Africa	-0.16	-0.59	-0.85
Spain	0.79	1.63	2.60
Sweden	-0.02	0.43	1.47
Switzerland	0.85	1.05	
UK	0.31	1.36	3.01
United States	0.43	1.35	2.06
Average	**0.29**	**0.93**	**1.90**

Table A4: Real GDP Growth Rate Forecasts and Realizations, Europe, All years

VARIABLES	(1) $FGDPR_{t+1}$	(2) $GDPR_{t+1}$	(3) $FGDPR_{t+2}$	(4) $GDPR_{t+2}$	(5) $FGDPR_{t+3}$	(6) $GDPR_{t+3}$
BB_t	0.0837**	0.143*	0.0627	0.223***	0.0327	0.156**
	(0.0370)	(0.0792)	(0.0520)	(0.0588)	(0.0818)	(0.0728)
OG_t	0.00365	-0.943***	-0.0328	-1.043***	-0.0910*	-0.548***
	(0.0486)	(0.0807)	(0.0364)	(0.0963)	(0.0427)	(0.142)
Constant	2.417***	2.114***	2.723***	2.189***	2.827***	1.809***
	(0.191)	(0.301)	(0.263)	(0.245)	(0.282)	(0.203)
Observations	239	239	209	209	164	164
R-squared	0.092	0.276	0.044	0.340	0.014	0.082
Countries	17	17	16	16	15	15
Year FE	No	No	No	No	No	No

Robust standard errors in parentheses, clustered at the country level
*** p<0.01, ** p<0.05, * p<0.1

Table A5: Euro Area Forecast errors

	1999-2007			1999-2011		
VARIABLES	(1) BBE_{t+1}	(2) BBE_{t+2}	(3) BBE_{t+3}	(4) BBE_{t+1}	(5) BBE_{t+2}	(6) BBE_{t+3}
BB_t	-0.381***	-0.381***	-0.353**	-0.349***	-0.449***	-0.369**
	(0.0883)	(0.0934)	(0.118)	(0.0351)	(0.107)	(0.125)
OG_t	0.523*	1.075***	1.448***	0.704***	1.542***	1.839***
	(0.238)	(0.253)	(0.182)	(0.126)	(0.345)	(0.499)
Constant	-0.158	0.429**	0.957***	-0.03	0.687**	1.550***
	(0.191)	(0.186)	(0.249)	(0.247)	(0.29)	(0.33)
Observations	94	82	70	141	130	118
R-squared	0.282	0.318	0.39	0.281	0.389	0.34
Countries	12	12	12	12	12	12
Year FE	No	No	No	No	No	No

Robust standard errors in parentheses, clustered at the country level
*** p<0.01, ** p<0.05, * p<0.1

Table A6: Non-Euro Area Forecast errors

	1999-2007			1999-2011		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	BBE_{t+1}	BBE_{t+2}	BBE_{t+3}	BBE_{t+1}	BBE_{t+2}	BBE_{t+3}
BB_t	-0.0949	-0.0842	0.303	-0.0989	-0.299**	-0.225
	(0.105)	(0.117)	(0.249)	(0.0588)	(0.121)	(0.214)
OG_t	-0.0387	0.712**	1.264**	0.497***	1.178***	1.896***
	(0.133)	(0.291)	(0.439)	(0.0958)	(0.246)	(0.380)
Constant	-0.305	-0.219	0.672	-0.134	0.193	0.970*
	(0.189)	(0.283)	(0.437)	(0.164)	(0.282)	(0.463)
Observations	103	78	40	135	104	63
R-squared	0.031	0.091	0.351	0.092	0.303	0.384
Countries	No	No	No	No	No	No
Year FE	13	10	6	13	10	8

Robust standard errors in parentheses, clustered at the country level
*** p<0.01, ** p<0.05, * p<0.1

Table A7: Forecast and Actual Violations of the Excessive Deficit Procedure 3% Limit, 1999-2007

Euro v. Non-Euro members, One year EDP violations/forecasts

Euro	A.N.V.	A.V.	Total
F.N.V.	63	23	86
F.V.	1	7	8
Total	64	30	94

Non-Euro	A.N.V.	A.V.	Total
F.N.V.	102	8	110
F.V.	5	0	5
Total	107	8	115

Euro v. Non-Euro members, Two year EDP violations/forecasts

Euro	A.N.V.	A.V.	Total
F.N.V.	54	27	81
F.V.	0	1	1
Total	54	28	82

Non-Euro	A.N.V.	A.V.	Total
F.N.V.	80	8	88
F.V.	5	0	5
Total	85	8	93

Euro v. Non-Euro members, Three year EDP violations/forecasts

Euro	A.N.V.	A.V.	Total
F.N.V.	46	24	70
F.V.	0	0	0
Total	46	24	70

Non-Euro	A.N.V.	A.V.	Total
F.N.V.	41	10	51
F.V.	2	0	2
Total	43	10	53

Notes: F.N.V. denotes a forecast budget deficit smaller than 3% of GDP ("Forecast: No Violation"), F.V. denotes a budget deficit breaking the 3% limit ("Forecast Violation"), A.N.V. denotse a realized deficit smaller than 3% of GDP ("Actual: No Violation"), and A.V. denotes a realized deficit greater than the 3% limit ("Actual Violation").

Data Appendix

Budget Balance and Growth Data Forecasts

Australia: 1985-2005 from Mühleisen et al (2005). 2006-2010 updated with government documents available at http://www.budget.gov.au/
Canada: 1985-2005 from Mühleisen et al (2005). 2006-2010 updated with government documents available at http://www.budget.gc.ca.
Chile: Data provided by the Banco Central de Chile.
France: 1996-1998 from Mühleisen et al (2005). 1999-2007 from Beetsma et al (2009). 2008-2011 updated using Annual Stability and Convergence programs.
Germany: 1991-1998 from Mühleisen et al (2005). 1999-2007 from Beetsma et al (2009). 2008-2011 updated using Annual Stability and Convergence programs.
Italy: 1990-1998 from Mühleisen et al (2005). 1999-2007 from Beetsma et al (2009). 2008-2011 updated using Annual Stability and Convergence programs.
Mexico: Data from national sources.
Netherlands : 1995-1998 from Mühleisen et al (2005). 1999-2007 from Beetsma et al (2009). 2008-2011 updated using Annual Stability and Convergence programs.
Norway: Data collected from Norwegian budgets available at http://www.statsbudsjettet.no/Statsbudsjettet-2012/English/
New Zealand : 1995-2005 from Mühleisen et al (2005). 2006-2010 updated using government documents. Available at http://www.treasury.govt.nz/budget/archive
Sweden : 1998 from Mühleisen et al (2005). 1999-2007 from Beetsma et al (2009). 2008-2011 updated using Annual Stability and Convergence programs.
Switzerland: 1990-2005 from Mühleisen et al (2005)
United States: 1986-2005 from Mühleisen et al (2005). 2006-2011 updated from government documents (Historical Tables). Available: http://www.gpoaccess.gov/usbudget/
United Kingdom: 1997-1998 from Mühleisen et al (2005). 1999-2007 from Beetsma et al (2009). 2008-2011 updated using Annual Stability and Convergence programs.
S.Africa: Data from government documents. Available at: http://www.treasury.gov.za/documents/national%20budget/default.aspx

Data only from Stability and Convergence Programs: Austria , Belgium, Denmark, Finland, Greece, Hungary, Ireland, Luxemburg, Portugal, Spain. European Union Stability and Growth Pact convergence programs are available at: http://ec.europa.eu/economy_finance/sgp/convergence/programmes/index_en.htm.

Budget Balance and Growth Data Realizations

European countries: All realizations from Eurostat. For 1999-present, budget balance is Eurostat series EDP B.9, net lending/net borrowing under the excessive deficit procedure, as this is the exact budget balance the European countries forecast in their stability and convergence programs. Prior to 1999, the deficit is defined according to ESA95 (series B.9). The difference between the two series differs in their treatment of interest relating to swaps and forward agreements. In practice, the differences between the series are very small, but the ESA95 calculation generally extends farther back than EDP B.9, which only goes back through 1995. See http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/en/gov_dd_esms.htm for more information.

For Australia, Canada, Chile, Mexico, New Zealand, South Africa, budget balance realizations are taken from the World Bank World Development Indicators. Budget balance realizationd for the United States are taken directly from the Historical Tables included in the annual budget documents.

Similarly, all real GDP growth realizations for European countries come from Eurostat and from World Development Indicators for the remaining countries with the exception of the United States. Because the United States reports fiscal year GDP growth forecasts in the budget, US real GDP growth rate realizations are calculated using the annual change in real GDP from Q3 over Q3 using data from Global Financial Data. Data on the level of real GDP used to compute the output gap are from the same sources as real GDP growth.