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NO 1220 / JULY 2010

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FISCAL SURVEILLANCE AND FISCAL PLANNING USING CASH DATA

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ISSN 1725-2806 (online)

CONTENTS

Abstract

This paper does two things. First it examines the use of real time inter-annual cash data and the role of early interventions for improving the monitoring of national fiscal policies and the correction of fiscal indiscipline. Early warnings are important because they allow us to spread the necessary adjustments over time. Examples from Germany and Italy show that large corrections are often necessary early on to make adjustments later on acceptable *and* to keep debt ratios from escalating. There is a credibility issue here; we find the difference between front-loaded and back-loaded adjustment schemes is likely to be vital for the time consistency of fiscal policymaking. Second, without early interventions, the later deficit reductions typically double in size – meaning governments become subject to the excessive deficit procedure and significant improvement tests more often. Thus the budget savings from early intervention and the use of cash data are significant; in our examples they are similar in size to the operating budget of the department of housing and urban development in Germany. Similar results apply in other Eurozone countries.

JEL Classification: E62, H50, H68
Keywords: fiscal surveillance, early warning, cash data, additive vs. slope adjustments, fiscal credibility.

1. Introduction

The past few years, especially since the expanded debt and deficits that followed the 2007-09 financial crisis and recession, have given rise to an emerging literature on the credibility of fiscal policies and the anchoring of (fiscal) expectations.[2] It matters a great deal that expectations of future policy should be anchored; that is, fiscal decisions and their financing need to be predictable, easily understood and credible in the sense of being both plausible and likely to be sustained into the future. That being the case, it is equally important that the necessary corrections be undertaken to return fiscal policies to their intended path following a shock, slippage or data errors. Only then can we regain the full effectiveness of fiscal policy that Leeper and others[3] associate with appropriately anchored expectations.

The goal of this paper is to show how to use cash data (up to the minute, in real time, and always available) on the state of government finances to help us assess fiscal developments and issue "early warning" signals about the corrections that need to be made in order to bring public finances (both deficits and debt) back on their intended track – as may be required by the *stability and growth pact* (SGP) from time to time. We show that early warning signals can be highly valuable because they allow us to start an adjustment process earlier and spread the effort over a longer time period. That makes the size of each adjustment smaller and a less contentious issue; and therefore less likely to create opposition in a government or its electorate. We also examine whether the budget corrections are better frontloaded or back-loaded – we find that different adjustment mechanisms have different size and timing profiles. These are all relevant questions from a policy perspective. It is important that the plans submitted or announced are actually time-consistent, so that governments stick to their published targets after an unplanned departure from the officially agreed *stability programme* (SP).[4] We highlight this point because there seems to be considerable evidence that the time consistency in SP plans has been violated in a number of cases.

It has long been emphasized in the fiscal forecasting literature, that data on government deficits are only available with a long time lag.[5] At the time when the data becomes available, the deficit has already realized and no policy measures can be implemented to avoid drifting away from the intended target values. However, Pérez (2007), Pedregal

[2] This literature is principally due to Eric Leeper in a series of papers conveniently summarized in Leeper (2009). The conditions under which expectations can be anchored such that they are consistent with what both the policymakers and what the private sector expect and intend to happen are set out in Acocella et al (2008).

[3] See Acocella et al (2008). Woodford (2005) makes the same point for monetary policy.

[4] Governments are obliged to submit a stability programme every year, which contains a timetable, for the deficit to return to the defined medium term objectives (MTOs) for budgetary balance. Based on the SP, the European Commission reviews the national fiscal policies and can issue early warnings to member states if it considers the developments in the programme to be too optimistic or too ambitious. However, the assessment of the submitted SP is done ex ante and is based only on the information available at the point of submission. Contingency plans are not included (except for some mechanical scenarios); and there is no provision to use real time or cash data to make a projection of the plan's realisation so that monitoring and subsequent adjustments can be undertaken during the plan's life time.

[5] See, for example, Pérez (2007), Onorante et al.(2008). or Pedregal and Pérez (2008).

and Pérez (2008) and Onorante et al. (2008) show that intra-annual data, available with much shorter time lags, can be used to derive accurate forecasts for end-of-year fiscal outcomes. We first build on their results by introducing cash data into that process. We then go one step further and ask, using their forecasting model, how much a government can actually gain by using early warning signals from this procedure and engaging in early corrections of a fiscal slippage. This question has received little attention in discussions on the prudential surveillance of fiscal policy. The reasons for that are two-fold. On the one hand, the question requires an objective function for the government in order to relate departures from a proposed plan to the adjustment costs inherent in making a correction. We discuss that issue in this paper and provide some alternative measures. On the other hand, it raises the problem of time consistency in fiscal policy. We highlight the potential for time inconsistency, and discuss the trade-off between adjustment costs and time inconsistency. At that stage we need to draw out the connection between deficit and debt surveillance within the SGP rules. Both parts need to be monitored if we are to fulfil the purpose behind the SGP – and create fiscal policies that are sound in the long run.

We have set our analysis within the framework of the existing SGP because that is still the standard framework for monitoring and control of fiscal policies in the Euro-zone. However the importance of our general approach has been reinforced by the fiscal crises of 2009-10 where programmes of exact deficit and debt targets, and the use of cash rather than accruals data, have been imposed on the delinquent countries – even if the parameters and time scales have had to be adapted to fit the circumstances. Similarly, our distinction between additive and slope correction schemes (ie between frontloading and back-loading the deficit corrections) has been pushed to centre stage now that preventing any further debt escalations has necessarily become the prime focus of attention. Back-loading, as we show, allows debt ratios to rise slowly but surely and have had to be ruled out for that reason. Whether this will lead to a formalisation of debt target rules within the SGP remains to be seen. But these developments all serve to highlight the importance of including both early interventions and cash data monitoring in any realistic fiscal surveillance programme.

2. Data

The data we use in this paper come from three different data series. First, since we are interested in the deficit of the general government, we use the annual series of government deficits according to ESA95 accounting standards. We then augment this series with data collected using the ESA79 standards in order to construct a longer time series. This data comes at annual frequency and provides the official deficit figure when it comes to the assessment of compliance with the SP plans. Second, starting in 1995, there is also a series at quarterly frequency of government deficit data. This also follows ESA95 accounting standards. We use this data as intra-annual information to forecast the end-of-year government deficit. Finally, we use the data series of the public accounts (*cash series*) that comes at monthly intervals. In addition, we use quarterly nominal GDP data. These data are required to normalize all other variables as ratios of GDP. We decided to build the model in ratio form in order to avoid the problem of having to forecast deficits and GDP separately to generate deficit ratios for the current year which are comparable to those submitted in the SP plan.

Thus the data we use come at three different frequencies. We can reduce the frequency of the cash data by aggregating it to quarterly observations. How we deal with the remaining frequency mismatch is explained below, in the model and estimation sections.

In Figure **1** below, we plot the annualized ratio variables for the public (cash data) and national accounts (ESA95) deficits as ratios to GDP. These are the data series to be used in the estimation and forecasting procedures described next. Figure 1 shows that these data display a joint long run trend, and strongly correlated short run co-movements. This suggests that the information obtained from the cash data deficits is likely to improve the forecast performance for the annual ESA95 deficit. The increase in forecast performance from using cash data and quarterly ESA95 data has been studied extensively in Onorante et al. (2008) and Pedregal and Pérez (2008). As described in Onorante et al (2008), this finding is notwithstanding some differences in the accounting rules and conventions between the cash data and ESA95 data. These differences relate to the methods for compiling the data, timing of recording of transactions, and differences in the coverage of budgets between countries and over time.

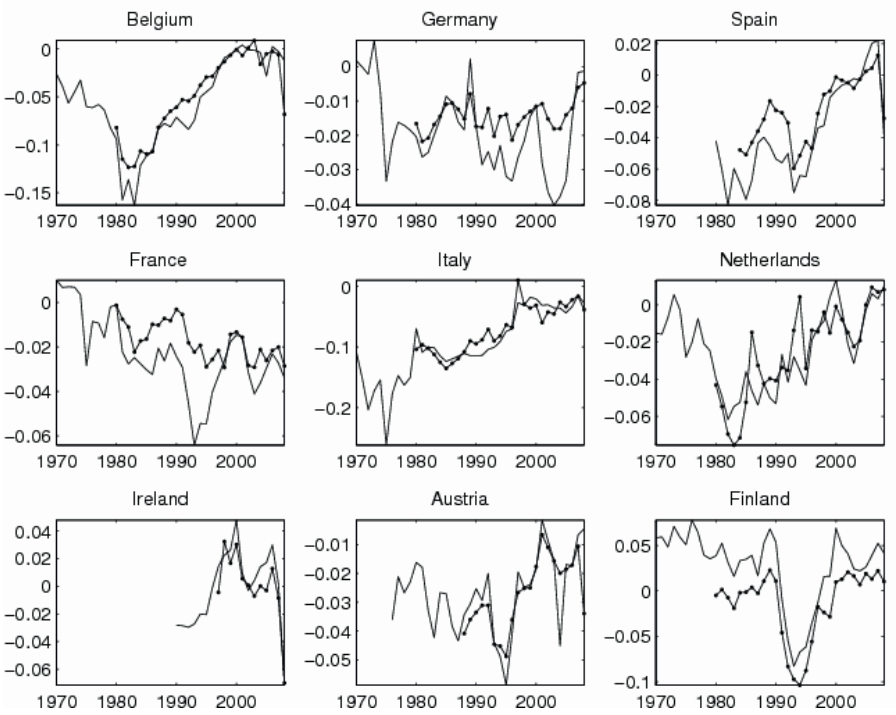

Figure 1: Co-movement of cash and ESA95 deficit ratios: ESA95 deficit ratio (solid line), Cash deficit ratio (solid-dotted line).

3. Estimation and forecasting

To forecast the fiscal developments in the different countries, we build on the approach using intra-annual cash data developed in Onorante et al. (2008) and Pedregal and Pérez (2008). Since the SP plans submitted by the governments are always expressed as ratios to GDP, we express the cash and deficit data as ratios to GDP. To obtain intra-annual GDP ratios, we construct quarterly GDP ratios as follows:

$$\hat{x}_{q,t} = \frac{\sum_{i=1}^{q} x_{i,t}}{\sum_{i=1}^{q} y_{i,t}} \qquad (1)$$

where x is the variable to be normalized[6], y is nominal GDP, q is the quarter index and t the index for the current year. In the fourth quarter the sums comprise all four quarters of the current year and the ratio variable coincides with the annual ratio of that variable. The variables used in the estimation process are the cash-to-GDP ratios and quarterly deficit ratios. These ratios will potentially show some cyclical pattern and we control for that in our estimation procedure (section 3.2). Lastly, when we make forecasts, we assume that data is available up to and including the first quarter of the current year for the deficit, cash data, and GDP data.

As noted, the reason we cast the model at quarterly frequency is to avoid the problem of forecasting both GDP and the deficit to construct deficit ratios for comparison with the numbers submitted in the SP plan. However, this way some cash information will be not used in the current forecasts when the current GDP data is not yet available.

3.1. Model specification

Once we have constructed all the time series in ratio form, we use the state space model described in detail in Onorante et al. (2008). This model combines the mixed-frequency data from annual ESA95 publications and from the monthly and quarterly public accounts. The annual frequency is reflected in an error-correction model, specified in ratios to annual nominal GDP. The co-integrating relationship underlying the error-correction model exists between the indicators derived from the annual fiscal data in cash accounts (sum of twelve months within the same year), and the actual annual fiscal data. Onorante et al. show that such co-integrating relationships between the deficit, revenue and expenditure ratios[7] on the one hand and the cash figure indicators on the other hand exist in almost all cases considered. In addition, it is shown that the cash-based data is a valid leading indicator for the annual fiscal variable. The error-correction model is then converted into state-space form with quarterly frequency, using the annual ratio variable in the fourth and filling in missing values in the first three quarters of the year.

Thus the monthly intra-annual data is transformed into quarterly data, such that the intra-annual model can be specified in quarterly frequency. The model for the indicator variable is directly set up in state-space form. It is thus possible to combine the annual error-correction model and the quarterly model for the indicator variable and set up a

[6] Cumulated from the monthly figures for the underlying cash data.
[7] Onorante et al. analyse for a few countries a wider set of fiscal variables.

joint framework such that the output of the indicator model is incorporated as input to the ECM equations.

3.2. Detailed Forecast Results

In order to be able to exploit the model's forecasts, the forecasts should be made as early as possible but also be as accurate and reliable as possible. Facing these two conflicting requirements, we consider the mid-point of each year to be an appropriate choice for the forecasting origin.[8] At that point, we can use all information up to and including Q1 of the current year as argued in Onorante et al. (2008). The model yields the forecasts given in table 1. The row *forecast* reports the forecasted value by the model, the row *realization* gives the true realization, and the row *SP* gives the most recent SP plan reported by the government.

Country	Statistic	2000	2001	2002	2003	2004	2005	2006	2007	2008
Belgium	Forecast	1.77	0.58	-0.30	-1.82	-0.21	-6.10	2.66	-0.30	-0.17
	Realization	-0.03	0.40	-0.11	-0.14	-0.37	-2.83	0.24	-0.28	-1.25
	SP	-1.00	0.20	0.00	0.00	0.00	0.00	0.00	0.30	0.00
Germany	Forecast	-2.79	-2.10	-3.97	-3.79	-4.11	-3.11	-2.47	-0.28	0.41
	Realization	-1.15	-2.82	-3.66	-4.03	-3.78	-3.31	-1.55	-0.17	-0.13
	SP	-1.25	-1.50	-2.00	-2.75	-3.25	-3.00	-3.30	-1.50	-0.50
Spain	Forecast	-1.12	0.69	0.40	-0.60	-0.83	-0.04	2.00	2.59	1.32
	Realization	-1.00	-0.66	-0.48	-0.23	-0.35	0.96	2.02	2.22	-3.82
	SP	-0.80	0.00	0.00	0.00	0.00	0.10	0.90	1.00	1.20
France	Forecast	-1.56	-1.38	-1.80	-3.38	-3.87	-3.85	-2.64	-2.63	-2.84
	Realization	-1.47	-1.56	-3.16	-4.12	-3.63	-2.96	-2.32	-2.73	-3.40
	SP	-1.70	-1.00	-1.40	-2.60	-3.60	-2.90	-2.90	-2.50	-2.30
Italy	Forecast	0.33	-2.40	-4.12	-4.04	-3.68	-4.01	-3.13	-2.95	-1.66
	Realization	-2.02	-3.10	-3.01	-3.54	-3.56	-4.37	-3.33	-1.48	-2.71
	SP	-1.50	-0.80	-0.50	-1.50	-2.20	-2.70	-3.50	-2.80	-2.20
Netherlands	Forecast	0.49	1.99	0.06	-1.22	-2.23	-0.84	0.08	0.44	0.10
	Realization	1.33	-0.25	-2.11	-3.15	-1.77	-0.28	0.60	0.33	0.99
	SP	-0.60	0.70	1.00	-1.00	-2.30	-2.60	-1.50	0.20	0.50
Ireland	Forecast									
	Realization				0.42	1.42	1.70	2.99	0.18	-7.15
	SP				-0.70	-1.10	-0.80	-0.60	-1.20	-0.90
Austria	Forecast	-2.66	-0.23	-1.20	-1.14	-0.03	-0.82	-1.61	-0.99	-0.22
	Realization	-1.85	-0.15	-0.87	-1.57	-4.52	-1.68	-1.75	-0.66	-0.46
	SP	-1.70	-0.75	0.00	-1.30	-0.70	-1.90	-1.70	-0.90	-0.70
Finland	Forecast	4.88	10.24	9.18	3.66	4.44	3.06	3.39	3.86	5.09
	Realization	6.90	4.99	4.07	2.41	2.19	2.61	3.90	5.24	4.16
	SP	4.70	4.70	2.60	2.70	1.70	1.80	1.60	2.80	3.70

Table 1: Forecast, Realization, and most recent SP plan for the horizon 2000 - 2008. Each year's forecast is based upon information up to and including Q1 of that year.

[8] We did a sensitivity check and shifted the forecasting period to later quarters but the additional gain in accuracy was small compared to the time loss. At an earlier forecast point, the loss of information was too large to constitute a worthwhile trade-off.

Table 1 shows the model works rather well in detecting financial slippage and therefore confirms the results obtained in Onorante et al. (2008). Although there are a few significant deviations in absolute terms between forecasted values and the realized deficits, the qualitative predictions are very good and justify the use of the model as an early warning tool – at least for the Euro-zone countries. Increasing the quantitative performance of the model is beyond the scope and intention of this paper and is therefore left as a subject for future research.[9]

4. Timeline of events

Our goal is to study the gains that can be obtained from early intervention in fiscal policy by governments. To do that, we have to specify the sequence of events of the government's action. In period t–1, before the current budget year starts, the government submits a SP plan to the European Commission. Then at the start of quarter $Q3$ of year t, the first year covered by the SP plan, a deficit forecast for the entire year is made[10]. If the forecast predicts a slippage of the government deficit below the SP target, the government can consider putting early intervention measures into place immediately, in order to avoid a deficit realization that is too far away from their SP target. Independent of whether early intervention measures have been implemented or not, the government also has to adjust its plan for the three remaining years of the plan to satisfy the debt targets of the initial SP plan by the end of the plan period. We illustrate the timing of these events in figure 2:

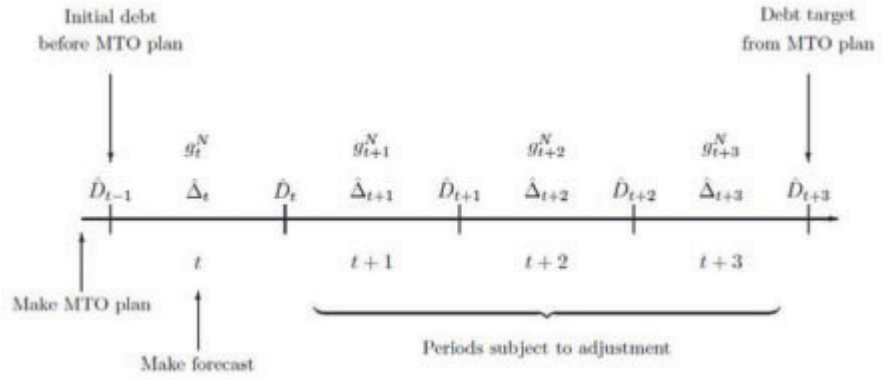

Figure 2: Timeline of events; g_t^N is the growth in nominal GDP in year t.

The time line set out in figure 2 is conceptually straightforward, but perhaps difficult to implement from a policy perspective. It puts a lot of faith in the effectiveness of fiscal activism, and in the "costless" production and pursuit of SP plans. Many governments may find that hard going in practice, and that mid-year is a bit late to adjust current (and future) budget plans which may have been in preparation for some time. Nevertheless,

[9] Forecasting the GDP and the deficit separately instead of forecasting the ratio directly might increase the performance significantly, for example.

[10] This is the earliest feasible period to make a prediction of the year-end deficit, given the data, model, and information restrictions in our forecasts discussed in section 3.

using real time data, Beetsma and Guiliodori (2008) show there is considerable evidence that governments do in fact adjust their budgets mid-year. We may therefore assume that the time line in figure 2 is feasible, if uncomfortable, at least for governments that are sufficiently determined to correct any budgetary failures before they run out of control. That is not to say that all governments do make fiscal corrections in good time. Recent experience in the Euro-zone shows very clearly that, while some do, many do not.

In an extension to figure 2's timeline, we also discuss the case where no changes to the original plan are made and calculate the deviations in the debt ratio that then appear at the end of the SP plan period.

5. Correction plans

When there has been a one time deviation in fiscal policy such that the deficit exceeds the SP plan, there are at least two ways to correct the deficit and meet the debt target at the end of the SP. One method we label the *constant slope* plan, and the other an *additive constant* plan[11]. The additive constant plan takes the original plan and adds a constant to all deficits planned under the original SP agreement. This constant *d* therefore describes a level shift. This plan will have large adjustments between *Q3* of period *t,* when the corrections start if there are early interventions (or from the end of period *t* if not), and period t+1 when the corrections can continue at the rate originally planned. Either way, these adjustments will be enough to eliminate the extra debt caused by the deficit slippage. We sketch this correction process in Figure 3.

The constant slope plan does not have this front-loading property. Instead, it creates a constant change in the deficit each year. The burden of adjustment in this plan is therefore spread more equally over the remaining periods of the plan. This time, the constant *d* describes a constant change in the deficit from year to year, whereas *d* in the additive case described a constant shift in the deficit compared to the original SP plan. We sketch this correction plan in figure 4.

[11] Both plans have the property that they can be described by a single parameter. In general, a correction plan is not uniquely determined because we have three degrees of freedom to define the plan but only one target to match. But once we concentrate on plans that can be described by a single variable, they are uniquely identified by the final debt target of the SP plan.

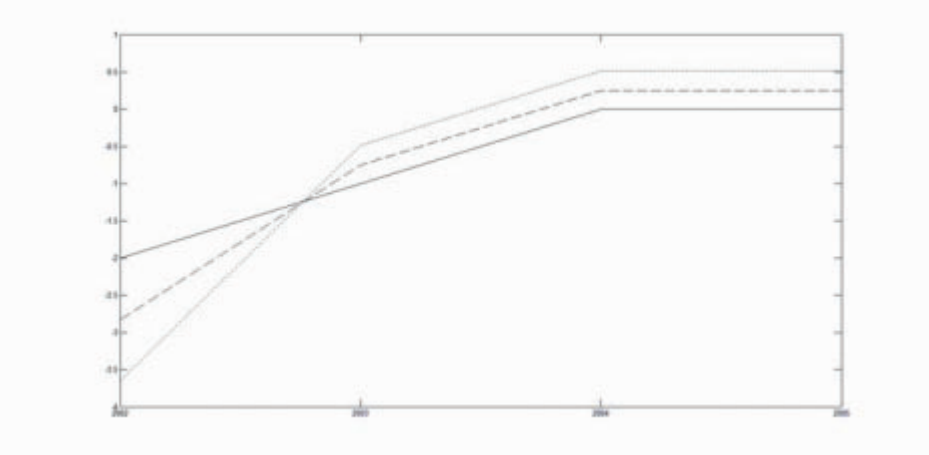

Figure 3: *Constant additive adjustments*. There a two correction plans: one with early interventions (dashed line), and one without early interventions (dotted line). We also plot the original SP/MTO plan (solid line). These corrections are based on the original SP plan plus an additive constant chosen to meet the same debt target at the end of the plan.

Note that the SP path is identical in both cases, so that we can easily compare the correction paths (see figure 5). We see that the constant slope plan has much smaller corrections in the deficit in the periods t to $t+1$. The larger corrections are postponed to later periods where, compared to the additive case, the adjustments relative to the original SP plan are plainly larger. They are back-loaded therefore[12]. In that sense these two correction schemes are polar opposites in terms of where the adjustments fall. The frontloaded, additive constant case represents a rapid correction ("cold shower") strategy and risks stirring up political opposition. The back-loaded, constant slope version is easier to implement, but risks allowing the policymakers to backslide and will therefore lack credibility if the markets doubt that it will be carried through to the end.

[12] Both correction plans include early intervention, calculated so that the SP/MTO debt target is reached at the end of the plan horizon.

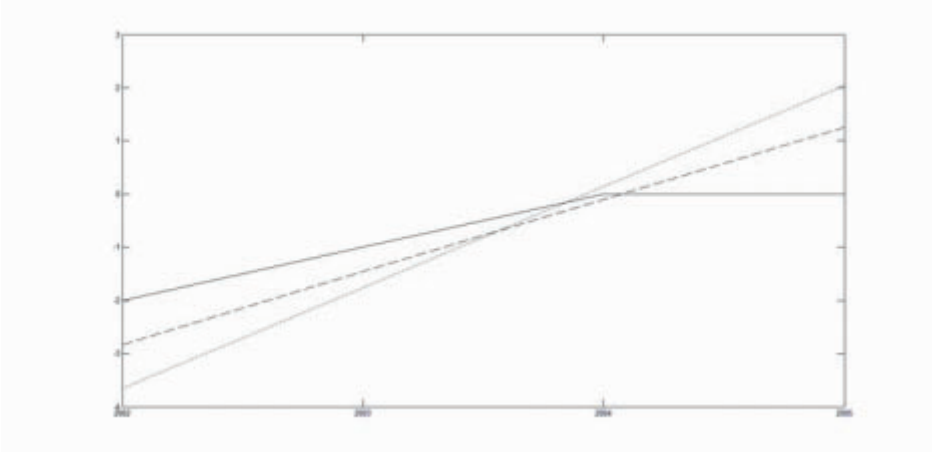

Figure 4: *Constant slope adjustments*. There a two correction plans: one with early interventions (dashed line) and one without early interventions (dotted line). We also plot the original SP/MTO plan (solid line). All plans have a constant slope and meet the same debt target at the end of plan.

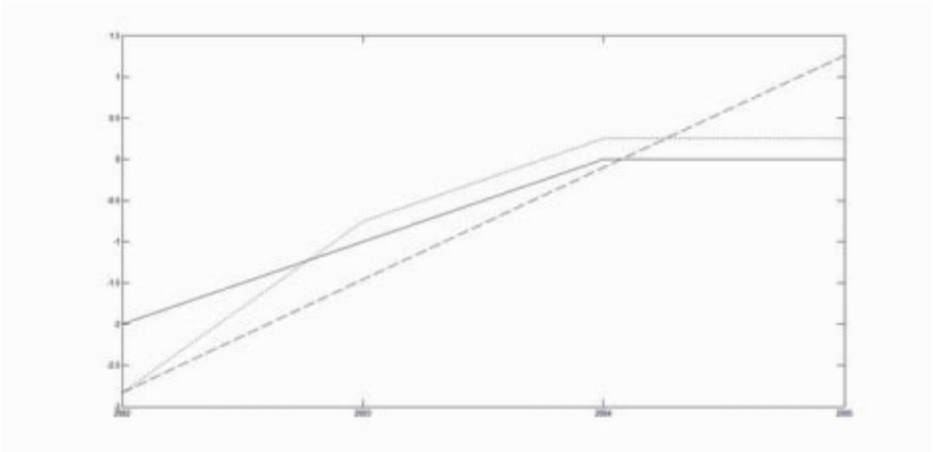

Figure 5: The constant slope (dashed line) and constant additive adjustments (dotted line) compared in the same problem (the early intervention strategies in figures 3 and 4 respectively). The solid line shows the original SP/MTO plan.

6. Example 1: The case of Germany in 2002

To give concrete examples of the differences between the two correction schemes we have described, we first consider the case of German fiscal policy in 2002. The German government submitted the following plan (see table 2) in December 2001 to the European Commission:

	2002	2003	2004	2005
Deficit	-2.0%	-1.0%	0.0%	0.0%
nominal GDP growth	2.77%	4.04%	4.04%	4.04%
Debt	60.38%	59.04%	56.75%	54.55%

Table 2: German government deficit plan, starting in 2002, as submitted in December 2001. Deficit and growth rates are taken from the plan submitted by the government. The debt figures follow from our own calculations based on a debt ratio of 60% in 2001.

For this plan, we take the deficit numbers and the nominal growth rates as given. The debt level in 2001 is taken to be 60 % of GDP. We update the debt ratio according to the following rule:

	2002	2003	2004	2005
Deficit	-3.65%	-1.0%	0.0%	0.0%
GDP growth	2.77%	4.04%	4.04%	4.04%
Debt	62.03%	60.62%	58.27%	56.01%
Debt (planned)	60.38%	59.04%	56.75%	54.55%

Table 3: German government deficit plan after a one-time deviation in 2002. Deficit and growth rates are taken from the plan submitted by the government in December 2001, and no corrections are taken with respect to these numbers. The debt follows from our own calculations based on a debt ratio of 60% for 2001. All GDP growth rates are nominal.

German government were simply to return to the original SP plan after 2002, the deficit *corrections* would be rather large (2.65% and 1% in 2003 and 2004 respectively), and there would be a permanent rise in the debt burden of 1.5% for ever – increasing the interest payments by 0.075% of GDP every year – all from one medium sized deficit slippage of 1.65% of GDP in 2002. Corrections of this size are unlikely to be undertaken.

Next we consider a situation in which early intervention measures are taken after the deficit forecasts are made. We make an arbitrary assumption that these intervention measures are effective to the extent that, at the end of the year, the deficit becomes a convex combination (with equal weights) of the SP target and the realization for that year; thus the deficit for 2002 in the case of early intervention $\hat{\Delta}_{2002}^{NEW}$ becomes:

$$\hat{\Delta}_{2002}^{NEW} = 0.5(-3.65\% - 2.0\%) = -2.82\% \qquad (3)$$

This step is used to provide a start to our calculations for the additive and constant slope corrections with early interventions. We replace it with a less arbitrary, but rather more difficult to implement, assumption for the early interventions in section 6.3. By contrast, where there are no early interventions we start with the realised deficit at the end of period *t*.

6.1. The additive correction approach

For the correction of a one time deficit slippage, we look first at the approach with a *level shift* for the remaining years up to the end of the planning horizon, in this case to 2005. The level shift is chosen such that the government can still satisfy its originally announced debt target.[16] We want to find deficits $\hat{\Delta}_{2003}^{NEW}, \hat{\Delta}_{2004}^{NEW}$ and $\hat{\Delta}_{2005}^{NEW}$ such that we meet the SP debt target of 54.55% in 2005. Since there are many plans that can satisfy this target, we look for a *simple* plan with a constant shift:

[16] Recent literature has emphasized the importance of targeting debt, rather than deficits, for constraining fiscal policy: Hughes Hallett (2005, 2008a,b), Kirsanova et al (2006). In view of the effects of the 2007/09 recession, policymakers have also raised the possibility of adopting explicit debt targets (see Blanchard, 2010).

$$\hat{\Delta}^{NEW}_{2003} := \hat{\Delta}^{SP}_{2003} + d$$
$$\hat{\Delta}^{NEW}_{2004} := \hat{\Delta}^{SP}_{2004} + d$$
$$\hat{\Delta}^{NEW}_{2005} := \hat{\Delta}^{SP}_{2005} + d$$

It is now easy to solve for *d* using the law of motion for the debt ratio in (2). We get

$$d = \frac{\hat{\bar{D}} - \frac{\hat{D}_{t-1}}{\prod_{s=t}^{t+3}(1+g^N_s)} - \frac{\hat{\Delta}_t}{\prod_{s=t+1}^{t+3}(1+g^N_s)} - \frac{\hat{\Delta}^{SP}_{t+1}}{\prod_{s=t+2}^{t+3}(1+g^N_s)} - \frac{\hat{\Delta}^{SP}_{t+2}}{(1+g^N_{t+3})} - \hat{\Delta}^{SP}_{t+3}}{1 + \frac{1}{1+g^N_{t+3}} + \prod_{s=t+2}^{t+3}(1+g^N_s)^{-1}}$$

where $\hat{D}_{t-1}$ denotes the initial debt before the SP plan starts; $\hat{\Delta}_t$ denotes the deficit realized in the first year covered by the SP plan; and $\hat{\bar{D}}$ denotes the target debt ratio at the end of the SP plan. If we evaluate *d* for Germany in 2002, we get *d* = 0.0025. Given the policies of 2002, this means the government has to decrease its deficit in each year, for the following three years, by 0.25% of annual GDP. The new plan can be seen in table 4. Notice that the deficit corrections going into 2003 and 2004 (at 2.1% and 1% of GDP) are smaller than in table 2, and also involve no extra debt or interest payments.

	2002	2003	2004	2005
Deficit	-2.83%	-0.75%	0.25%	0.25%
GDP growth	2.77%	4.04%	4.04%	4.04%
Debt	61.21%	59.58%	57.01%	54.55%
Debt (planned)	60.38%	59.04%	56.75%	54.55%

Table 4: German government deficit plan after a one-time deviation and revision in July 2002. Deficit and growth rates are taken from the plan submitted by the government in December 2001, and no corrections are taken with respect to these numbers. The debt follows from our own calculations based on a debt ratio of 60% in 2001.

The alternative for the government would be not to take early intervention measures and to let the deficit take its realized value for 2002. In this case, the debt at the end of 2002 would be 62.03%. Based on this, we can again calculate the shift value, *d*, necessary to reach the 54.55% debt target in 2005. We get *d*= 0.0051. This implies that the government has to reduce its deficit for the next three years by an additional 0.51% of GDP each year, compared to 0.25% if early intervention measures had been taken. The necessary annual corrections have now *doubled* in size therefore.

Against this, it must be kept in mind that the government already had to intervene in mid-2002 in the early intervention case. It reduced the deficit by 0.83% of GDP: from 3.65% with no early interventions, to 2.83% of GDP under early interventions (thereby avoiding the need to undergo the SGP's excessive deficit process and the significant improvement test). The difference of 0.83% is spread as net expenditure cuts over the remaining three years if there are no early interventions – matching the 0.25% per year of early

interventions, plus the additional interest charges. By contrast, the 0.83% difference in the early interventions case has to be corrected through public spending cuts in 2002.[17] That may be a tough call, but it does allow the German government to avoid the SGP's excessive deficit procedure and it is the kind of correction the German government will impose upon itself in its own new balanced budget legislation.

6.2. The slope correction approach

The second approach for correcting the one time deficit slippage would be to apply a *constant slope* adjustment path for the remaining years up to the end of the planning horizon, in this case 2005. The slope has to be chosen such that the government can still satisfy its original debt target. We need to find deficits Δ_{2003}^{NEW}, Δ_{2004}^{NEW} and Δ_{2005}^{NEW} such that we meet the debt target of 54.55% in 2005. Since there are many plans that can satisfy this target, we look for a *simple* plan such that:

$$\hat{\Delta}_{2003}^{NEW} := \hat{\Delta}_{2002} + d$$
$$\hat{\Delta}_{2004}^{NEW} := \hat{\Delta}_{2003}^{NEW} + d = \hat{\Delta}_{2002} + 2d$$
$$\hat{\Delta}_{2005}^{NEW} := \hat{\Delta}_{2004}^{NEW} + d = \hat{\Delta}_{2002} + 3d$$

Given that, it is easy to solve for *d* based on the law of motion for the debt ratio in (2)

$$d = \frac{\hat{\bar{D}} - \frac{\hat{D}_{t-1}}{\prod_{s=t}^{t+3}(1+g_s^N)} - \hat{\Delta}_t\left(\prod_{s=t+1}^{t+3}(1+g_s^N)^{-1} + \prod_{s=t+2}^{t+3}(1+g_s^N)^{-1} + \frac{1}{1+g_s^N} + 1\right)}{3 + \frac{2}{1+g_{t+3}^N} + \prod_{s=t+2}^{t+3}(1+g_s^N)^{-1}}$$

where $\hat{D}_{t-1}$ denotes the initial debt before the SP plan starts, $\hat{\Delta}_t$ denotes the deficit realized in the first year of the SP plan, and $\hat{\bar{D}}$ denotes the target debt ratio at the end of the plan. If we evaluate *d* for Germany in 2002, we get *d*=0.0131. This means that the government, under early intervention, has to decrease its deficit in each year, for the following three years, by 1.31% of annual GDP. As a result, the budget contractions are 0.46% and 0.35% of GDP smaller in 2003-4, but 1% larger in 2005. The new plan can be seen in table 5.

[17] Notice however that the total budget cuts with no early interventions are slightly smaller than those with early interventions: 1.53% vs. 1.58%, despite extra interest charges. This is because of the effect of higher GDP growth on the debt/deficit ratios later in the plan.

	2002	2003	2004	2005
Deficit	- 2.83%	- 1.46%	- 0.10%	1.26%
GDP growth	2.77%	4.04%	4.04%	4.04%
Debt	61.21%	60.30%	58.06%	54.55%
Debt (planned)	60.38%	59.04%	56.75%	54.55%

Table 5: German government deficit plan after a one-time deviation and revision in July 2002. Deficit and growth rates are taken from the plan submitted by the government in December 2001, and no corrections are taken with respect to these numbers. The debt follows from own calculations based on a debt ratio of 60% for 2001.

If we consider the case of no early interventions measures, then the corrections under a constant slope regime needed to meet the debt target in 2005 would require a slope parameter d=0.0182 and a period by period budget contraction of 1.82% of GDP. This is a large number: 0.5% larger in each period than with early interventions. On the other hand, the corrections here reduce the net spending cuts (or any revenue increases) to only 0.83% and 0.3% of GDP in 2002 and 2003, but then increase them by 2.1% of GDP in 2004-5. This adjustment plan is set out in table 6. The extent of the softening of the early budget contractions in 2002-3, and then the back-loading of them in 2004-5, is large and clearly visible:

	2002	2003	2004	2005
Deficit	-3.66%	- 1.76%	0.14%	2.04%
GDP growth	2.77%	4.04%	4.04%	4.04%
Debt	62.04%	61.39%	58.87%	54.55%
Debt (planned)	60.38%	59.04%	56.75%	54.55%

Table 6: German government deficit plan after a one-time deviation and revision in July 2002. Deficit and growth rates are taken from the plan submitted by the government in December 2001, and no corrections are taken with respect to these numbers. The debt follows from own calculations based on a debt ratio of 60% for 2001.

6.3. Altering the impact of early intervention

For our numerical example, we assume that, at the point at which the slippage is first detected, it is still possible to achieve a deficit at the end of the year that is a convex combination of the planned and the realized deficit. To overcome possible concerns regarding this particular approach, we provide a flexible sensitivity formula. Instead of assuming equal weights, we tried introducing a weighting parameter θ such that

$$\hat{\Delta}_t = \theta\tilde{\Delta}_t + (1-\theta)\Delta_t^{SP}$$

where $\tilde{\Delta}_t$ denotes the realized deficit in period t without intervention. It is easy to verify that the adjustment rules for d under both rules are linear in θ. The derivative with respect to θ therefore provides a flexible sensitivity measure of the adjustment rule with respect to the assumption of equal weights.

6.3.1. Constant slope adjustment

In the case of constant slope adjustments, the derivative is

$$\frac{\partial d}{\partial \theta} = \frac{\left(\prod_{s=t+1}^{t+3} (1+g_s^N)^{-1} + \prod_{s=t+2}^{t+3} (1+g_s^N)^{-1} + \frac{1}{1+g_s^N} + 1 \right)}{3 + \frac{2}{1+g_{t+3}^N} + \prod_{s=t+2}^{t+3} (1+g_s^N)^{-1}} (\tilde{\Delta}_t - \Delta_t^{SP})$$

and the change in *d* becomes $\frac{\partial d}{\partial \theta}\Delta\theta$ where $\Delta\theta$ denotes the difference in θ from 0.5, our benchmark case. A simple estimate of the change can be obtained by setting nominal growth rates to zero. In this case the formula reduces to $\frac{2}{3}(\tilde{\Delta}_t - \Delta_t^{SP})$ which, in the case of Germany, would imply a sensitivity of 1.1 %. If we set θ equal to zero, i.e. a complete correction as soon as the slippage is first detected, we would get a slope coefficient of 1.85 % which is almost exactly equal to the numerical value of 1.83 % used earlier. For the numeric example in this section, we assume that for the remaining six months of the year after the forecast has been made, the government can implement policy measures, e.g. a budget freeze, so that the deficit is in accordance with the submitted SP plan. In the case of Germany, every month less of compliance with the SP plan[18] will increase the slope coefficient by approximately 0.09. This shows that there are quantitative effects from altering the impact range of early intervention but, compared to not intervening, the gains always remain substantial.

6.3.2. Additive constant adjustment

In the case of the additive constant adjustment the derivative becomes

$$\frac{\partial d}{\partial \theta} = \frac{\prod_{s=t+1}^{t+3} (1+g_s^N)^{-1}}{1 + \frac{1}{1+g_{t+3}^N} + \prod_{s=t+2}^{t+3} (1+g_s^N)^{-1}} (\tilde{\Delta}_t - \Delta_t^{SP}) .$$

If we set nominal growth rates to zero as before, we get $\frac{1}{3}(\tilde{\Delta}_t - \Delta_t^{SP})$ reflecting the equal spread of the corrections over the three adjustment periods. For Germany, the sensitivity in our example would be 0.55 %, i.e. we would get an adjustment parameter of 0.53 % if there were a complete correction in the period in which the slippage were first detected, instead of 0.51% as in our calculations. Once again there is sensitivity with respect to the impact range of early intervention; but, as in the case of the constant slope adjustment scheme, the gains of intervening early are always substantial.

[18] The compliance in this case is measured relative to our assumption of six months of compliance.

7. Example 2: The case of Italy in 2002

As a second case, we take Italy in 2002. The Italian government had submitted the following plan (see table 7) to the European Commission in November 2001:

	2002	2003	2004	2005
Deficit	-0.5%	0.0%	0.0%	0.2%
GDP growth	4.76%	4.85%	4.54%	4.54%
Debt	103.12%	98.35%	94.07%	89.78%

Table 7: Italian government deficit plan starting in 2002, submitted in November 2001. Deficit and growth rates are taken from the plan submitted by the government. The debt follows from own calculations based on a debt ratio of 107.5% for 2001.

For this plan, we again take the deficit numbers and the nominal growth rates as given. The debt level in 2001 is taken to be 107.5 % of GDP, and we update the debt ratio according to the rule given in (2).[19]

Based on the forecast for Italy made in June/July 2002, we expect a deficit for 2002 of 3.88%.[20] We now derive the debt ratio of the Italian government using the realization for 2002 and assume that this is a one time deviation from the SP plan (see table 8). This is intended to resemble a situation in which there are no intra-annual interventions and the full deficit is realized.

Next, we consider the situation where, after the forecast is made, early intervention measures are taken. We make the same assumption as before; that the measures taken are effective to the point that, at the end-of-year, the deficit is the convex combination with equal weights of the SP target and the realization for that year. In that case, the deficit for 2002 $\hat{\Delta}_{2002}^{NEW}$ becomes

$$\hat{\Delta}_{2002}^{NEW} = 0.5(-3.01\% - 0.5\%) = -1.76\%$$

	2002	2003	2004	2005
Deficit	-3.01%	0.0%	0.0%	0.2%
GDP growth	4.76%	4.85%	4.54%	4.54%
Debt	105.63%	100.74%	96.37%	91.98%
Debt (planned)	103.12%	98.35%	94.07%	89.78%

Table 8: Italian government deficit plan after a one-time deviation in 2002. Deficit and growth rates are taken from the plan submitted by the government in November 2001, and no corrections are taken with respect to these numbers. The debt follows from own calculations based on a debt ratio of 107.5% for 2001.

[19] The updated debt ratios are lower than the debt ratios from the plan submitted by the Italian government. However, to get a consistent benchmark case, we allow debt to evolve according to the proposed SP rule.

[20] It will turn out that the actual deficit will be 3.01% for 2002.

7.1. The additive correction approach

First, we derive again the correction under the *level shift* as in the German example above. If we solve for *d* we get *d*=0.0038. This means that the Italian government would have to cut the deficit by about 0.4% of GDP for each of the remaining years. This plan can be seen in table 9. In this scenario, with early interventions the government would escape both the SGP's excessive deficit scrutiny and the Commission's significant improvement test. However, the early deficit reductions are severe: 1.24% of GDP in 2002, and 2.14% in 2003, but very little thereafter.

	2002	2003	2004	2005
Deficit	-1.76%	0.38%	0.38%	0.58%
GDP growth	4.76%	4.85%	4.54%	4.54%
Debt	104.38%	99.16%	94.47%	89.78%
Debt (planned)	103.12%	98.35%	94.07%	89.78%

Table 9: Italian government deficit plan after a one-time deviation and revision in July 2002. Deficit and growth rates are taken from the plan submitted by the government in November 2001, and no corrections are taken with respect to these numbers. The debt follows from own calculations based on a debt ratio of 107.5% for 2001.

The alternative would be not to take any early intervention measures and to let the deficit take its course for 2002. In that case the debt at the end of 2002 would be 105.63%. Based on this, we can calculate the level shift, *d,* that would be necessary to reach the 89.78% debt target in 2005. We get *d*= 0.0076. This implies that the government has to double its deficit reductions, to 0.76% of GDP, each year for three years, instead of only 0.38% had early intervention measures been taken. However, it must be kept in mind that the government already had to reduce the deficit by a large margin in 2002 in the early interventions scenario. The deficit in 2002 with early interventions is 1.76%, whereas it is 3.01% without such interventions; the difference of 1.25% being spread over the remaining three years. On the other hand, the deficit reductions of 0.38% for three years in the early interventions case are less than the 1.25% of additional cuts imposed after 2002 when there are no early interventions – but not by much. Those late cuts are used to pay for the extra spending in 2002.

Thus, in this plan the government avoids the savage cuts in the first two years of the early interventions solution by trading cuts of 1.24% in net spending saved in 2002, and 1.38% of GDP saved in 2003, for larger cuts (of 0.76% and 0.56%) in 2004-5. The difference in the cuts required under the two plans being made up by the growth in GDP during the life of the plan.

7.2. The slope correction approach

The second approach is the *constant slope* adjustment path taken to the end of the plan's horizon. The slope is chosen such that the government can still satisfy the original debt target in 2005. We need to find deficits $\hat{\Delta}_{2003}^{NEW}$, $\hat{\Delta}_{2004}^{NEW}$ and $\hat{\Delta}_{2005}^{NEW}$ such that we meet the debt target of 89.78% by 2005. If we evaluate *d* for Italy in 2002, we get *d*=0.0105 with early interventions. This means the government has to decrease its deficit from year to year, for the next three years, by 1.05% of annual GDP.

The new plan can be seen in table 10. The back-loading is more obvious here than in the German example; and, with an extra 1% of GDP in budget cuts in 2005, and a correspondingly larger gain in frontloading relief, the temptation for time inconsistent behaviour compared to the early intervention solution in table 8 will be large. This is guaranteed to raise doubts about the credibility of this as a budget consolidation plan.

	2002	2003	2004	2005
Deficit	-1.76%	-0.67%	0.42%	1.51%
GDP growth	4.76%	4.85%	4.54%	4.54%
Debt	104.38%	100.21%	95.44%	89.78%
Debt (planned)	103.12%	98.35%	94.07%	89.78%

Table 10: Italian government deficit plan after a one-time deviation and revision in July 2002. Deficit and growth rates are taken from the plan submitted by the government in November 2001, and no corrections are taken with respect to these numbers. The debt follows from own calculations based on a debt ratio of 107.5% for 2001.

If, instead, we consider the case of no early interventions measures, then the constant slope regime would require d=0.0183 to meet the 2005 debt target. The resulting plan can be found in table 11. This time the budget corrections are considerably larger than those with early interventions. Similarly, the back-loading element is large: the budget would have to be cut by 2.2% more of GDP in 2005 than in the scheme with additive corrections, and by 2.4% more than with both additive corrections and early interventions. The frontloading relief is equally large: 1.24% in 2002 and 1.3% in 2003. It is hard to believe that time inconsistent behaviour would not appear in such a case. As a result this plan is unlikely to have much credibility in the markets.

	2002	2003	2004	2005
Deficit	-3.01%	-1.12%	0.78%	2.67%
GDP growth	4.76%	4.85%	4.54%	4.54%
Debt	105.63%	101.86%	96.65%	89.78%
Debt (planned)	103.12%	98.35%	94.07%	89.78%

Table 11: Italian government deficit plan after a one-time deviation and revision in July 2002. Deficit and growth rates are taken from the plan submitted by the government in November 2001, and no corrections are taken with respect to these numbers. The debt follows from our own calculations based on a debt ratio of 60% for 2001.

8. Measuring the gains from early intervention

It is relatively easy to derive a monetary measure of the gains to be had from early interventions. Here we use the difference in the debt burden at the end of the current SP plan starting with or without early interventions. That takes out any differences in the subsequent fiscal corrections which depend on the type of correction method chosen.

8.1. The gains in monetary terms

a) *For Germany:* we assume that, after the slippage, the government returns to the fiscal contractions in its original SP plan, first having made an early intervention and then without. The difference in outcomes is easily read off from table 2. We see that, for Germany, the gain of early intervention would have been a difference in debt ratios in 2005 of 1.46%. If we take a nominal interest rate of 5%, this would increase the government deficit for all future periods by 0.073% of GDP. For Germany, this would mean additional interest payments every year of about 1.64 billion Euros at 2005 prices. This is equivalent to the entire central government budget for housing, urban development, and regional planning[21] (1.794 billion Euros) being lost for ever.

b) *For Italy:* we follow the same approach as in the case of Germany and compare the debt ratio at the end of the SP plan in 2005 in the case where early intervention measures have been taken, to the case where they have not been taken. The difference can be read off from table 8 and we see that for Italy the difference in debt ratios in 2005 would have been 2.20%. Again, assuming a nominal interest rate of 5%, this means a permanent raise in interest payments of 0.11% of GDP. For Italy, this is equivalent to a loss in public spending of 1.57 billion Euros each year for ever.

8.2. The gains in terms of budget management

In the case of the *additive* correction approach, the gains from early intervention can be read off from the adjustment factor *d* that captures the value of reducing the fiscal contractions in the following years of the SP plan. In the *constant slope* approach, the change in the fiscal impulse can be derived as the difference of the corrected plan and the original SP plan.

We set out the net fiscal contractions or expansions implied for Germany, relative to the original SP plan, in table 12. These figures show that the two approaches offer different schedules for correcting fiscal slippages. Both allow quite a large amount of extra spending in the first year of the plan. But then they differ. The constant slope plan offers two additional years of extra spending, but then demands a large cut in net spending. The additive constant approach, by contrast, offers small cuts spread evenly over the three correction years.

For Italy, the net fiscal contractions or expansions implied, relative to her original SP plan are set out in Table 13. Qualitatively the results resemble those for Germany. They imply small but equally spread fiscal contractions under the additive approach; and but positive impulse in the first two periods, followed by a small contraction in 2004 and a sharp contraction in the last period under the constant slope approach.

[21] This number is taken from http://www.bundesfinanzministerium.de/bundeshaushalt2005/pdf/vorsp/zyubfkt.pdf.

		2002	2003	2004	2005
Deficit	planned	-2.00%	-1.00%	0.0%	0.0%
	Additive constant	-2.82%	-0.75%	0.25%	0.25%
	Constant slope	-2.82%	-1.46%	-0.10%	1.26%
Fiscal impulse	Additive constant	+0.82%	-0.25%	-0.25%	-0.25%
	Constant slope	+0.82%	+0.46%	+0.10%	-1.26%

Table 12: Change in the fiscal impulse of the German in reaction to a *additive constant* and *constant slope* revision of the original SP plan to meet the debt target in 2005.

		2002	2003	2004	2005
Deficit	planned	-0.5%	0.0%	0.0%	0.2%
	Additive constant	-1.76%	0.38%	0.38%	0.58%
	Constant slope	-1.76%	-0.67%	0.42%	1.51%
Fiscal impulse	Additive constant	+1.26%	-0.38%	-0.38%	-0.38%
	Constant slope	+1.26%	+0.67%	-0.42%	-1.31%

Table 13: Change in the fiscal impulse of the Italian in reaction to a *constant slope* and *constant slope* revision of the original SP plan to meet the debt target in 2005.

9. Elsewhere in the Eurozone

Up to now, we have looked only at two countries in two specific time periods. In this section we do the same analysis for the eurozone countries in all years for which SP plans exist and are publicly available. To get a comprehensive measure, and to avoid an overload of individual country detail, we average the fiscal impulses of the different adjustment plans over all the cases back to 2000 where forecasting deficit slippages demanded early intervention. The results are presented in table 14 for both additive and constant slope approaches.

These results confirm that what we saw above for Germany and Italy in their 2002 plans does in fact hold more generally. The differences between the left and right panels show that there are clear and substantial advantages in terms of both lower debt levels and permanent interest savings in every case to instituting early corrections. The changes in the overall run of fiscal policies required to make the necessary budget corrections is almost always smaller – often substantially smaller – with early interventions; most obviously Germany, Italy, the Netherlands and Belgium. In most cases the changes are halved if early action is taken; with those changes bunched in the final year in the slope adjustment method is used, but evenly spread out if the additive method is used.

		with early intervention				without early intervention			
Country	Intervention	*t*	*t*+1	*t*+2	*t*+3	*t*	*t*+1	*t*+2	*t*+3
Belgium	slope	0.49	0.17	-0.17	-0.43	0.97	0.35	-0.31	0.88
	additive	0.49	-0.15	-0.15	-0.15	0.97	-0.30	-0.30	-0.30
Germany	slope	0.51	0.30	-0.11	-0.62	1.02	0.48	-0.26	-1.10
	additive	0.51	-0.16	-0.16	-0.16	1.02	-0.31	-0.31	-0.31
Spain	slope	0.13	0.04	0.01	-0.15	0.26	0.08	-0.03	-0.27
	additive	0.13	-0.04	-0.04	-0.04	0.26	-0.08	-0.08	-0.08
France	slope	0.38	0.08	-0.11	-0.30	0.75	0.22	-0.22	-0.66
	additive	0.38	-0.12	-0.12	-0.12	0.75	-0.23	-0.23	-0.23
Italy	slope	0.99	0.44	-0.26	-1.02	1.98	0.80	-0.54	-1.94
	additive	0.99	-0.30	-0.30	-0.30	1.98	-0.60	-0.60	-0.60
Netherlands	slope	1.08	0.35	-0.38	-0.90	2.15	0.74	-0.68	-1.90
	additive	1.08	-0.33	-0.33	-0.33	2.15	-0.65	-0.65	-0.65
Austria	slope	0.26	0.06	-0.09	-0.19	0.51	0.15	-0.17	-0.43
	additive	0.26	-0.08	-0.08	-0.08	0.51	-0.16	-0.16	-0.16
Portugal	slope	0.14	0.11	0.27	-0.47	0.29	0.16	0.23	-0.60
	additive	0.14	-0.04	-0.04	-0.04	0.29	-0.09	-0.09	-0.09

Table 14: The average changes in the fiscal impulse relative to the SP plan for the *additive constant* and the *constant slope* approaches with and without early interventions.

Similarly, the required changes are almost always much smaller (even in the earlier years) if the additive adjustment method is used. In fact the changes are typically 3 to 5 times smaller with additive rather than slope adjustments, most notably in Spain, Germany, Italy and Portugal (possibly Belgium and the Netherlands). It is important to bear in mind that, although these results are qualitatively the same as those for the actual budget corrections discussed in sections 6 and 7, the figures in table 14 show the changes in overall fiscal policy stance which those budget corrections cause when superimposed on the SP/MTO plans. And those are the changes in policy which the public see and judge the policymakers by.

Country		*t*	*t*+1	*t*+2	*t*+3
Belgium	$r\Delta D$	-0.0243 %	-0.0307 %	-0.0370 %	-0.0430 %
Germany	$r\Delta D$	-0.0255 %	-0.0324 %	-0.0391 %	-0.0455 %
Spain	$r\Delta D$	-0.0065 %	-0.0081 %	-0.0096 %	-0.0110 %
France	$r\Delta D$	-0.0188 %	-0.0238 %	-0.0287 %	-0.0335 %
Italy	$r\Delta D$	-0.0494 %	-0.0623 %	-0.0746 %	-0.0864 %
Netherlands	$r\Delta D$	-0.0538 %	-0.0676 %	-0.0810 %	-0.0940 %
Austria	$r\Delta D$	-0.0128 %	-0.0163 %	-0.0196 %	-0.0227 %
Portugal	$r\Delta D$	-0.0071 %	-0.0089 %	-0.0105 %	-0.0121 %

Table 15: The *additional* interest payments when no corrections are made, using the *additive constant* approach. The term $r\Delta D$ gives the government spending, expressed as a share of GDP that would need to be devoted to extra interest payments if no adjustments at all were taken. In this case, debt targets are not met and higher interest payments would be necessary for ever.

Country	Intervention	*t*	*t*+1	*t*+2	*t*+3
Belgium	$r\Delta D$	-0.0243 %	-0.0147 %	-0.0224 %	-0.0430 %
Germany	$r\Delta D$	-0.0255 %	-0.0096 %	-0.0149 %	-0.0455 %
Spain	$r\Delta D$	-0.0065 %	-0.0043 %	-0.0037 %	-0.0110 %
France	$r\Delta D$	-0.0188 %	-0.0139 %	-0.0189 %	-0.0335 %
Italy	$r\Delta D$	-0.0494 %	-0.0250 %	-0.0369 %	-0.0864 %
Netherlands	$r\Delta D$	-0.0538 %	-0.0337 %	-0.0510 %	-0.0940 %
Austria	$r\Delta D$	-0.0128 %	-0.0095 %	-0.0137 %	-0.0227 %
Portugal	$r\Delta D$	-0.0071 %	-0.0015 %	0.0120 %	-0.0121 %

Table 16: The *additional* interest payments when no corrections are made, using the *constant slope* approach. The term $r\Delta D$ gives the government spending, expressed as a share of GDP, that would need to be devoted to extra interest payments if no adjustments at all were taken. Debt targets are not met and higher interest payments would be necessary for ever.

Looking at the figures in tables 15 and 16, we can see that the interest payment consequences of making no early budget corrections are indeed small (justifying our having left them out of consideration before this point) – just a fraction of a percent in each case, even in Italy and the Netherlands. Moreover the extra interest payments are not different between the two correction methods. Again it was reasonable to ignore them. However, they build up over time and last for a long time since the corrections are sufficient only to get us back to the planned debt levels.

10. Conclusions

In this paper we have accomplished two things:
a) We have investigated the gains to be made, in terms of monitoring and correcting excessive deficits, by using cash data rather than accruals data to monitor the current fiscal position; and, given that information, by computing the early interventions needed to head off any excess deficits as they emerge; and
b) We have also examined and compared two different strategies for correcting excess deficits that may have already emerged, such that the debt ratio returns to some pre-specified level at the end of the designated planning period.

Independently of the measure used, our results obtained show that the gains from early intervention are certainly not negligible for governments committed to reducing their debt. What is different between the different plans is the allocation of the corrections over time. Both the *constant slope* and the *additive constant* plans require a lot of effort at the moment a fiscal slippage is detected in order to avoid further slippages in the remainder of the year and in subsequent years. This means that an important part of the adjustment has to take place in the first year. After that, the two approaches differ sharply in the timing of the corrections. The *additive* approach typically requires a second costly adjustment after the early intervention. One could however argue that this would be a less serious problem if those corrections could be implemented in a package together with the early intervention measures and therefore avoid further discussion in the political process.

The advantage of the *constant slope* approach is that it spreads the adjustment steps equally across the horizon of the SP plan. They may therefore be easier to implement

politically. However, it also requires an especially strong and committed government to overcome the (political) temptation to use the surplus that occurs towards the end of the plan for opportunistic spending instead of debt reductions; for example, close to elections or as debt or deficit consolidation fatigue begins to set in among the politicians.

In our discussion of the different adjustment paths available to a fiscally consolidating government, we have emphasised the gains of early intervention. In that context we have stressed the importance of accounting for the interaction between deficit and debt targets, and the danger of time consistency in the associated consolidations. The time consistency problem in particular seems to be empirically relevant and strategically important, but it has received very little attention in the literature on the monitoring and control of fiscal policies.

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