Towards expenditure rules and fiscal sanity in the euro area

Sebastian Hauptmeier
European Central Bank

A. Jesus Sanchez-Fuentes
U. Complutense de Madrid

Ludger Schuknecht
European Central Bank

December, 2010

Abstract: The study demonstrates the key role of expenditure policies in explaining fiscal developments during EMU in the euro area, its three largest members and four "macro-imbalances" countries. It compares actual primary expenditure trends with those that would have prevailed if countries had followed neutral policies based on expenditure rules since the start of EMU. It also calculates the implications for debt trends. It finds that, all sample countries except Germany applied expansionary expenditure policies already before the crisis. This resulted in much higher expenditure and debt paths compared to a counterfactual neutral expenditure stance. Rules-based expenditure policies could have led to much safer fiscal positions much more in line with the EU's Stability and Growth Pact. An empirical analysis of the determinants of countries' expenditure stance confirms the need for stronger fiscal rules and institutions in the euro area.

1.   Introduction

The outlook for public finances in the euro area and in many other advanced economies for the second decade of the 21st century is extremely challenging. Euro area public debt exceeded 80% of GDP in 2010 and continued rising as public deficits were above 6% of GDP in that year. Several countries in and outside the euro area experienced fiscal crises starting in 2009. However, this was not only a consequence of the financial crisis: fiscal positions of many euro area countries had already been imprudent at the start of EMU, and they remained imprudent before the crisis struck in 2007 and significant further imbalances were accumulated (Schuknecht, 2009). Returning to sound public finances is, therefore, probably the most important policy challenge for advanced economies in general and the euro area in particular.

This study aims to contribute to mastering this challenge in three ways. First, it analyses in how far public expenditure policies were responsible for the deterioration of public finances before and during the crisis.[1] This question relates to the simple fact that virtually the whole deterioration of the fiscal deficit since the start of EMU of about 5% of GDP was due to an increase in the primary expenditure ratio. The study, therefore, takes an in-depth look at the expenditure stance in the euro area and a number of its member states during EMU. It conducts simulation exercises comparing actual expenditure developments against the benchmark of a neutral fiscal stance defined by a number of expenditure rules.[2] The study focuses on the euro area 12, its largest member countries, Germany, France, and Italy, and the countries that accumulated significant macroeconomic imbalances and which have attracted particular attention from financial markets, i.e., Ireland, Greece, Portugal and Spain.

---

[1] A number of studies have pointed to expansionary expenditure policies in many European countries for much of the EMU period (Holm-Hadulla, Hauptmeier and Rother, 2010; Schuknecht, 2009 and 2010; Turrini, 2008).
[2] Previous studies already advocated explicit expenditure rules. See Brück and Zwiener (2006) and Mungey (2008) for futher information.

The study finds restrictive expenditure policies in Germany contrasting with more or less expansionary policies in the other sample countries, and notably in the "macro-imbalances countries", during EMU. Neutral expenditure policies over the 1999-2009 period in all countries (and with Germany's policies unchanged) would have implied several percentage points of GDP lower primary expenditure ratios for the euro area. In some of the macro imbalances countries the cumulative expenditure stance was expansionary by about 10 pp of GDP. It is important to note that - for the euro area excluding Germany - more than half of the spending above that implied by neutral policy rules already accumulated in the pre-crisis period up to 2007. For the macro-imbalances countries this share amounted to almost two thirds.

The study also suggests that the deviation from neutral expenditure policies before and during the crisis has contributed strongly to public debt dynamics, notably in the imbalances countries. Public debt ratios in the euro area would not have been much above 60% and in the macro-imbalances countries near or well below 60% at the end of 2009 if a neutral expenditure stance had been pursued. This would have hardly precipitated the fiscal crisis that was experienced in 2010.

Second, the study conducts a tentative empirical analysis of the determinants of euro area countries' expenditure stance during EMU. It finds that the policy stance tends to be pro-cyclical whereas strong budgetary institutions limit this spending bias. Moreover, spending growth above that implied by a neutral policy rule tends to be correlated with the political business cycle and the stability of governments. High public debt and the existence of an excessive deficit procedure in the context of the Stability and Growth Pact (SGP) do not seem to have significantly affected the expenditure stance.

Third, the study raises some important policy lessons. To prevent expansionary biases in public budgets as experienced during EMU, the paper recommends

expenditure rules based on potential GDP growth. This should be adjusted down by ½ percentage points to cater for downward revisions of growth as experienced over the past decade. This provides a benchmark for prudent expenditure growth in the future from which any further needs for consolidation (due to fiscal imbalances or risks of economic overheating) must still be deducted. Finally, the empirical analysis argues in favour of strong national fiscal institutions and a substantially strengthened European fiscal framework that includes expenditure monitoring, a stronger focus on public debt and strong implementation and enforcement.

The next section looks at methodological issues. Section 3 derives the assessment of the expenditure stance and the implications for primary expenditure ratios in the sample economies before Section 4 examines debt developments as implied by the expenditure stance. Section 5 provides an empirical analysis of the factors determining the governments' tendencies to deviate from neutral spending policies. Section 6 derives some normative conclusions for the choice of expenditure rules while section 7 concludes.

2.   Methodological issues

The first aim of this study is to analyse what role public expenditure policies have played in getting euro area public finances in the challenging situation of 2010. One way to "measure" the contribution of (expansionary) spending policies is to simulate what would have occurred on the spending side of national budgets if governments had followed "neutral" expenditure policies based on a set of rules and to compare this with actual developments.

Our simulation exercise follows a sequence of steps: First, numerical spending rules in terms of predefined growth rates are applied in a recursive manner to country-specific and euro area aggregate spending levels starting with the base year of our

analysis, i.e. 1999. This allows us to compute "alternative" - rule- and country-specific - spending paths for primary expenditure and other major spending categories.[3] These can then be contrasted with actual developments.

In a <u>second</u> step, the resulting gaps between actual and "neutral" spending are used to assess the implications of alternative expenditure paths for the accumulation of government debt. Here, we introduce the simplifying and conservative assumption of constant revenue-to-GDP ratios (implying a GDP elasticity of taxes equal to one) to generate alternative rule-specific deficit paths both for the countries in our sample as well as for the euro area as whole.[4] These deficits are then cumulated into government debt levels, also taking into account compound interest effects. In our baseline simulations, we proxy country-specific interest rates with implicit rates, i.e. the interest rate paid on average on the given stock of government debt.[5] Alternative assumptions about multipliers and compound interest effects have been explored in a sensitivity analysis. The conclusions remain broadly unaffected.[6]

Given that our study focuses on euro area countries the choice of using the European Commission AMECO macroeconomic database is straightforward. It allows to recover "real-time" data from different vintages which for our purpose is important to ensure that policies are assessed on the basis of the information set available to

---

[3] Note that, when simulating alternative spending paths, we take into account macroeconomic feedback effects of changes in the expenditure stance. We do this by applying standard GDP multipliers to estimate the effect of deviations from actual spending levels on nominal GDP. For this purpose, we build on Coenen *et al* (2010) who carry out a model comparison exercise on the basis of various large-scale macroeconomic models. We consider the middle point of the range presented in this study to construct country-specific GDP multipliers, explicitly taking into account the country-specific structure of government spending. Using this approach, the size of the GDP multiplier varies from 0.47 in Greece to 0.57 in the case of Ireland. More detailed information can be received from the authors upon request.

[4] This is a conservative assumption because we do not assume any second-round/confidence/general equilibrium effects that could result in higher long term growth and revenue from less expansionary expenditure policies. However, as a robustness check we also run the simulations with higher or lower tax elasticities (0.8-1.2). The simulation results show very little change compared to the baseline assumption. The results are available upon request.

[5] Note that we assume the interest rate to be exogenous as we do not incorporate feedback effects of changes in debt accumulation on the interest rate level. This is again a very conservative assumption because if lower spending, deficits and debt also implied lower interest rates the impact of a neutral expenditure stance on the debt ratio would have been even greater. In any case, results change little with different interest rate assumptions. The results are available upon request.

[6] Results from a broad set of sensitivity analyses can be received from the authors upon request.

policy-makers at the time of implementation of policy measures.[7] Substantial data revisions, which have occurred repeatedly in the past, may result in a different assessment of the underlying policy stance when using ex-post and real-time data respectively (see Cimadomo, 2008).

Before turning to the computation of alternative expenditure paths, we have to choose the specific policy rules to be applied. In practice, expenditure rules tend to define ceilings or target growth rates, either in real or nominal terms.[8] For the purpose of this study we focus on the latter type of rules. The objective of ensuring neutrality of expenditure policies constitutes the guiding principle for our choice. A natural benchmark that immediately comes to mind in this context is to restrict spending growth to some measure of long-term or potential growth in economic activity. Consequently, the following alternative rules were applied in the context of our simulation exercise:

(1) *Nominal Potential GDP Growth (NPG):* The growth rate of spending in a given year is set equal to nominal potential GDP growth using both ex-post and real-time data.

(2) *Real Potential GDP growth + ECB price stability objective (RPECB):* The growth rate of spending in a given year is restricted to real potential GDP growth plus the ECB price stability objective.[9] The *RPECB* rule is applied both on the basis of ex-post and real-time data.

---

[7] Our real-time dataset is constructed such that the one-year ahead forecast of the Commission's autumn macroeconomic projection in year *t-1* constitutes the information set available to the policy-makers when setting up expenditure plans for year *t*.

[8] See Chapter 3 in European Commission (2006) for an overview of different types of fiscal rules in EU countries.

[9] To operationalise the ECB's price stability objective in the context of our simulations we set the annual growth rate of the GDP deflator to 2.0% as an upper bound. The main reason for capping the deflator at the ECB objective is to countervail overheating or competitiveness loss as reflected in high inflation.

(3) *Nominal average growth 1999-2009 (AV 99-09):* The constant growth rate of spending is set equal to the average nominal GDP growth rate over the time horizon of our analysis.

(4) *Nominal 10 years moving average growth (10–MA):* The growth rate of spending in a given year is set equal to the moving average of nominal GDP growth in the previous ten years using real-time data.

As discussed above, these rules are applied to actual spending levels in a recursive manner in order to compute alternative spending and debt paths both for the individual countries in our sample as well as for the euro area aggregate (see Annex tables A1 and A2 for technical details.)

3.   Assessing the public expenditure stance

To gauge the stance of public expenditure policies and the magnitude of fiscal expansion (or restrictiveness) in EMU, this section analyses public primary expenditure developments over the first 11 years for the euro area and the seven selected member countries.[10] As discussed in the previous section, the benchmark is a neutral stance proxied by applying a set of six expenditure rules. Table 1 provides the main findings. Positive figures measure the degree of expansionary policies in percentage points (pp) of GDP accumulated over the period 1999 up to 2007/2009 compared to a neutral expenditure stance. Negative numbers account for the degree of restrictiveness of

---

[10] It could be argued that the analysis presented should be conducted on primary expenditure adjusted for unemployment spending as this is the spending item that reacts automatically to cyclical developments rather than discretionary government decisions. We tested the robustness of our results with respect to the exclusion of this spending item within the scope of available. This exercise confirms very similar figures for the expenditure stance across countries and, thus, the validity of our baseline results. These results are available upon request.

policies. This is calculated for the six different rules and the 8 economies (euro area + 7 countries).[11]

-Table 1 about here-

When looking, first, at <u>real time</u> expenditure rules, the expenditure stance for the euro area average varied significantly depending on the rule applied. Based on the nominal potential growth (NPG) rule, the euro area stance was around neutral (column 1 and 2 of Table 1). This is reflected in an effect of expenditure policies that is slightly restrictive (the primary expenditure ratio was 0.5pp of GDP lower than with a neutral stance) until 2007 and that turns slightly expansionary until 2009 (0.3%). When capping nominal expenditure growth with the ECB inflation benchmark plus real potential growth (RPECB) rule, the stance was expansionary (column 3-4) as reflected in a primary expenditure ratio increase by 0.6 and 1.7pp of GDP. Recall that this is because countries with a higher inflation than the ECB objective have a lower neutral expenditure growth path than under the unadjusted NPG rule. The 10-year moving average growth rate (10MA) rule, by contrast, suggests a broadly neutral stance (-0.2pp) (column 5-6). The less restrictive effect of this rule is straightforward given that the 11-year period under consideration was characterised to a significant degree by favourable economic developments, i.e. nominal GDP growth above that of potential output and very high growth at the end of the boom in some countries.

As regards individual countries, real time analysis based on potential growth rules finds huge differences across countries. A strongly restrictive stance in Germany resulted in expenditure restraint of over 3% of GDP accumulated over the 11-year period (columns 1-4). Or in other words, Germany consolidated about ¼ pp of GDP per annum via restrictive expenditure policies since the start of EMU. By contrast, a

---

[11] For example, a figure of 1.2 for 2010 implies that expenditure policies were expansionary by roughly 0.1pp of GDP per annum on average over the 12 year period. However, this can mean that policies were restrictive or neutral in some years.

moderately expansionary stance in France and Italy led to a cumulative expenditure increase of 1½ -3 pp of GDP. For Italy, expansionary spending policies had mostly accumulated before the crisis, while policies were more neutral in 2008-09.

A very expansionary stance in the four macro-imbalances countries is reflected in an expenditure increase of up to 10pp of GDP above neutral, depending on the country and method. The normative rule based on the ECB price stability objective (RPECB) "naturally" shows more expansion in the economies where inflation had typically been higher than 2%. Greece and Spain show the highest figures. Moreover, the expansionary effect had already been accumulated to a significant extent by the end of the good years in 2007. Further expansion during the crisis (2008-09) amounted to around 2pp of GDP for the macro-imbalances countries.

For the 10MA rule, a very restrictive stance in Germany is almost counterbalanced by expansion in the other countries. Portugal and Italy report an almost neutral stance.

The last line of panel A in Table 1 illustrates how much the euro area expenditure stance in real time is affected by Germany. This selective exercise is justified by the fact that almost all euro area countries were in unsound fiscal positions at the start of EMU and only Germany has exercised determined expenditure restraint in our sample. When excluding this country, the "euro area-De" expenditure ratio had been rather expansionary.[12] It was about 2-3½ pp of GDP higher than if all other countries had followed a neutral stance based on these rules since the start of EMU.

A second general pattern of the findings is that ex post rules judge actual expenditure trends as much more expansionary than real time rules. This is because potential GDP was significantly revised down ex post, as can be seen in columns 13-14 of Table 1. Cumulative downward revisions during EMU averaged over 4pp of GDP

---

[12] The "euro area-De" figures represented here and elsewhere refer to euro area 12 excluding Germany and thus include the results for the analysis on Belgium, Netherlands, Luxembourg, Austria and Finland.

over the sample economies. The 5.2 pp figure for Germany implies that potential growth had on average been overestimated by almost ½ pp of GDP per annum.

On the basis of ex-post rules, expenditure policies turn out to be much more expansionary (columns 7-12). Depending on the rule, euro area primary expenditure has been 3-5pp of GDP higher by 2009 than it would have been with neutral expenditure policies since the start of EMU. Only Germany conducted modestly restrictive expenditure policies on balance while expenditure policies were very expansionary across the other countries. According to the NPG rule, French spending should have been about 2pp of GDP lower and Italian spending about 3 ½ pp lower if neutral spending policies had been pursued. Figures for the four macro-imbalances countries tend to be significantly higher. When looking at the RPECB rule, Greece and Ireland experienced expenditure growth that was about 1pp of GDP per annum higher than neutral spending policies would have suggested. Corresponding figures for Spain and Portugal are only modestly lower.

The last line of panel B shows just how expansionary expenditure policies were on average when excluding Germany. On the basis of ex post rules, primary expenditure would have been 3-5pp of GDP lower if "euro area-De" countries had followed a neutral stance based on these expenditure rules.

A different way of illustrating the results of this analysis is to compare the evolution of actual expenditure ratios with those that would have resulted from neutral expenditure policies since the start of EMU. Figure 1 presents these results. The thick line reports the actual primary expenditure ratio and the other lines mark the ratio that would have followed from the six expenditure rules. Had all countries followed a neutral expenditure stance on the basis of real time rules, the aggregate euro area primary expenditure ratio would have been between 46% and 48% of GDP in 2010, thus up to 2pp of GDP lower than the actual ratio. On the basis of ex post rules, the

expenditure ratio would have dropped much more in good times and would have ended up at between 44 ½ - 46% of GDP compared to 48% of actual spending. The primary spending ratio would then not have been much higher in 2009 than at the start of EMU.

-Figure 1 about here-

The corresponding results are also reported for public consumption and transfers. We note that neutral expenditure policies on the basis of real time rules would have suggested somewhat lower public consumption ratios and broadly unchanged public transfer ratios. Ex post rules would have resulted in 2-3 pp of GDP lower government consumption and about 1-2pp of GDP lower transfer ratios.

The profile of neutral primary expenditure ratios changes again quite significantly when looking at the euro area excluding Germany. With neutral spending policies, primary expenditure ratios would have been significantly lower in the "euro area-De" already before the crisis and even more so by 2009 on the basis of all rules.

When looking at individual countries, Germany again sticks out (Figure 2). As reported above, ex post rules would have suggested a slightly restrictive fiscal stance for the average of the EMU period. As a result primary expenditure ratios were roughly identical around 45-46% of GDP in 1999 and in 2009. On the basis of real time rules, a neutral stance would have implied a higher primary expenditure ratio of 49% to over 50% of GDP by 2009. This illustrates yet again the impact of chronic overestimations of potential growth on the assessment of expenditure paths.

For all other countries the situation is very different, and primary expenditure ratios increased almost continuously since the start of EMU. If a neutral stance had been followed, French primary expenditure ratios would by 2009 have been much closer to 50% of GDP than above 53%. Italian primary expenditure would still mostly be in the 40-45% range. The four macro-imbalances countries would have lowered their primary expenditure to the higher 20s (Ireland) or at most the higher 30s (Portugal) in the period

10

up to 2007. By 2010, primary expenditure ratios would have been much lower in all these countries (except on the basis of the 10MA rule). On the basis of ex post rules, primary spending ratios would have been below or at least not much above those prevailing in 1999.

-Figure 2 about here-

All in all, only Germany employed a restrictive expenditure stance on average since the start of EMU. All other countries would be judged to have applied more or less expansionary expenditure policies. As a result, public primary expenditure ratios in the euro area and its member countries would mostly have been much lower at the start of the crisis and by 2010 and potentially not higher than at the start of EMU if governments had adhered to expenditure rules.

4.   Implications for public debt dynamics

The implications of public expenditure policies during EMU for debt developments were significant. Taking into account the assumptions about fiscal multipliers, tax elasticities and compound interest effects discussed in section 2, the counterfactual debt paths that would have emerged if countries had followed neutral expenditure policies, as defined by our six rules would have been typically significantly lower (Table 2).

-Table 2 about here-

The pattern of counterfactual debt developments reflects that of expenditure ratios as reported in the previous section, except that the compound effects result in much more diverse figures and trends. Looking again first at real time rules and starting with the euro area, the fiscal stance at the aggregate level reported in the previous section would have also implied not much change in the debt ratio compared to the actual level in 2009. Debt would be broadly unchanged if the NPG rule had been applied. It would have been somewhat lower by 5pp of GDP if all countries had followed the RPECB

rule and 4pp of GDP higher if they had all followed the 10MA rule. By contrast, the application of ex post rules would have resulted in much more restrictive expenditure policies and hence lower debt ratios by 3-13pp of GDP.

When looking at individual countries, the diversity of compound effects on public debt ratios is striking. In the case of Germany, it is comforting that the government did not apply the real time rules as the debt ratio would then have been 24-38 pp of GDP higher. This is because ex post revisions in potential growth were particularly large but also because initially deficits would have increased significantly further and, thus, contributed to rising debt. On the basis of ex post rules, the debt ratio would have been only modestly (6-7pp) higher given the on average modestly restrictive stance. By contrast, for France and Italy, the debt ratio would have been significantly lower especially on the basis of ex post rules (up to 30pp of GDP for Italy and up to 14pp of GDP for France). The four macro-imbalances countries would have all reported much lower debt paths with figures up to over 50pp of GDP lower for some countries and rules.

The impact of neutral expenditure policies on the debt path for the sample economies and across expenditure rules is shown in Figure 3. Consistent with the previous results, real time rules typically lead to higher debt paths than ex post rules. The French debt path would have overall been more benign and public debt would have been much closer to the 60% of GDP reference value than was actually the case in 2009. If a neutral spending path had been followed Italian public debt would have been between roughly 80% and 100% of GDP in 2009 (except on the basis of the 10MA rule) rather than near 120% of GDP.

-Figure 3 about here-

For the macro-imbalances countries, the difference becomes even more drastic. Neutral spending policies in Portugal would have led to debt ratios of 40-60% of GDP

in 2009 (again except with 10MA) rather than over 80% of GDP in reality. Spanish debt would have been at a trough of 10-40% in 2007-08 and would have remained well below the reference value in 2009 under all rules. Ireland would have just about eliminated all its debt in good times and thus created significant room for the subsequent rise. Under all rules, debt would have remained below 60% of GDP in 2009. Finally, Greek public debt would have fallen to 60-80% of GDP (rather than remain broadly constant around 100% of GDP until the start of the crisis) and increased much more slowly in the crisis.

All in all, public debt positions in the euro area would have been much sounder at the start of the crisis and in 2009, if euro area countries had pursued at least a neutral expenditure stance on average during EMU. Public debt could have been well around or below the reference value in the euro area in most of its members by 2009 and nowhere above 100% of GDP.

5.   Determinants of the expenditure stance

An empirical analysis of factors that influence countries' expenditure stance could provide further information on the reasons and remedies for expansionary expenditure policies. In a first, tentative effort, we apply standard fixed-effects panel estimation techniques on a sample of 12 euro area countries for the 2000-2009 period. The measure of the expenditure stance, i.e. the (marginal) deviations of actual spending growth from rule-based or neutral spending (under the NPG and the RPECB rule in ex-post terms) is used as the dependent variable.

The aim of this empirical exercise is to explain the governments' expenditure stance on the basis of fiscal and macroeconomic factors, relevant institutional characteristics

as well as political economy variables. The results of the analysis are presented in Table 3 both as regards our NPG and RPECB rule.[13]

-Table 3 about here-

As one would expect, the <u>macroeconomic environment</u> measured by the output gap (in % of potential GDP) constitutes an important determinant of the expenditure stance. We find robust support for a positive correlation between the output gap and the expenditure stance across rules and estimations, suggesting a pro-cyclical spending behaviour.

As regards <u>fiscal factors</u>, surprisingly the level of public indebtedness does not seem to significantly affect our measure of the expenditure stance. We also do not find robust evidence for an effect of revenue windfalls that arguably could increase spending profligacy. We capture such windfalls by including the excess revenue growth in a given year relative to previous year's Autumn forecast by the European Commission. However, while we see the expected positive sign the effect is not significant.

We find empirical support for the importance of <u>political economy factors</u>. In particular, parliamentary elections at the national level (Electoral cycle 1) tend to significantly increase the deviation of actual from rule-based primary spending. The opposite holds true for a second election-related variable (Electoral cycle 2) which captures the years left in the current election term. The negative sign on this variable suggests that the incentives for fiscal discipline can be expected to be higher at the beginning of the legislative period. We also control for government stability as measured by the respective index of the World Bank and find that the policy stance on the spending side is less expansionary if a government scores a higher value.

---

[13] Results are indicated for the euro area 12 but they are very similar if we limit the sample to just the seven countries. These can be obtained upon request.

Most interestingly from a policy perspective, our results suggest that the country-specific institutional framework exerts a significant effect on the expenditure stance. In particular, we control for the extent to which national expenditure policy faces domestic institutional constraints using the expenditure rules index as developed by Debrun et al. (2008).[14] We interact this index with the output gap to analyse to what extent strong institutions reduce spending profligacy and find that, indeed, the strength of the national institutional framework on the expenditure side significantly reduces the pro-cyclicality of the expenditure stance. This finding is along the lines of Holm-Hadulla et al (2010), Turini (2008) and Wierts (2008). At the same time, the EDP dummy which is included to capture whether a country is facing an excessive deficit procedure (EDP) due to deficits above the 3% of GDP reference value of the Stability and Growth Pact, does not turn up significantly in our regressions.

The results on the impact of fiscal institutions may be put into the perspective of the debate regarding the need to strengthen the European fiscal framework. One of the lessons from past fiscal developments in euro area countries is that the implementation of the Stability and Growth Pact has not been effective in delivering sound and sustainable fiscal positions in Member States. While one has to be careful when interpreting the non-significance of the effect of the EDP procedure dummy, the result is in line with this perception. Moreover, the empirical analysis suggests that national budgetary rules if well-designed can help to effectively reduce spending profligacy and therefore serve as important tools to promote sound and sustainable public finances in line with the European fiscal framework. This reinforces the need for enhancing national fiscal rules and frameworks as had been proposed by the European Commission in the autumn of 2010.

---

[14] For a definition and a detailed description of the computation of this index see European Commission (2006) and Debrun et al. (2008). The index takes into account the share of public spending covered by the rule and qualitative features such as the type of enforcement mechanisms and media visibility.

6.   Towards an expenditure rule for future fiscal sanity

The findings of this study hold important lessons as regards the design of fiscal institutions and notably expenditure policy rules. The pursuit of expenditure policies based on real time rules in all countries except Germany would have resulted in sounder public finances. However, these rules provided a too optimistic picture on the state of the economy and public finances as trend growth was typically revised down markedly ex post. This made the adverse impact of expansionary policies even more drastic, notably in the macro-imbalances countries. On the basis of these findings, expenditure rules and notably potential growth rules would have resulted in sounder policies than actual expenditure growth. But they would not have been sufficient to prevent policies to be judged expansionary ex post.

From this experience, one can derive two approaches that might be fruitful in the context of choosing effective expenditure rules:

The first one is simple: if we broadly expect the past to be the future and expect that potential growth continues to be revised down on average by almost ½pp of GDP per year, countries would fare well with an adjusted nominal potential GDP rule where expenditure growth is also ½ pp less per annum than suggested by projected nominal potential growth (NPG – ½ pp).

A second approach would be to look at the experience in EMU by type of country and see whether any parallels can be drawn for the future. Our sample countries include four types: 1) Germany where post-unification excesses required economic restructuring and balance sheet adjustment which, in turn, contributed to low growth, 2) France which experienced potential growth revisions but which did not feature particular imbalances, 3) Italy which experienced the largest cumulative growth revisions and very low growth prospects, and 4) the economies of Spain, Ireland,

Portugal and Greece where expansionary spending policies coincided with the accumulation of large imbalances.

Looking forward, the following normative lessons may be drawn from this perspective. First, the performance of macro-imbalances countries in the future may resemble Germany in the past. Hence, the application of an NPG rule minus a large margin of prudence would seem to be a reasonable approach. Moreover, within this group, there are still "catching up economies", notably Portugal but perhaps also Spain and Greece to some extent. These may experience a renewed boom and "above-average" inflation. A simple NPG-1/2pp rule could then be inappropriately pro-cyclical. For these countries, a rule based on real potential growth plus the ECB price stability objective minus a margin of prudence might be appropriate (e.g., RPECB-1/2 pp).

It is more difficult to judge which group Italy, France and Germany will belong to. Perhaps the arguments provided above suggest that all three countries will continue to experience low growth with a continuing though hopefully slower trend to even less growth. An NPG rule minus a margin of prudence (e.g. NPG-1/2pp) would then perhaps be reasonable.

To see what a prudent expenditure rule would have implied in the first 11 years of EMU we conduct a final simulation exercise. We derive counterfactual expenditure and debt trends on the basis of expenditure following the rule of nominal potential GDP growth adjusted for a ½ pp margin of prudence (NPG- ½ pp rule) and the adjusted rule that caps the deflator at the ECB price stability objective (RPECB- ½ pp rule). Table 4 reports the results for primary expenditure and public debt ratios (columns 4-5 and 6-7 respectively). It compares these to actual developments (columns 1-3) and developments that would have resulted from a nominal potential GDP rule based on ex post data (NPG ex post; columns 8-9).

-Table 4 about here-

On the basis of this rule, public expenditure ratios for the euro area and most countries would have been much lower than actually experienced (2-3 pp of GDP for the euro area and up to 10pp of GDP for certain countries). It would have also been more prudent than the NPG ex post rule. The public debt ratio for the euro area would have been 8-15pp of GDP lower by 2009 than the actual ratio to stand at 65-71% of GDP and it would also have been significantly below the NPG ex post rule.

However, again these findings are strongly influenced by Germany. If all countries apart from Germany had followed the two rules including a margin of prudence, primary expenditure would have been 4-5 pp of GDP lower and public debt about 17-25pp of GDP lower in 2009. Much lower expenditure ratios (and thus also deficits) would have led to Greek debt of around 60% of GDP, and Portuguese, Spanish and Irish debt in the 6-51% of GDP range by 2009. This would have hardly precipitated the debt crisis that was experienced in 2010.

The counterfactual expenditure and debt paths for the macro-imbalances countries and notably for Spain and Ireland also warrant further discussion. The much lower spending ratios would have also implied much better fiscal balances and even high surpluses. In Spain and Ireland public debt would have almost disappeared. While this might have been difficult to sustain from a political economy perspective it is not unreasonable from an economic one. In fact, high surpluses were the experience of Finland and Luxembourg during the boom so that these countries also report very low gross debt and positive net asset positions. And it is these two countries that "survived" the financial crisis the best from a fiscal perspective up to the writing of this study.

Finally, how do these results link to the debate on reforming the EU institutional framework? The Commission proposed to link fiscal surveillance to on an implicit expenditure growth rule "consistent with prudent fiscal policy making" and linked to a

"prudent medium term rate of growth". This could lead to a better result for the coming decade if "prudent growth" assumptions were really sufficiently prudent. If real time nominal potential growth projections were to be the basis, the study has shown that this would not have been prudent enough for the past decade unless a further margin had been subtracted from expenditure growth.

7.   Conclusion

The study demonstrates the key role of expenditure policies in explaining fiscal developments during EMU in the euro area, its three largest members and four "macro-imbalances" countries. It compares actual primary expenditure trends with those that would have prevailed if countries had followed neutral policies based on expenditure rules since the start of EMU. It also calculates the implications for debt trends. It finds that, all sample countries except Germany applied expansionary expenditure policies already before the crisis. This resulted in much higher expenditure and debt paths compared to a counterfactual neutral expenditure stance. Rules-based spending policies could have led to much safer fiscal positions much more in line with the EU's Stability and Growth Pact.

This and the empirical evidence on the determinants of euro area countries' expenditure stance provide a number of policy implications. First, and more generally, strong national budgetary institutions seem to limit expansionary spending biases. Second, the European institutional framework needs to feature prominently expenditure monitoring and control. A strong implementation should ensure that high public debt and the existence of an excessive deficit procedure in the context of the Stability and Growth Pact exert a significant constraining effect on public expenditure so as to re-attain sound public finances.

Third, the paper argues that a potential growth rule with an extra ½ percentage point deduction from the resulting annual expenditure growth targets would be a sufficiently prudent and, thus, advisable expenditure rule for euro area countries. . As economic (e.g., population aging) and political economy reasons suggest that overestimating potential growth could also occur in the future, such a rule could provide a reasonably prudent benchmark for a neutral expenditure stance looking forward.

It needs to be kept in mind that there may be two reasons for further deductions from expenditure growth plans: First, capping the deflator (that guides nominal spending growth) at the ECB price stability objective may be warranted for "high inflation" countries so as to prevent overheating and competitiveness loss. Second an extra margin would have to be deducted to accommodate any consolidation needs on the expenditure side.[15] Given the challenging fiscal environment in the euro area and beyond, such a margin will be warranted for many years to come.

---

[15] Moreover, the planned expenditure stance needs to be consistent with underlying policy measures. Note that both adjustments to the expenditure rule, i.e. the ½ pp safety margin and the cap at the ECB price stability objective, imply an in-built "consolidation bias" if either the annual revision to potential GDP growth remains below ½ pp or if the annual growth of the GDP deflator exceeds 2%.

Bibliography:

Brück, T. and R. Zwiener (2006), Fiscal policy rules for stabilisation and growth: A simulation analysis of deficit and expenditure targets in a monetary union, *Journal of Policy Modeling*, 28, 357–369.

Cimadomo, J. (2008) Fiscal policy in real time, Working Paper 919, European Central Bank.

Coenen, G, C., Erceg, C. Freedman, D. Furceri, M. Kumhof, R. Lalonde, D. Laxton, J. Lindé, A. Mourougane, D. Muir, S. Mursula, C. de Resende, J. Roberts, W. Roeger, S. Snudden, M. Trabandt and J. in't Veld (2010) Effects of fiscal stimulus in structural models, Working Paper, 10/73, International Monetary Fund.

Debrun, X., L. Moulin, A. Turrini, J. Ayuso-i-Casals and M. Kumar (2008) Tied to the mast? National fiscal rules in the European Union, *Economic Policy*, 23 (54), 297–362.

European Commission (2006) Public finances in EMU - 2006, European Economy, 3, Brussels.

Holm-Hadulla, F., S. Hauptmeier and P. Rother (2010) The impact of numerical expenditure rules on budgetary discipline over the cycle, Working Paper 1169, European Central Bank.

Menguy, S. (2008), A dynamic rule applied to the threshold imposed on the European budgetary deficits, *Journal of Policy Modeling*, 30, 1093–1105.

Morris, R. and L. Schuknecht (2007) Structural balances and revenue windfalls - the role of asset prices revisited, Working Paper 737, European Central Bank.

Schuknecht, L. (2009) Booms, Busts and Fiscal Policy. Public Finances in the Future? London: Politeia.

Schuknecht, L. (2011) Fiscal activism in booms, busts and beyond, forthcoming in Banca d'Italia, 2011.

Turrini, A. (2008) Fiscal policy and the cycle in the Euro Area: The role of government revenue and expenditure, European Economy - Economic Papers 323, European Commission.
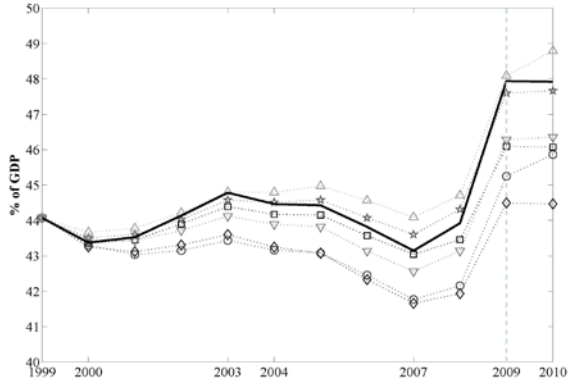
Wierts, P. (2008) How do expenditure rules affect fiscal behaviour?, DNB Working Paper 166.

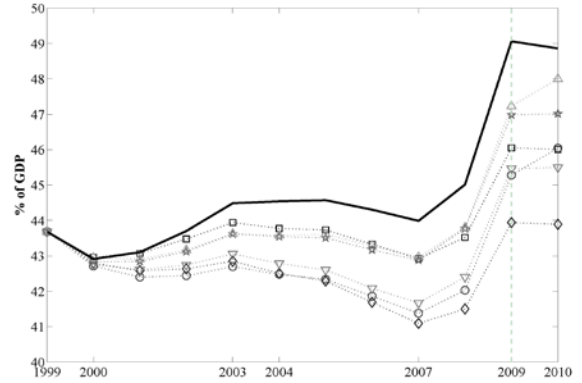Van Riet, A. (ed.) (2010) Euro area fiscal policies and the crisis, Occasional Paper 109, European Central Bank.

Figures and tables

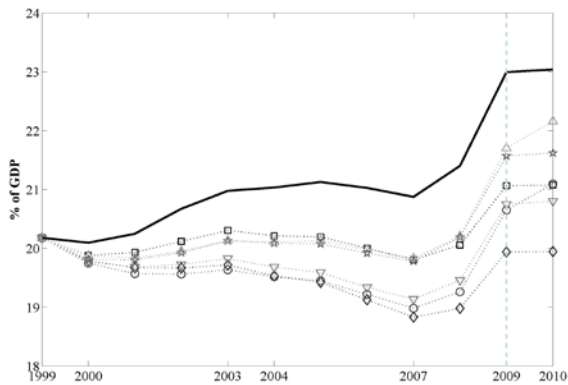## Figure 1: Euro Area (12). Expenditures ratios - actual vs. rule-based
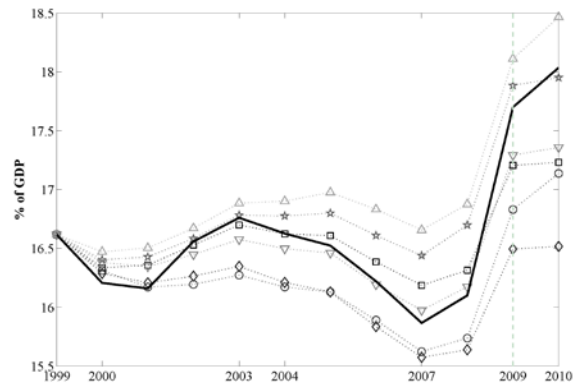
**Primary expenditures
Euro area (12)**

**Primary expenditures
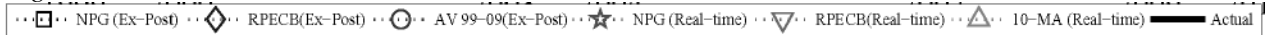(Euro area (12) – Germany)**

Government consumption

Transfers

Legend:

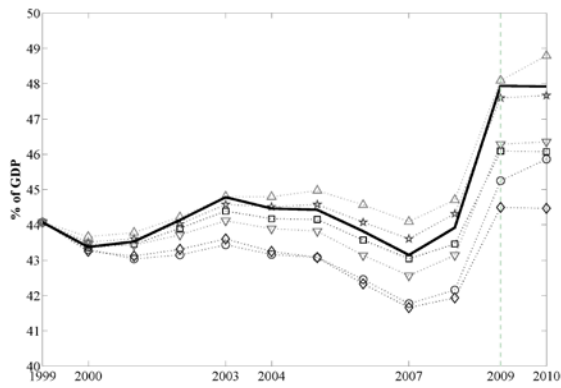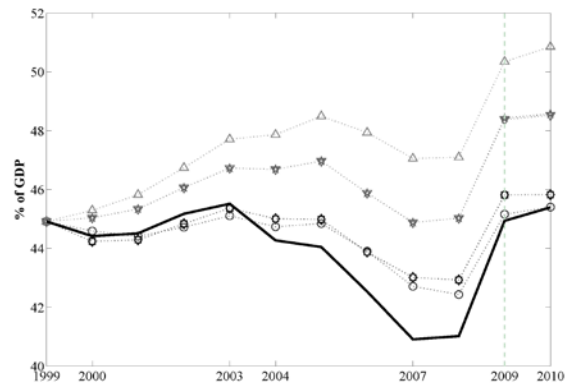| ⸳⸳□⸳⸳ NPG (Ex–Post) | ⸳⸳◇⸳⸳ RPECB(Ex–Post) | ⸳⸳○⸳⸳ AV 99–09(Ex–Post) | ⸳⸳☆⸳⸳ NPG (Real–time) | ⸳⸳▽⸳⸳ RPECB(Real–time) | ⸳⸳△⸳⸳ 10–MA (Real–time) | ▬▬ Actual |

Figure 2: Primary expenditure ratios - actual vs. rule-based
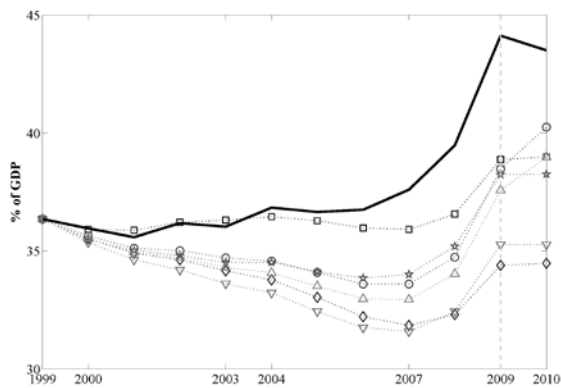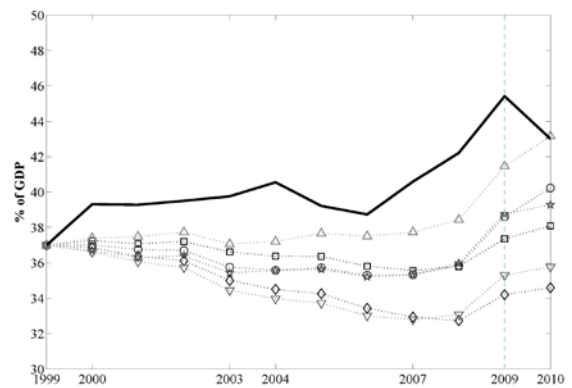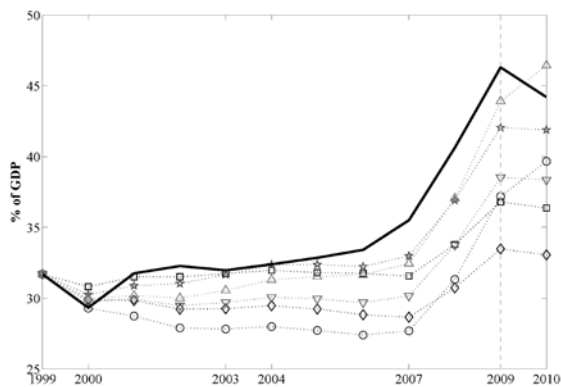
Euro area (12)
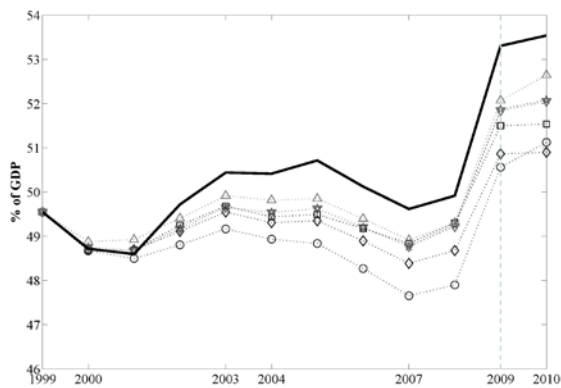

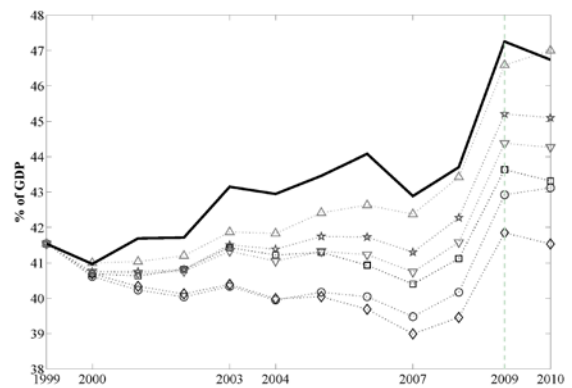
Germany

France

Italy

Spain

Greece
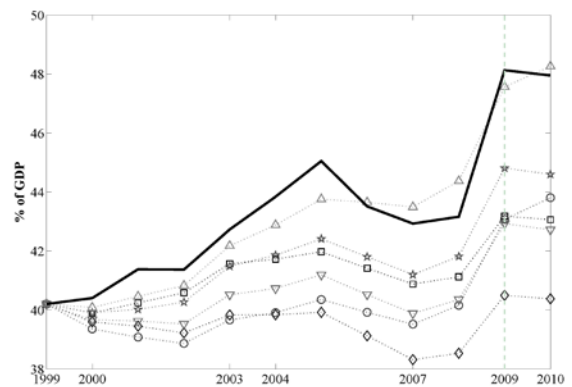
Ireland

Portugal

Legend:

⊡··· NPG (Ex–Post) ··◇·· RPECB(Ex–Post) ··○·· AV 99–09(Ex–Post) ··☆·· NPG (Real–time) ··▽·· RPECB(Real–time) ··△·· 10–MA (Real–time) ▬▬ Actual

Figure 3: Public debt ratios - actual vs. rule-based

Euro area (12)

Germany

France

Italy

Spain

Greece

Ireland

Portugal

Legend:

· · ·□· · · NPG (Ex–Post)　· · ·◇· · · RPECB(Ex–Post)　· · ·○· · · AV 99–09(Ex–Post)　· · ·☆· · · NPG (Real–time)　· · ·▽· · · RPECB(Real–time)　· · ·△· · · 10–MA (Real–time)　——— Actual

24
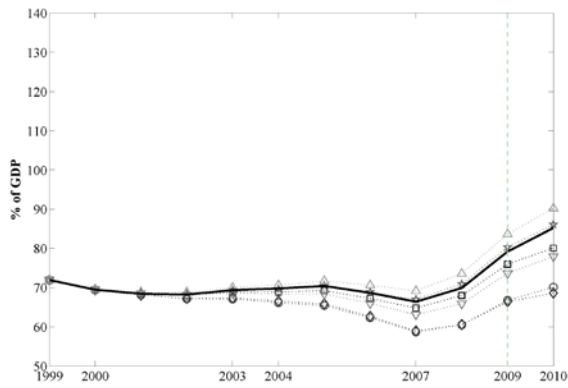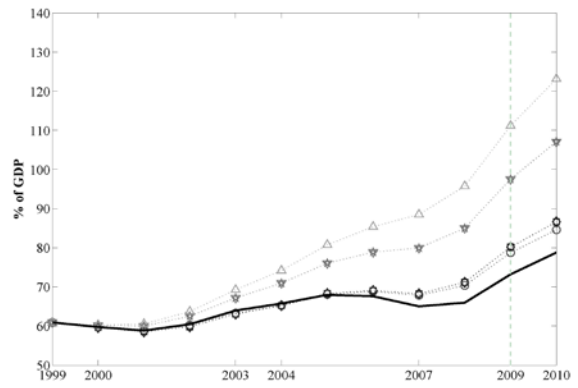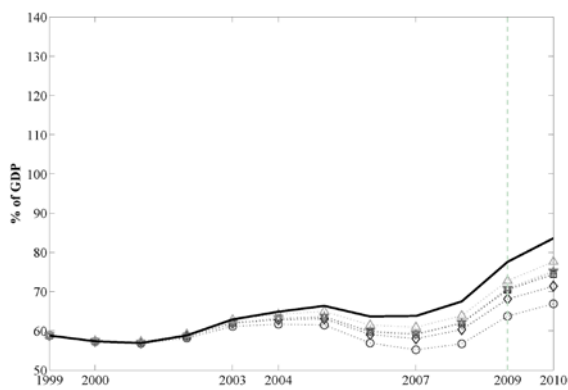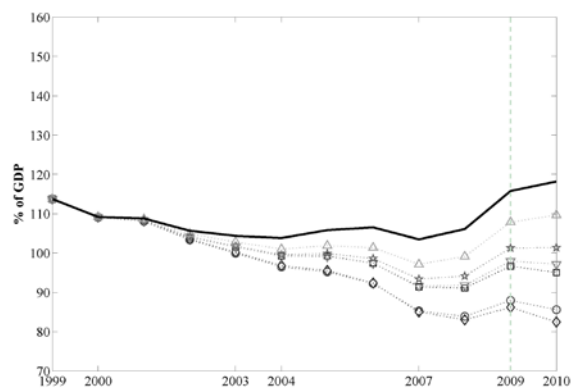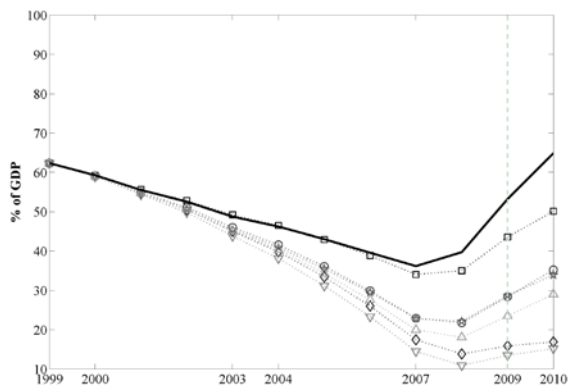
Table 1: Cumulative changes to primary expenditure ratios compared to a neutral expenditure stance across countries and rules (in percentage points of GDP)

Panel A: Real-time analysis

	Nominal Potential GDP (NPG)		Real Potential GDP + ECB inflation objective (RPECB)		Nominal growth 10 year moving average (10-MA)	
	2007	2009	2007	2009	2007	2009
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Euro Area (12)	*-0.5*	*0.3*	*0.6*	*1.7*	*-0.9*	*-0.2*
Germany	-4.0	-3.5	-4.0	-3.4	-6.1	-5.4
France	0.8	1.4	0.8	1.5	0.7	1.2
Italy	1.6	2.0	2.1	2.9	0.5	0.7
Spain	3.6	5.9	6.0	8.9	4.7	6.5
Greece	5.3	6.6	7.8	10.1	2.9	3.9
Ireland	2.5	4.2	5.3	7.8	3.0	2.4
Portugal	1.7	3.3	3.1	5.2	-0.6	0.6
Memorandum: EA(12) - DE	*1.1*	*2.1*	*2.3*	*3.6*	*1.0*	*1.8*

Panel B: Ex-post analysis

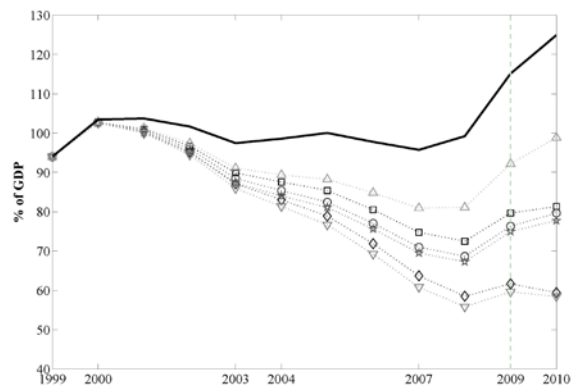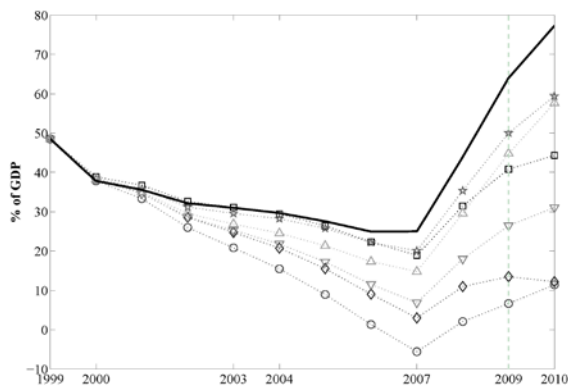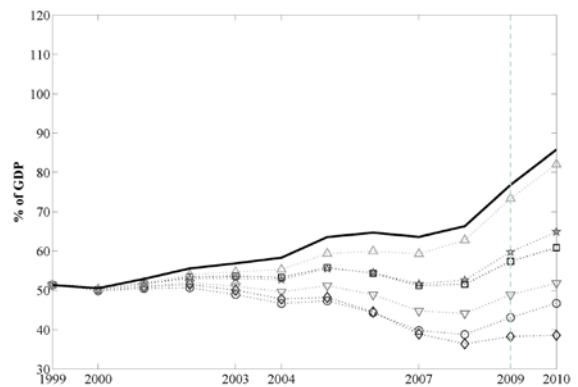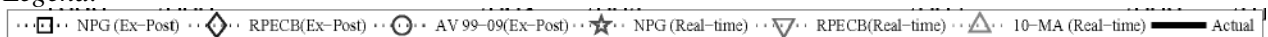|	Nominal Potential GDP (NPG)		Real Potential GDP + ECB inflation objective (RPECB)		Nominal average growth 1999-2009 (AV 99-09)	
	2007	2009	2007	2009	2007	2009
	(7)	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
Euro Area (12)	*0.1*	*1.9*	*1.5*	*3.4*	*1.4*	*2.7*
Germany	-2.1	-0.9	-2.1	-0.9	-1.8	-0.2
France	0.8	1.8	1.2	2.4	2.0	2.7
Italy	2.5	3.6	3.9	5.4	3.4	4.3
Spain	1.7	5.2	5.7	9.7	4.0	5.6
Greece	5.0	8.0	7.6	11.2	5.3	6.8
Ireland	3.9	9.5	6.8	12.8	7.8	9.1
Portugal	2.0	5.0	4.6	7.6	3.4	5.1
Memorandum: EA(12) - DE	*1.1*	*3.0*	*2.9*	*5.1*	*2.6*	*3.8*

Memorandum: Cumulative Potential GDP revisions		
	99-07	99-09
	(13)	*(14)*
Euro Area (12)	*-3.0*	*-4.5*
Germany	-3.9	-5.2
France	-3.3	-3.7
Italy	-5.5	-7.5
Spain	1.0	-1.4
Greece	0.5	-3.3
Ireland	-5.7	-9.6
Portugal	-5.1	-6.7
Memorandum: EA(12) - DE	*-2.7*	*-4.3*

Notes: (i) Positive (negative) figures indicate that actual path was more expansionary (restrictive) than the corresponding rule. They are expressed as percentage points of GDP. (ii) Positive (negative) figures indicate that real-time growth rates were lower (higher) than actual figures.

Table 2: Cumulative changes to public debt ratios compared to a neutral expenditure stance across countries and rules (in percentage points of GDP)

Panel A: Real-time analysis

	Nominal Potential GDP (NPG)		Real Potential GDP + ECB inflation objective (RPECB)		Nominal growth 10 year moving average (10-MA)	
	2007	2009	2007	2009	2007	2009
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Euro Area (12)	*-0.6*	*-1.1*	*3.3*	*5.5*	*-2.8*	*-4.4*
Germany	-14.9	-24.3	-14.9	-24.3	-23.5	-38.0
France	4.5	6.8	4.5	6.9	2.9	4.8
Italy	10.1	14.5	11.8	17.8	6.3	7.9
Spain	13.3	24.6	21.7	39.8	16.2	29.7
Greece	26.2	40.2	34.9	55.5	14.8	22.9
Ireland	4.9	14.0	18.1	37.5	10.2	19.2
Portugal	11.9	17.1	18.8	27.9	4.3	3.5
Memorandum: EA(12) - DE	*5.5*	*8.9*	*10.1*	*16.8*	*5.0*	*8.2*

Panel B: Ex-post analysis

	Nominal Potential GDP (NPG)		Real Potential GDP + ECB inflation objective (RPECB)		Nominal average growth 1999-2009 (AV 99-09)	
	2007	2009	2007	2009	2007	2009
	(7)	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
Euro Area (12)	*1.6*	*3.2*	*7.4*	*12.8*	*7.7*	*12.4*
Germany	-3.2	-7.0	-3.2	-7.0	-2.8	-5.5
France	4.7	7.1	5.8	9.5	8.6	13.9
Italy	12.1	19.1	18.5	29.6	18.2	27.8
Spain	2.1	9.7	18.7	37.4	13.2	24.9
Greece	21.0	35.5	32.0	53.4	24.7	38.8
Ireland	6.1	23.2	22.0	50.5	30.6	57.4
Portugal	12.4	19.5	24.7	38.6	23.8	33.7
Memorandum: EA(12) - DE	*3.8*	*7.8*	*11.7*	*20.6*	*11.9*	*19.5*

Notes: (i) Positive (negative) figures indicate that the debt ratio would have been lower (higher) with a neutral expenditure stance as the actual path was more expansionary (restrictive) than the corresponding rule. They are expressed as percentage points of GDP.

Table 3: Determinants of expenditure stance

Dependent variable: Deviation of primary spending growth from rule-based growth rate

Panel A: Ex-post Nominal Potential GDP (NPG) rule

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Output gap (based on Potential GDP)	0.525 [3.78]***	0.476 [3.01]**	0.401 [2.50]**	0.463 [3.04]**	0.274 [1.65]	0.374 [2.22]*	0.476 [3.00]**
Public debt ratio (t-1)	0.054 [0.96]	0.056 [1.04]	0.035 [0.62]	0.071 [1.20]	0.042 [0.83]	0.033 [0.67]	0.057 [1.03]
Crisis dummy	3.946 [2.17]*	3.649 [1.74]	4.028 [1.64]	3.138 [1.75]	2.241 [1.08]	2.34 [1.13]	3.341 [1.22]
Strenght of expenditure framework * Output Gap		-0.262 [2.09]*					-0.262 [2.08]*
Surprises in Revenues growth			0.09 [0.46]				
Strenght of expenditure framework * Surprises in revenues growth			-0.08 [0.86]				
Electoral cycle 1				2.204 [3.64]***			
Electoral cycle 2					-0.812 [3.66]***		
Government Stability						-2.699 [3.26]***	
EDP							0.308 [0.16]
Constant	-2.941 [0.72]	-2.998 [0.77]	-1.47 [0.39]	-4.148 [0.97]	-0.006 [0.00]	-0.512 [0.13]	-3.079 [0.78]
Observations	108	108	108	108	90	90	108
Number of countries	12	12	12	12	10	10	12
R-squared	0.1	0.11	0.11	0.14	0.13	0.11	0.11
corr u_i and Xb	-0.76	-0.76	-0.57	-0.79	-0.52	-0.47	-0.77
adjusted R-squared	0	0.01	-0.01	0.05	0.01	-0.02	0
R-squared overall model	0.02	0.02	0.05	0.03	0.07	0.06	0.02
R-squared within model	0.1	0.11	0.11	0.14	0.13	0.11	0.11
R-squared between model	0.56	0.53	0.58	0.57	0.49	0.38	0.53

Panel B: Ex-Post Real Potential GDP +ECB price stability objective (RPECB) rule

	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Output gap (based on Potential GDP)	0.469 [3.92]***	0.429 [2.74]**	0.299 [2.39]**	0.419 [3.20]***	0.277 [1.94]*	0.377 [2.58]**	0.429 [2.72]**
Public debt ratio (t-1)	0.057 [1.19]	0.059 [1.33]	0.031 [0.64]	0.071 [1.40]	0.053 [1.18]	0.044 [0.98]	0.058 [1.33]
Crisis dummy	2.882 [1.56]	2.634 [1.26]	3.267 [1.26]	2.223 [1.22]	1.685 [0.74]	1.793 [0.78]	2.654 [0.90]
Strenght of expenditure framework * Output Gap		-0.219 [1.75]					-0.219 [1.74]
Surprises in Revenues growth			0.172 [0.91]				
Strenght of expenditure framework * Surprises in revenues growth			-0.044 [0.59]				
Electoral cycle 1				1.798 [3.40]***			
Electoral cycle 2					-0.798 [4.17]***		
Government Stability						-2.544 [3.48]***	
EDP							-0.02 [0.01]
Constant	-2.808 [0.75]	-2.855 [0.82]	-0.747 [0.22]	-3.792 [0.97]	-0.392 [0.10]	-0.879 [0.23]	-2.85 [0.83]
Observations	108	108	108	108	90	90	108
Number of countries	12	12	12	12	10	10	12
R-squared	0.08	0.09	0.09	0.11	0.14	0.11	0.09
corr u_i and Xb	-0.82	-0.82	-0.55	-0.83	-0.61	-0.58	-0.82
adjusted R-squared	-0.02	-0.02	-0.02	0.01	0.01	-0.01	-0.03
R-squared overall model	0.01	0.01	0.04	0.01	0.07	0.06	0.01
R-squared within model	0.08	0.09	0.09	0.11	0.14	0.11	0.09
R-squared between model	0.61	0.61	0.58	0.62	0.4	0.37	0.61

Notes: Baseline (I), Baseline + Institutional framework (II and III), Baseline + electoral cycle and government stability , (IV - VI) and Baseline + European Institutions (VII).

Table 4: Expenditure and debt ratios - actual vs. normative ex-ante rule

Panel A: Primary expenditure ratios (% of GDP)

	Actual			NPG (real-time) - 1/2 pp. of expenditure growth		RPECB (real-time) - 1/2 pp. of expenditure growth		Ad memoriam: NPG (ex-post)	
	1999 (1)	**2007** (2)	**2009** (3)	**2007** (4)	**2009** (5)	**2007** (6)	**2009** (7)	**2007** (8)	**2009** (9)
Euro Area (12)	*44.1*	*43.1*	*47.9*	*42.3*	*45.9*	*41.3*	*44.6*	*43.0*	*46.1*
Germany	44.9	40.9	44.9	43.5	46.7	43.5	46.6	43.0	45.8
France	49.6	49.6	53.3	47.4	50.1	47.4	50.0	48.8	51.5
Italy	41.5	42.9	47.3	40.1	43.5	39.5	42.7	40.4	43.6
Spain	36.4	37.6	44.1	33.0	36.8	30.6	33.9	35.9	38.9
Greece	37.0	40.6	45.4	34.2	37.3	31.8	33.9	35.6	37.4
Ireland	31.7	35.5	46.3	32.0	40.6	29.2	37.1	31.6	36.8
Portugal	40.2	42.9	48.1	40.0	43.2	38.7	41.4	40.9	43.2
Memorandum: EA(12) - DE	*43.7*	*44.0*	*49.1*	*41.6*	*45.3*	*40.4*	*43.8*	*42.9*	*46.0*

Panel B: Public debt ratios (% of GDP)

	Actual			NPG (real-time) - 1/2 pp. of expenditure growth		RPECB (real-time) - 1/2 pp. of expenditure growth		NPG (ex-post)	
	1999 (10)	**2007** (11)	**2009** (12)	**2007** (13)	**2009** (14)	**2007** (15)	**2009** (16)	**2007** (17)	**2009** (18)
Euro Area (12)	*71.9*	*66.4*	*79.2*	*61.7*	*71.5*	*57.9*	*64.9*	*64.8*	*76.0*
Germany	60.9	65.0	73.2	74.2	88.1	74.2	88.1	68.2	80.2
France	58.8	63.8	77.6	53.6	61.4	53.6	61.4	59.1	70.5
Italy	113.7	103.5	115.8	88.5	92.9	86.8	89.6	91.4	96.7
Spain	62.3	36.2	53.2	18.8	21.5	10.4	6.4	34.0	43.6
Greece	94.0	95.7	115.1	65.3	67.8	56.7	52.7	74.8	79.7
Ireland	48.5	25.0	64.0	16.3	42.6	3.2	19.3	18.9	40.8
Portugal	51.4	63.6	76.8	46.6	51.2	39.7	40.4	51.2	57.4
Memorandum: EA(12) - DE	*77.0*	*66.9*	*81.4*	*56.4*	*63.9*	*51.8*	*56.1*	*63.1*	*73.6*

Notes: (i) NPG = Nominal Potentital GDP, RPECB = Real Potential GDP + ECB price stability objective.

Annex

Table A1: Computation of neutral expenditure paths and the corresponding debt level

Concept	Formula
Expenditure path	$\overline{G}_{1999} = G_{1999}, \overline{G}_t = \overline{G}_{t-1} * (1 + gr_t), t = 2000,2010$ (Cumulative effects) $\overline{G}_{1999} = G_{1999}, \overline{G}_t = G_{t-1} * (1 + gr_t), t = 2000,2010$ (Marginal effects) where: $\overline{G}$, **G**, and **gr_t** are the rule based expenditure level, the actual expenditure level and the growth rule applied according to each of our rules, respectively.
Debt developments *(*)*	$\overline{D}_t = D_t + \sum_{s=1999}^{t} \Delta G_s + \sum_{s=1999}^{t} \overline{I}_s, t = 1999, 2010$ where: $\overline{D}$, **D**, **ΔG_s** and $\overline{I}_s$, are the rule based public debt level, the actual debt level, the deviation of public expenditures from rule-based expenditures (*) and the Interest flow generated from the deviations of our rules from the actual levels at each period.

(*) Note that, for the sake of clarity of presentation, we assume in this formula implicitly that GDP elasticity of the tax is equal to 1. Alternative scenarios with values of 0.8, 0.9, 1.1 and 1.2 were considered. Main conclusions remain.

Table A2: Assumptions and definitions of multiplier and interest rates effects.

Concept	Definition	Scenarios	Assumptions
GDP Multiplier	$\overline{Y}_t = Y_t * \left(1 + \Delta\%G_t * g\right)$ where: **$\Delta\%G_t$** and **g** are the deviation of public expenditures to our rule-based expenditures (in percentage points of GDP) and the estimated effect on GDP after one period.	*Weighted average*	$g = \sum_j \omega_j g_j$ where: **w_j** and **g_j** are correspondingly the weight and the estimated effect of the expenditure components.
		Uniform	$g = \sum_j g_j \Big/ J$ where: **g_j** is the estimated effect of the expenditure components (Coanen et al., 2010)
		Constant	$g \in \{0:0.1:1\}$
Compound Interest rate	$\overline{I}_s = \Delta G_s * r_t^N$ where: **ΔG_s**, **r** and **N** are the initial amount (the deviation of public expenditures to our rule-based expenditures at period *s*), the annual nominal interest rate, and the number of years, respectively.	*Implicit interest rate*	**$r_t = I_t / GCD_t$** where: **I_t** and **GCD_t** represent the current interest payments and the Gross Consolidated Debt at period t, respectively.
		Average interest rate	$r_t = \sum_i r_t^i \Big/ I$ where: **r_t^i** (i=1, …, I) is the different maturities each country has ever used.
		Uniform	$r_t = r_t^i$ where: **r_t^i** represent one uniform maturity for all the countries (10 years)
		Fixed-term *(short, médium and long-term)*	$r_t = \sum_i r_t^i \Big/ I$ where: **r_t^i** (i=1, …, I) is the maturities at short-term (2-5 years), medium-term (6-9 years) and long-term (10, 15 years), respectively.