Expansionary Austerity and Reverse Causality

Christian Breuer

Chemnitz University of Technology
Department of Economics
Junior Professorship for European Economics
christian.breuer@wirtschaft.tu-chemnitz.de

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Abstract

We show that the cyclical adjustment strategy used in a large stream of literature on the conventional or data-based analysis of fiscal policy fails to correct for cyclical effects in the case of expenditure-GDP-ratios so that the finding of expansionary austerity in this literature is based on reverse causality, i.e. increasing GDP causally decreases expenditure-GDP-ratios and not vice versa. We propose a new version of the "Blanchard"-method to adjust for cyclical effects and correct for this error. Replicating some prominent results based on the conventional approach with this new indicator, the expansionary effect of fiscal consolidations disappears or turns into opposite. These findings may help understanding some of the controversies in the literature and contribute to improve the conventional approach as well as the "Blanchard method".

Keywords: fiscal adjustment; Blanchard method; cyclical adjustment; reverse causality
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1. Introduction

One of the lively debated issues in today's macroeconomic research is the question of the effects of fiscal policy. Since the European fiscal crisis, this debate gained political relevance because policy-makers around the world have been in search of an efficient way to reduce government debt levels. The idea of an "expansionary fiscal contraction" seemed to be a tempting solution for the challenges of the time.

Macroeconomic textbooks in the Keynesian tradition however suggest that fiscal expansions increase, while fiscal consolidations contract aggregate demand. A reduction of government deficit levels would thus decrease economic growth in the short run. On the other hand, a substantial amount of research on the macroeconomic effects of fiscal consolidations challenges this conventional wisdom and finds that fiscal adjustments may have expansionary economic effects ('expansionary austerity hypothesis'). This view was first expressed by Giavazzi and Pagano (1990) who discussed the expansionary effects of cases of fiscal adjustments in Ireland and Denmark during the 1980s. Alesina and Perotti (1995)[2] found first evidence for the expansionary austerity hypothesis in a large panel of OECD countries. In the aftermath, a number of papers built on the approach used in A&P (1995) to investigate the effects of fiscal policy.[3] According to this stream of literature, fiscal consolidations are likely to be expansionary if the adjustment mainly takes place on the expenditure side, while tax increases are more likely to be contractionary (Alesina and Ardagna, 1998, 2010, and 2013).[4]

To measure discretionary changes in fiscal policy, A&P investigate changes in the cyclically-adjusted primary balance (hereafter: *conventional* or *data-based approach*) and apply a cyclical adjustment strategy based on the so-called "*Blanchard method*" (hereafter: *A&P approach*).[5]

Critique of this approach is not new. In a comment on A&P, Kollintzas (1995) criticised that the cyclical adjustment strategy used in A&P (1995) might not capture the cyclical effects of the government budget balance so that the resulting "*Blanchard Fiscal*

[2] Hereafter A&P.
[3] See for instance Alesina and Perotti (1997), Alesina and Ardagna (1998, 2010, and 2013), and Ardagna (2004 and 2009).
[4] Hereafter A&A (1998, 2010, and 2013).
[5] The cyclical adjustment strategy is motivated by Blanchard (1990) and described by Alesina and Perotti (1995).

Indicator" (BFI) might not be an appropriate measure of a discretionary change in fiscal policy. Moreover, Giavazzi (1995) suggests that the results in A&P are influenced by accompanying monetary policies, in form of exchange rate devaluations, for example in the case of Ireland 1987.

At the beginning of the European fiscal crisis, there was a renewed interest in the effects of fiscal consolidations and potential expansionary effects. Against this background, A&A (2010 and 2013) provided new evidence on expansionary effects of fiscal consolidations in a panel of OECD countries. These studies have been frequently debated in the recent literature.[6] Different from A&A (2010), Leigh et al. (2010) and Guajardo et al. (2014) analysed historical records of fiscal adjustments and contrasted the *conventional approach* with the *historical approach*. Their results did not share the expansionary austerity view.

Guajardo et al. (2014) illustrate that the fiscal indicator as used in A&A (2010) is correlated with GDP forecast revisions. The authors state that estimates based on the conventional approach appear to be biased towards overestimating expansionary effects, since the conventional approach entails one-offs operations in the budget balance. They also criticise that the cyclical adjustment strategy of A&A (2010) neglects the effects of budgetary effects of changes in asset prices. Jayadev and Konczal (2010) and Jordà and Taylor (2016) illustrate that the successful cases of fiscal adjustments in A&A (2010) are in most instances associated with an economic upswing, an analysis that questions the exogeneity of the fiscal indicator used in the *data-based* approach. In this line, De-Cos and Moral-Benito (2013) illustrate that fiscal adjustment episodes as identified by A&A (2010) are not exogenous to economic growth and treat fiscal consolidations as weakly exogenous or predetermined, pointing to potential feedback effects and reverse causality. De-Cos and Moral-Benito (2016) illustrate that the cases of fiscal adjustments identified by the *narrative approach* are not exogenous to GDP, too.

To account for potential endogeneity in the study of A&A (2010), Holden and Midthjell (2013) and Yang et al. (2015) applied alternative measures of discretionary change and illustrate that the positive effect of fiscal adjustments disappears after applying alternative strategies of adjusting budgetary data for cyclical effects, rather than adjusting with the method used in A&A.

[6] Refer to Blyth (2013) and Stiglitz (2016) for a comprehensive discussion and critique of expansionary fiscal consolidations and their relevance in the European fiscal crisis.

After the Blanchard method used in A&A (2010) has been criticised for the (non-) recognition of fluctuations in asset prices and their effect on the budget balance (Guajardo et al., 2014), Yang et al. (2015) developed an indicator of fiscal impulse which controls for asset price fluctuations and discovered that the results are more in-line with the narrative approach when the changes in the fiscal stance is measured with this alternative strategy. Holden and Midthjell (2013) discussed potential reverse causality in the study of A&A (2010) and illustrate that reductions in government spending are not more likely to be successful in terms of reducing government debt, compared to tax increases, if the CAPB is estimated with a modified strategy, rather than the strategy used by A&A. However, Holden and Midtjell (2013) as well as Yang et al. (2015) apply newly developed strategies to adjust for cyclical effects rather than applying standard methods of cyclical adjustments and do not show whether their assumptions are more in line with the literature, compared to the assumptions on the cyclical sensitivity of the government budget made in A&P (1995), as well as A&A (1998, 2010, and 2013). Moreover, Holden and Midthjell (2013) focus on the question of whether fiscal policies are effective in reducing debt, rather than examining the effect of the cyclical adjustment strategy on the estimated fiscal multiplier. To this end, no previous study discussed why the *Blanchard method* as used in the literature following A&P is in conflict with standard assumptions on automatic stabilizers and how fixing this conflict influences the estimated fiscal multiplier in conventional analyses of fiscal policy.

This paper builds on the previous literature and illustrates that studies using the BFI in the tradition of A&P as an indicator of fiscal impulse are biased towards expansionary austerity because the cyclical adjustment strategy does not correctly adjust the budget balance for cyclical effects. This cyclical adjustment problem in the method proposed by A&P and applied in A&A (1998, 2010, and 2013) is particularly pronounced in the case of government expenditures. This explains why the estimated fiscal multipliers in the literature based on the A&P method are biased towards expansionary results and why this is particularly pronounced in the case of cuts in government expenditure. The remainder of this paper is structured as follows:

Section 2 of this paper illustrates that the strategy pioneered by A&P is in conflict with standard assumptions made in the literature on cyclical adjustment. Different from the

assumptions proposed in the literature, A&P implicitly assume unit-elastic government expenditures with respect to GDP, while it is common to assume inelastic government expenditure (other than transfers). To fix the incomplete cyclical-adjustment problem, an augmented specification of the BFI is proposed. The following empirical part tests hypotheses outlined in section 2 based on the dataset used in A&A (2010). Results based on the A&P approach are compared with those based on a CAPB (computed with standard assumptions) and the augmented version of the BFI proposed before.[7]

Section 3 also provides evidence for the hypothesis that the fiscal indicator as used in A&A (2010) entails a pro-cyclical pattern and is positively correlated with the output gap, while the same is not true for the CAPB of the OECD or the augmented version of the Blanchard method. This pattern appears to be particularly pronounced for the expenditure-GDP-ratio (if calculated with the A&P method).

Replicating A&A (2010), the estimated effects are compared (based on the CAPB used in A&A, the CAPB of the OECD, and the augmented BFI. In line with the hypotheses formulated in section 2, it is shown that the results based on the A&A measure provide evidence for expansionary effects of fiscal contractions in the case of expenditure cuts, while this effect is contractionary after using standard assumptions to correct for cyclical effects. It is shown that there is a qualitative difference in the estimated fiscal multiplier if standard methods are used to compute the CAPB, rather than the method proposed by A&A. Section 4 concludes.

2. Cyclical adjustment and reverse causality

2.1. Cyclical adjustment and the data-based approach

To analyse the effects of changes in fiscal policy on GDP, the conventional (data-based) approach applies regressions of GDP growth rates Δy_t in year *t* on changes in the cyclically-adjusted primary budget balances (as a ratio to GDP) $\Delta capb_t$:

$$\Delta y_t = \alpha + \beta\, \Delta capb_t + \varepsilon_t \tag{1}$$

[7] I use the same data and definitions as A&A (2010), precisely the OECD Economic Outlook, No. 84, as applied in A&A (2010). As a standard cyclical adjustment strategy I obtain cyclically-adjusted data from the same source, based on the method proposed in Girouard and André (2005).

The idea of this approach is straightforward: coefficient β captures the effect of a change in fiscal policy (measured as a percentage point of GDP) on GDP growth rates, i.e. the fiscal multiplier. This approach provides unbiased estimates of the fiscal multiplier if the fiscal indicator is not affected by GDP (no reverse causality). Because the budget balance is influenced by a number of factors (that might be correlated with the economic cycle), however, the question of reverse causation has frequently been discussed. Perotti (2013) highlights two potential pitfalls of empirical papers on the effects of fiscal policy using the conventional approach, the "countercyclical response problem", and the "imperfect cyclical adjustment problem".

Since the cyclical adjustment strategy aims at controlling for the automatic feedback effects of GDP on the budget balance, the most obvious reason why the budget balance responds to GDP seems to be controlled for, however, an "incomplete cyclical adjustment problem" arises when the cyclical adjustment strategy does not appropriately account for cyclical effects in the budget balance, f. e. because it does not take into account changes in asset prices. In this context, a number of articles discuss the influence of asset prices on the budget balance.[8] While the cyclical adjustment strategy controls for automatic effects of GDP on the budget balance, another problem might arise through discretionary policy measures. For example, it is possible that systematic counter-cyclical policy responses might contribute to the positive relationship between the budget balance and economic growth ("counter-cyclical response problem"). Accordingly, the estimated coefficient β is an unbiased assessment of the fiscal multiplier only under the assumption of no "imperfect cyclical adjustment problem" and no "counter-cyclical response problem". In the following, we focus on the incomplete cyclical-adjustment problem in the literature using the conventional approach and the Blanchard-method to adjust for cyclical effects in the tradition of A&P (1995).

[8] See Morris and Schuknecht (2007) and Yang et al. (2015) on how asset price fluctuations might influence the budget balance and the estimated fiscal multiplier in the conventional approach.

2.2. The Blanchard method in the tradition of A&P

Typical cyclical adjustment strategies (as for instances applied in the OECD economic outlook) aims at controlling for automatic feedback from changes in the economic cycle to the budget balance using an estimated budget sensitivity (to the output gap) α_g:

$$\Delta CAPB_t = \Delta PB_t - \alpha_g \Delta Gap_t \quad (2)$$

Here, *Gap* represents the output gap (as a percentage of potential GDP), where potential GDP is to be measured with a production function or filtering methods, what is a potential source of measurement error. Since a number of authors have been skeptical regarding the reliability of estimations of potential output and the output gap, Blanchard (1990) suggests using the unemployment rate as a natural indicator of the economic cycle rather than estimates of the output gap[9]:

$$\Delta CAPB_t = \Delta PB_t - \alpha_u \Delta UR_t \quad (3)$$

A&P (1995) pioneered data-based analyses and the so-called "Blanchard method" to adjust the budget balance for cyclical effects with estimations of α_u. They refer to the so computed change in the fiscal stance as the "Blanchard fiscal indicator" (equation 3).

The basic question in the article at hand is whether and how the cyclically adjustment strategy proposed in A&P is in line with the assumptions made in the literature on cyclical adjustment, particularly whether there are potential pitfalls at the spending- or revenue side. Fedelino et al. (2009) is referred to as a benchmark study on cyclical adjustment, even though there are other pioneering discussions of cyclical adjustment strategies, for example Girouard and André (2005). According to Fedelino et al. (2009), CAPB consists of cyclically-adjusted revenues net of cyclically-adjusted expenditure, both adjusted with their sensitivity to GDP (Y_t^P represents potential GDP)[10]:

$$CAPB_t = R_t\left(\frac{Y_t^P}{Y_t}\right)^{\varepsilon_R} - G\left(\frac{Y_t^P}{Y_t}\right)^{\varepsilon_G} \quad (4)$$

The literature on cyclical adjustment proposes the following simplifying assumptions: unit-elastic revenues (responding to the tax base with an elasticity of 1), ε_R = 1, and inelastic government expenditure (ε_G = 0). If so, equation (4) can be simplified to

[9] According to Blanchard (1990), an estimation of the level of potential GDP is not necessary anyway, since we are interested in changes in fiscal policy, rather than levels.

[10] Note that the CAB in this illustration is not calculated as a ratio to GDP.

(5) $$CAPB_t = R_t\left(\frac{Y_t^P}{Y_t}\right) - G_t$$

To adjust the budget balance for cyclical effects, it appears to be reasonable to adjust revenues but not expenditure. Only few expenditure items (unemployment benefits) are affected by the economic cycle, it might be necessary to take into account elastic transfer payments. In this line Alesina and Perotti (1995) assume that social transfers to households, as well as revenues (and only transfers and revenues) respond to cyclical effects and apply the cyclical adjustment procedure to taxes and transfers, whereas expenditures other than transfers remain unadjusted. According to A&P[11], the BFI is

(6) $$\Delta CAPB_t = \Delta R_t - \alpha_R \Delta UR_t - (\Delta Tr_t - \alpha_{Tr}\Delta UR_t) - \Delta G_t$$

Rather than computing estimates of potential GDP and output elasticities, it is necessary to compute estimates of the elasticities of transfers and tax revenues to unemployment (α_R and α_{Tr}). To do so, for each country A&P regress social transfers as a share of GDP[12] on two time trends (one for the full period and one for the period after 1975 to control for a potential structural break)[13] and on the unemployment rate:

(7) $$Tr_t = a_0 + a_1 \cdot trend_1 + a_2 \cdot trend_{75} + \alpha_{Tr} \cdot UR_t + e_t$$

Then A&P estimate what the transfers would be in period t if unemployment rates were the same as in the previous year:

(8) $$Tr_t(UR_{t-1}) = \hat{a}_0 + \hat{a}_1 \cdot trend_1 + \hat{a}_2 \cdot trend_{75} + \hat{\alpha}_{Tr} \cdot UR_{t-1} + \hat{e}_t$$

Here, $\hat{a}_0$, $\hat{a}_1$, $\hat{a}_2$, and $\hat{\alpha}_{Tr}$ represent estimated coefficients (and $\hat{e}$ is the residual) of equation (7). The difference between unemployment-adjusted transfers $Tr_t(UR_{t-1})$ according to equation (8) and previous' years' transfers Tr_{t-1} is regarded as a measure of the change in cyclically-adjusted transfers (equivalent to equation 6):

(9) $$\Delta CATr_t = \Delta Tr_t - \hat{\alpha}_{Tr} \cdot \Delta UR_t$$

The elasticity of transfers with respect to unemployment $\hat{\alpha}_{Tr}$ is estimated with equation (7). The same procedure is applied for revenues to achieve unemployment-adjusted

[11] This definition remains relatively similar to the following papers, as e. g. in A&A (1998, 2010, 2013).
[12] Note that in A&P the fiscal variables are expressed as ratios to GDP.
[13] In more recent studies, the second trend is neglected (see A&A, 2010 and 2013).

revenues $R_t(UR_{t-1})$. With $Tr_t(UR_{t-1})$ and $R_t(UR_{t-1})$, A&P estimate the primary deficit that would have prevailed in period *t* if unemployment would be the same rate as in year *t-1*. According to equation (6), the BFI (changes in cyclically-adjusted primary balance) is the difference between the unemployment adjusted measure of the primary balance (here, all budget items other than taxes and transfers as a ratio to GDP remain unadjusted) and the previous year's primary balance.

2.3. Scaling and the incomplete cyclical adjustment problem

The definition of the BFI, as defined above, however, is in conflict with standard methods to compute cyclically-adjusted budget balances, for example, the OECD approach (Girouard, André, 2005) or as described in Fedelino et al. (2009). The reason for this is that the Blanchard method - according to A&P - does not adjust only revenue and expenditure, but revenue and expenditure as a ratio of GDP. To use the variables in data-based analyses of fiscal policy it is helpful to scale the variables and express the CAPB as a ratio of (potential) GDP (as it is done in the literature). In doing so, following Fedelino et al. (2009), equation (4) and (5) will have to be modified:

(10)

$$capb_t = \frac{CAPB_t}{Y_t^p} = \frac{R_t}{Y_t}\left(\frac{Y_t^P}{Y_t}\right)^{\varepsilon_R - 1} - \frac{G_t}{Y_t}\left(\frac{Y_t^P}{Y_t}\right)^{\varepsilon_G - 1} = \frac{R_t}{Y_t}(1+gap_t)^{-(\varepsilon_R - 1)} - \frac{G_t}{Y_t}(1+gap_t)^{-(\varepsilon_G - 1)}$$

Note that *gap* represents the output gap as a ratio of potential GDP. Assuming unit-elastic revenues ε_R = 1 and inelastic government expenditure ε_G = 0 yields

(11) $$capb_t = \frac{R_t}{Y_t} - \frac{G_t}{Y_t}(1+gap_t)$$

The result is different from the CAPB without scaling in equation (5). Using revenues and expenditures as a ratio of GDP, standard assumptions would suggest adjusting expenditure (as a ratio of GDP), rather than revenue (as a ratio of GDP).[14]

[14] In this line A&P note that using the primary deficit as a share of GDP "is not a bad approximation as long as expenditures and revenues are close to being unit elastic to GDP". Indeed, the method proposed by A&P assumes unit-elastic government expenditure, what is in conflict with the assumptions made in the literature (see Girouard and André, 2005, and Fedelino et al., 2009).

2.4. Incomplete cyclical adjustment and reverse causality

Using equation (10) and (1) to measure the effect of fiscal policy on growth gives

$$\Delta Y_t = \alpha + \beta\ \Delta\left(\frac{R_t}{Y_t}(1+gap_t)^{-(-\varepsilon_R-1)} - \frac{G_t}{Y_t}(1+gap_t)^{-(\varepsilon_G-1)}\right) + u_t \tag{12}$$

If ε_R = 1 and ε_G = 0

$$\Delta Y_t = \alpha + \beta\ \left(\Delta\left(\frac{R_t}{Y_t}\right) - \Delta\left(\frac{G_t}{Y_t}(1+gap_t)\right)\right) + u_t \tag{13}$$

Accordingly, government expenditure as a ratio of GDP needs to be corrected for cyclical effects, however, following A&P and correcting only taxes and transfers as a ratio of GDP, the estimated CAPB (as a ratio of GDP) includes cyclical effects (in the denominator) and consists of (adjusted) revenues as a ratio of GDP, (CAR_t), net of (adjusted) transfers as a ratio of GDP ($CATr_t$), net of the ratio of (unadjusted) government expenditure (other than transfers) to GDP (E_t/Y_t):

$$\Delta Y_t = \alpha + \beta\ \Delta\left(CAR_t - CATr_t - \frac{E_t}{Y_t}\right) + u_t \tag{14}$$

It turns out that, by approximation, the expenditure-to-GDP ratio behaves inversely proportional to the output gap:

$$\Delta Y_t = \alpha\ + \beta\ \Delta\left(CAR_t - CATr_t - e_t(1-Gap_t)\right) + u_t \tag{15}$$

Where e_t is the structural ratio of expenditure (other than transfers) to potential GDP. It is now obvious that the ratio of government expenditure other than transfers can be influenced by two separate factors, discretionary policy changes that influence the structural expenditure ratio (Δe_t) and cyclical effects (ΔGap_t). Assuming no policy changes (ΔCAR_t=0, $\Delta CATr_t$=0, as well as Δe_t=0), and under the assumption that output growth is a sum of (constant) potential output growth *c* and changes in the output gap ($\Delta Y_t = c + \Delta Gap_t$), equation (15) can be simplified to:

$$c + \Delta Gap_t = \alpha + \beta\ e_t \Delta Gap_t + u_t \tag{16}$$

It is obvious that an increase in the output gap (ΔGap) influences both sides of equation (16), even without any policy change. The conventional BFI however interprets an economic upswing (increase in the output gap) as reduction in government spending.

2.5. A new Blanchard Fiscal Indicator

The simplest way of solving the reverse causality problem in the conventional approach would be to use expenditures as a ratio to potential or trend GDP, rather than as a ratio to GDP. Different from A&P, we compute an alternative (augmented) specification of the BFI, where all fiscal items that are supposed to be inelastic (or close to being inelastic, as government expenditure and revenue other than taxes and social security contributions) are deviated by trend GDP, while the items that are supposed to be unit elastic (or close to unit elastic, as taxes and social contributions), are treated as proposed in A&P. With this single exception, the *augmented BFI* is computed exactly the same way as proposed in A&P and A&A and specified in equation (7), (8), and (9).[15] Note that the reverse causality problem as highlighted in equation (14) and (16) disappears after correcting for cyclical effects in the denominator of the expenditure ratio.

2.6. Hypotheses

How would the different assumptions on the elasticities ε_R and ε_G influence estimates of parameter β in *conventional* analyses on fiscal policy? Ignoring other pitfalls (countercyclical response problem and changes in asset prices), regressions of equation (12) provide unbiased estimates of parameter β if the elasticities ε_R and ε_G are estimated correctly. However, if the method applied does not correctly adjust for cyclical effects, this would affect the correlation of the CAPB-ratio to the output gap and the estimated multiplier. Table 1 summarizes how ε_R and ε_G would affect the estimated fiscal multiplier in the presence of an imperfect cyclical adjustment problem.

Following the assumptions that $\varepsilon_R = 1$ and $\varepsilon_G = 0$ or $\varepsilon_G < 0$, the consequence for the estimated fiscal multipliers is particularly pronounced in the case of expenditures, since different from the assumptions made in the A&P approach, expenditure are not supposed to be unit-elastic. The estimated multiplier will be biased towards understating the negative effect of fiscal consolidation in the case of expenditure cuts, if we use the A&P approach. From this analysis we derive the following testable hypotheses:

1.) The BFI is correlated with changes in the output gap, while other fiscal indicators based on standard assumptions are not (or less).

[15] I thank Olivier Blanchard for suggesting this in a comment on a previous version of the paper.

2.) This correlation is particularly pronounced in the case of changes in expenditure (per GDP) and less pronounced in the case of changes in revenues (per GDP).
3.) The resulting estimated fiscal multiplier (using equation 1) is small (or even negative) if the BFI is used as fiscal impulse, compared to results based on standard assumptions (the CAPB as used in the OECD Economic Outlook based on Girouard and André, 2005, or the augmented BFI).
4.) Differences in estimates of the fiscal multiplier are particularly pronounced in the case of expenditures and less pronounced in the case of revenues.

3. Replication and sensitivity

This section replicates the evidence shown in A&A (2010) based on the BFI and shows the sensitivity of the results if the CAPB as a fiscal indicator is cyclically-adjusted with different methods (A&P method/ OECD method/ augmented BFI). [16]

Section 2 has shown that the BFI suffers from imperfect cyclical adjustment problem. To test hypothesis (1), that the BFI entails a (positive) cyclical pattern, figure 1 compares a) changes in the *CAPB* (estimated according to A&P), and b) according to the definitions of the OECD with changes in the output gap, since an imperfect c.a. problem would result in a (more) cyclical behavior of $\Delta CAPB$.[17]

Figure 1 (c and d) depicts the cyclical behavior of cyclically adjusted government revenues (adjusted with the A&P method and the OECD method), and Figure 1 (e and f) shows the comparable behavior of expenditures. Figure 1 a) and b) show that the fiscal indicators measured according to A&P depict a more cyclical pattern, compared to the OECD fiscal indicator (hypothesis 1). While this pattern is not visible for revenues (1 c), it is particularly pronounced in the case of expenditures (hypothesis 2).[18]

Given these illustrations and positive tests of hypothesis (1) and (2), it appears to be reasonable that the cyclical adjustment problem in A&A (2010) is quantitatively important. We continue with tests of hypotheses (3) and (4).

[16] Since the data is the same data as used by A&A, the results for the Blanchard method are perfect replications of the results in A&A.
[17] The data used in this paper is from the same source as used in A&A (2010), obtained from the OECD Economic Outlook no. 84. The c.a. procedure of the OECD is described in Girouard and André (2005).
[18] More on this is available in the online appendix.

As discussed in the previous section, A&A (2010) examine episodes of large changes in the fiscal stance, if the BFI/CAPB increases/decreases by more than 1.5 percentage points. The selected episodes by this definition, for the BFI, the CAPB (OECD), as well as the augmented BFI, are shown in the appendix. Table 2 and 3 show the results of a replication of A&A (2010) with the BFI, the CAPB (OECD), and the augmented BFI as a fiscal indicator. A&A (2010) analyze the effect of changes in the CAPB on GDP in episodes of large changes in the fiscal stance with regressions of the following form:

$$\Delta y_{it} = \alpha + \sum_{j=1}^{2} \alpha_j \Delta y_{it-j} + \beta\ \Delta capb_{it} + \gamma X + u_{it} \tag{17}$$

Table 2 shows the results for the analysis of large episodes of fiscal expansions. While column (1) and (2) are perfect replications of the results in A&A, column (3) and (4) show the same results, with the only difference that the CAPB is used as provided by the OECD (from the OECD Economic outlook no. 84), rather than calculated with the A&P method, and column (5) and (6) illustrate the same results based on the new BFI that fixes the reverse causality problem of the A&P method, as suggested in section 2. While the BFI (A&P) selects 72 episodes, the number of episodes selected by the CAPB (OECD) and the augmented BFI decreases substantially (65 and 64). While the positive (expansionary) effect of fiscal consolidations decreases after using the CAPB (OECD), the effect is not statistically significant in all three regressions (column 1, 3, 5). Column (2), (4) and (6) distinguish between the effect of current expenditure investment and revenue. The results based on the BFI and presented in A&A show a clear negative relationship between expenditure and growth in episodes of fiscal stimuli. This relationship has been widely interpreted as evidence for a negative multiplier in the case of expenditure cuts (A&A, 2010). However, using the OECD measure of the CAPB, this result decreases substantially and loses statistical significance (column 4). In column 6 the coefficient for expenditures even turns into opposite, after applying the augmented specification of the BFI, suggesting that the BFI, if correctly specified, does not produce results in support of expansionary fiscal contractions in the case of expenditures.

Table 3 illustrates the results for fiscal adjustments. As in the case of fiscal stimuli (Table 2), the number of observations decreases (from 88 to 76 / 80) after using the CAPB (or the augmented BFI). Similar to the evidence in Table 2, the effect of fiscal

consolidation based on the BFI is positive in column 1, suggesting evidence for expansionary austerity. The results based on the CAPB (OECD), however, shows that fiscal consolidations appear to be negatively associated with GDP growth, suggesting a Keynesian effect. Nevertheless, again the effect is not statistically significant in all specifications. Column 2, 4 and 6 distinguish between the effects of expenditure- and revenue- based fiscal consolidations. It turns out that the effect of revenues increases slightly if the OECD method is applied, while the effect of expenditure cuts on GDP decreases and loses statistical significance if the cyclical adjustment is based on the OECD method. Again, the negative effect of expenditures disappears after applying the augmented version of the BFI (Table 3). The negative multiplier for results based on the BFI seems to be more pronounced in the case of expenditure cuts, compared to increases in revenues (hypothesis 4), representing the countercyclical response problem. Further, the evidence presented in Tables 2 and 3 is based on a limited number of observations so that it might be interesting to additionally analyze and compare the evidence based on the full sample and not rely only on the selective evidence for cases of large changes in fiscal policy.

Table 4 replicates and compares another result of A&A (2010), that fiscal consolidations are positively associated with GDP, if the sample is not restricted to large episodes of discretionary change. We estimate regressions of the following form:

$$\Delta y_{it} = \sum_{j=1}^{2} \alpha_j \Delta y_{it-j} + \beta_k \Delta capb_{it-k} + \lambda_i + \mu_t + u_t \tag{18}$$

Here, the sample is not restricted to large cases of fiscal stimuli and adjustments, and includes country- and time fixed effects. Again, columns (1) and (2) present the replication of the A&A results, while columns (3) and (4) show the results based on the CAPB (OECD), and (5) and (6) based on the augmented BFI. Comparing columns (1) and (3), the statistically significant positive effect of fiscal consolidation on GDP disappears after using the CAPB of the OECD (hypothesis 3). Using the augmented BFI, column (5) suggests that fiscal consolidations have negative rather than positive effects. Further, the negative multiplier for expenditures (column 2) decreases substantially if CAPB based measure rather than the BFI (column 4) is used and turns into opposite after using the augmented BFI (consistent with hypothesis 4).

To analyze the dynamic effects of fiscal consolidations on GDP and how this is influenced by the strategy of how to adjust for cyclical effects, we apply the method proposed by Leigh et al. (2010) and Alesina and Ardagna (2013): [19]

$$\Delta Y_{it} = \sum_{j=1}^{2} \alpha_j \Delta y_{it-j} + \sum_{k=0}^{2} \beta_k \Delta capb_{it-k}^{FA} + \lambda_i + \mu_t + u_t \quad (19)$$

Again, Δy_{it} represents real GDP growth in country *i* at time *t* and Δcab_{it}^{FA} denotes the estimated change in the cyclically adjusted primary balance (as a percentage of GDP) in periods of large fiscal adjustments ($\Delta capb_{it-k}$ > 1.5 p.p. of GDP) and zero otherwise.[20] Again, we distinguish between three strategies to adjust for cyclical effects, the BFI method as proposed by Alesina and Perotti (1995), the conventional (OECD) method, as proposed by Girouard and André (2005), and the augmented BFI as proposed in section two of this paper. λ_i and μ_t represent cross-section and time fixed effects, respectively.

Table 5 shows the result of this augmented specification. Column (1) shows a positive association between fiscal adjustments and GDP growth, however, the result is not statistically significant. This coefficient changes its sign in column (3), after using the c.a. strategy of the OECD and after applying the augmented version of the BFI (column 5). Furthermore, column (2) shows a strong non-Keynesian effect of expenditure cuts on GDP (based on the BFI, according to A&A), but the result turns into opposite after using the OECD measure or the augmented BFI. This clearly supports hypothesis 3 and 4 which states that the BFI-based results are biased towards expansionary effects and that this bias is particularly pronounced for expenditure cuts. Column (4) and (6) additionally suggest that the (negative) effects of revenue-based consolidations are underestimated in the case of the BFI-based measure.

Figure 2 depicts the dynamic effects of changes in fiscal policy based on the results of equation (19), where there is a distinguishment between the estimated effect of large changes in the CAPB as calculated with the method proposed by A&P (1995) and large

[19] Since A&A (2010) did not compute dynamic responses of fiscal policy, this table is not a replication of A&A (2010), however, since the sample and data is almost similar, it is comparable to A&A (2013), where dynamic responses of changes in fiscal policy based on the BFI (A&P) are estimated within a similar framework.

[20] In an augmented specification I include changes in cyclically-adjusted current revenues and changes in cyclically-adjusted current primary spending in periods of large fiscal adjustments, rather than changes in the CAB during the same year.

changes in the CAPB as provided by the OECD. Similar to A&A (2013), dynamic response functions are computed with the delta method, depicting the estimated response of GDP to a one-percentage point fiscal consolidation after a given period. According to the estimated regressions (Table 5), the dynamic response varies with the measure of fiscal policy.

A comparison of the results show that the estimated contractionary effect of fiscal adjustments based on the CAPB (OECD approach) is more pronounced, compared to the results based on the A&A method. While the response of the BFI-based consolidation shows some evidence for potential expansionary effects of fiscal adjustment, the results based on the CAPB (OECD approach) are relatively contractionary, in line with hypothesis (3).

Figure 3 shows the estimated effect of a one percent point increase in current revenues. In line with hypothesis 4, the estimated effects of both approaches are relatively similar and contractionary, what is not surprising, given that the elasticity of revenues is usually assumed to be approximately one, so that the revenue-GDP-ratio does not necessarily need to be adjusted for automatic cyclical effects.

Figure 4 shows the same results for expenditure cuts. The estimated effect of a one percent point reduction in primary expenditures is very different in both approaches, depending on the method applied to adjust the data for cyclical effects. The A&P approach finds expansionary effects of fiscal adjustments at the spending side. The (negative) impact multiplier is estimated to be -0.3 and turns out to be -0.4 after two years.[21] If the data provided by the OECD is used, the result is the opposite. The impact multiplier is 0.1 (positive), suggesting that a reduction in government spending has a negative impact on GDP. This observation is in line with hypothesis (4), where a negative correlation is expected between GDP growth and the expenditure-GDP ratio, if we fail to correct the expenditure-GDP ratio for cyclical effects.[22]

[21] These results are very much in line with the results in Alesina and Ardagna (2013), who found that a one percent point reduction in government spending increases GDP by 0.15 percent in the same year and by 0.46 percent after two years. Note that these results presented in table 5 are no perfect replications of A&A (2013), but comparable.

[22] Alesina and Ardagna (2010) state that their results are not affected by the method applied to adjust for cyclical effects, and that the results remain robust, even without controlling for cyclical effects. Indeed, the estimated effects of fiscal consolidations based on the A&P approach are almost identical to those estimated with unadjusted data. To address this question, I compute the results based on unadjusted data, compared to the results based on the CAPB. The results based on this measure are available upon request.

In this line, figure 5, 6, and 7 depict the response of GDP after a one percentage point fiscal consolidation, and compare the BFI-based (A&A) results with results based on the augmented BFI. Summarizing, the results support the view that A&A underestimate the contractionary effects of expenditure based consolidations.

Since the conventional approach has been criticized for not controlling for one-off operations (Guajardo et al, 2014), as another test for robustness, all regressions are estimated using an alternative CAPB, which excludes one-off operations, the so-called underlying balance.[23]. After using this indicator, most of the results turn out to be even more pronounced and statistically significant, compared to the CAPB-based ones.[24]

4. Conclusion

The reverse causality argument proposed in this article focuses on the incomplete cyclical adjustment problem in the approach of A&P (1995) to adjust for cyclical effects in budgetary data with the help of the "*Blanchard method*" to compute the *Blanchard fiscal indicator* (BFI), which is relevant in a large number of subsequent studies based on the same approach, as for instance A&A (1998, 2010 and 2013), Ardagna (2002 and 2009), as well as in a number of subsequent studies.

The critique of the A&P method is that when calculating the Blanchard Fiscal Indicator (BFI), A&P implicitly assume an elasticity of government expenditure (other than transfers) with respect to GDP of one (or close to one). Conversely, standard cyclical adjustment procedures assume an elasticity of zero for expenditures other than transfers (Girouard and André, 2005). The theoretical discussion in this paper states that the imperfect cyclical adjustment problem influences the estimated multiplier in *conventional* (*data-based*) analyses of fiscal policy so that the results are endogenously biased towards expansionary austerity in the case of expenditure cuts. It is shown that the BFI as proposed by A&P does not effectively adjust for cyclical effects in the case of government expenditure and that the results in A&A (2010) are affected by reverse causality, i.e. increasing GDP decreases expenditure-GDP-ratios.

[23] Refer to Joumard et al. (2008) for a discussion on how one-off operations influence the budget balance and the definition of the underlying primary balance.
[24] More on this is available upon request.

We propose an augmented version of the BFI, where the incomplete cyclical adjustment problem is addressed. Replicating the results presented in A&A (2010), and comparing the results based on the (traditional) Blanchard-method with the results based on alternative CAPB-based measures (cyclically-adjusted with the method proposed by Girouard and André, 2005, as well as the augmented BFI), it is shown that the expansionary effect of fiscal consolidations disappears after appropriately controlling for cyclical effects.

The reverse causality argument proposed in this paper might help systemizing a number of controversies in the recent literature. For example, it explains why the evidence on expansionary austerity is particularly based on cases where output operates above potential (Jayadev and Konczal, 2010; de Cos and Moral-Benito, 2013; Jordà and Taylor, 2015) and why previous research has discovered that fiscal consolidations in A&A are endogenous to growth. It explains why the literature based on the A&P approach suggests that cuts in government expenditure are associated with macroeconomic expansions, while increasing revenues (as a ratio to GDP) are contractive. While the latter finding is in line with the theoretical literature, the finding of expansionary effects in the case of expenditure cuts has been frequently highlighted in the academic debate as well as among policy-makers.

In this article it is shown that this finding reflects reverse causation, i.e. cyclical increases in the budget as a result of an economic upswing, rather than an economic upswing resulting from a discretionary cut in government expenditures.

This article might also contribute to the literature in a more general way. Some contributions have been critical regarding conventional analyses of fiscal policy in the recent past (Guajardo et al, 2014). Nevertheless, there is an urgent need to analyze budget data and to improve cyclical adjustment strategies to proxy discretionary changes in fiscal policy and to estimate cyclically-adjusted budget data, as for example in the context of the newly established fiscal rules in Europe.

In this article it is shown that it is not the conventional approach in general, rather than a specific method of how to adjust the budget balance for cyclical effects that flaws the results in previous analyses based on the conventional approach. In line with Yang et al. (2015), this article shows that the conventional approach per se is applicable if the cyclical position of the budget is correctly taken into account. Of course, there are other

issues, as for instance the counter-cyclical response problem, as highlighted by Perotti (2013), as well as the presence of one-off operations (Guajardo et al, 2014), that need to be tackled to further improve the conventional approach.[25]

The paper at hand is one step in this direction. It establishes a new Blanchard method to compute an augmented version of the Blanchard Fiscal Indicator (BFI) that is designed to solve the incomplete cyclical adjustment problem of the previous literature using the BFI (see e.g. A&P, 1995, A&A, 1998, 2010, 2013, and Ardagna, 2004, 2009). The present fiscal crisis in Europe has shown that estimations of potential output (and structural deficits) are prone to extensive revisions, so that real-time estimates of structural balances are of limited use. In line with Blanchard (1990) it would thus be reasonable to establish an alternative fiscal indicator which is not prone to large revisions and arbitrary measurement issues. This paper contributes to this discussion by suggesting on how to improve both, the *Blanchard Fiscal Indicator* as well as the literature on fiscal policy based on the *conventional approach*.

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[25] To address both, the issue of incomplete cyclical adjustment, as well as of one-off operations, I would suggest using underlying balances as an indicator of fiscal policy for future research based on the conventional approach or the augmented Blanchard method as proposed in this paper, but excluding (net) capital transfers from the analysis (because most one-off operations are net capital transfers).

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Table 1: Consequences of imperfect cyclical adjustment under different assumptions on revenue- and spending elasticities

If	Relation to gap	Effect on the estimated multiplier
$\varepsilon_R > 1$	R/Y (positive)	Underestimation of the (negative) revenue multiplier
$\varepsilon_R < 1$	R/Y (negative)	Overestimation of the (negative) revenue multiplier
$\varepsilon_G > 1$	G/Y (positive)	Overestimation of the (positive) expenditure multiplier
$\varepsilon_G < 1$	G/Y (negative)	Underestimation of the (positive) expenditure multiplier

Table 2: Fiscal Stimulus and Growth

Equation estimated: $\Delta Y_{it} = \alpha_1 \Delta Y_{it-1} + \alpha_2 \Delta Y_{it-2} + \beta X + \gamma \Delta FS_{it} + \varepsilon_{it}$

	(1)	(2)	(3)	(4)	(5)	(6)
	Blanchard method Replication of A&A		CAPB-based (OECD)		Blanchard method Augmented	
GDP growth (t-1)	0.468***	0.484***	0.528***	0.542***	0.252	0.225
	(0.147)	(0.133)	(0.165)	(0.164)	(0.185)	(0.179)
GDP growth (t-2)	-0.162	-0.081	-0.219	-0.245	-0.064	-0.160
	(0.139)	(0.134)	(0.149)	(0.151)	(0.164)	(0.164)
G7 growth (t-1)	0.364*	0.272	0.308	0.272	0.305	0.253
	(0.202)	(0.185)	(0.232)	(0.229)	(0.232)	(0.225)
Debt (t-1)	-0.004	-0.007	-0.008	-0.014	-0.006	0.003
	(0.008)	(0.008)	(0.011)	(0.012)	(0.009)	(0.010)
Expenditure		-0.751***		-0.367		0.214
		(0.262)		(0.433)		(0.378)
Investment		-0.255		0.144		-0.427*
		(0.185)		(0.225)		(0.244)
Revenues		-0.177		-0.189		-0.435
		(0.285)		(0.375)		(0.380)
Consolidation	0.283		0.113		0.291	
	(0.187)		(0.228)		(0.247)	
Constant	0.008	0.012	0.012	0.017	0.023**	0.014
	(0.009)	(0.009)	(0.012)	(0.013)	(0.011)	(0.012)
Observations	72	72	65	65	64	64
R-squared	0.282	0.428	0.285	0.332	0.117	0.208

Notes: The table reports point estimates and heteroscedasticity-robust standard errors.
*** Significant at 1%, ** significant at 5%, * significant at 10%.

Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Table 3: Fiscal Adjustments and Growth

Equation estimated: $\Delta Y_{it} = \alpha_1 \Delta Y_{it-1} + \alpha_2 \Delta Y_{it-2} + \beta X + \gamma \Delta FA_{it} + \varepsilon_{it}$						
VARIABLE	(1) Blanchard method Replication of A&A	(2)	(3) CAPB-based (OECD)	(4)	(5) Blanchard method Augmented	(6)
GDP growth (t-1)	0.296***	0.288***	-0.004	-0.000	0.330***	0.363***
	(0.099)	(0.092)	(0.137)	(0.134)	(0.121)	(0.126)
GDP growth (t-2)	-0.001	0.082	0.069	0.068	-0.046	-0.042
	(0.088)	(0.084)	(0.115)	(0.111)	(0.107)	(0.109)
G7 growth (t-1)	0.116	0.038	0.210	0.001	0.191	0.132
	(0.151)	(0.142)	(0.204)	(0.211)	(0.172)	(0.183)
Debt (t-1)	-0.011*	-0.007	-0.012*	-0.015**	-0.010*	-0.010
	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)
Expenditure		-0.434**		-0.313		-0.081
		(0.170)		(0.291)		(0.207)
Investment		0.082		-0.067		-0.064
		(0.136)		(0.172)		(0.159)
Revenues		-0.216		-0.455*		-0.117
		(0.199)		(0.260)		(0.232)
Consolidation	0.044		-0.081		0.052	
	(0.134)		(0.173)		(0.147)	
Constant	0.026***	0.024***	0.030***	0.039***	0.019***	0.021***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)
Observations	88	88	76	76	80	80
R-squared	0.218	0.348	0.073	0.170	0.208	0.219

Notes: The table reports point estimates and heteroscedasticity-robust standard errors.
*** Significant at 1%, ** significant at 5%, * significant at 10%.

Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Table 4: Fiscal Policy and GDP Growth

Equation estimated: $\Delta Y_{it} = \alpha_1 \Delta Y_{it-1} + \alpha_2 \Delta Y_{it-2} + \beta X + \gamma \Delta F_{it} + \mu_i + \lambda_t + \varepsilon_{it}$						
	(1)	(2)	(3)	(4)	(5)	(6)
	Blanchard method Replication of A&A		CAPB-based (OECD)		Blanchard method Augmented	
GDP growth (t-1)	0.352***	0.367***	0.351***	0.346***	0.357***	0.371***
	(0.042)	(0.040)	(0.043)	(0.043)	(0.043)	(0.043)
GDP growth (t-2)	-0.038	0.016	-0.045	-0.036	-0.044	-0.040
	(0.042)	(0.040)	(0.043)	(0.043)	(0.043)	(0.043)
Debt (t-1)	-0.004	-0.005	-0.003	-0.004	-0.001	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Expenditure		-0.508***		-0.169**		0.123*
		(0.061)		(0.082)		(0.071)
Investment		-0.070		0.057		-0.075
		(0.060)		(0.062)		(0.065)
Revenue		-0.121**		-0.099		-0.207***
		(0.061)		(0.066)		(0.065)
Consolidation	0.154***		0.028		-0.072*	
	(0.039)		(0.042)		(0.040)	
Observations	569	569	566	566	569	569
R-squared	0.500	0.562	0.482	0.491	0.487	0.496
Countries	21	21	21	21	21	21
R-squared within	0.500	0.562	0.482	0.491	0.487	0.496
R-squared between	0.872	0.802	0.886	0.846	0.897	0.899
R-squared overall	0.504	0.571	0.488	0.499	0.493	0.505

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Table 5: Dynamic response of GDP to fiscal consolidation

Equation estimated: $\Delta Y_{it} = \alpha_1 \Delta Y_{it-1} + \alpha_2 \Delta Y_{it-2} + \beta X + \gamma_0 \Delta FA_{it} + \gamma_1 \Delta FA_{it-1} + \gamma_2 \Delta FA_{it-2} + \mu_i + \lambda_t + \varepsilon_{it}$

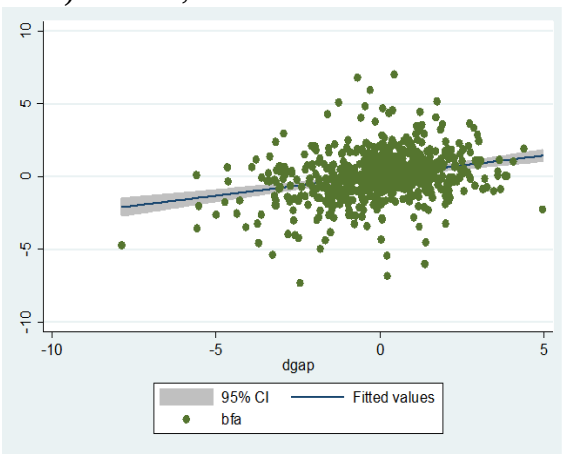
	(1)	(2)	(3)	(4)	(5)	(6)
	Blanchard method Replication of A&A		CAPB-based (OECD)		Blanchard method Augmented	
GDP growth (t-1)	0.319***	0.325***	0.391***	0.394***	0.302***	0.309***
	(0.040)	(0.040)	(0.042)	(0.042)	(0.040)	(0.040)
GDP growth (t-2)	-0.019	-0.014	-0.029	-0.018	-0.022	-0.012
	(0.040)	(0.040)	(0.041)	(0.041)	(0.040)	(0.040)
Revenues		-0.101		-0.140		-0.328***
		(0.133)		(0.125)		(0.125)
Revenues (t-1)		-0.049		-0.314**		-0.206
		(0.134)		(0.125)		(0.127)
Revenues (t-2)		0.092		-0.014		0.020
		(0.133)		(0.126)		(0.128)
Expenditure		-0.286**		0.123		0.440***
		(0.132)		(0.193)		(0.145)
Expenditure (t-1)		-0.034		-0.115		-0.191
		(0.133)		(0.193)		(0.147)
Expenditure (t-2)		0.086		-0.062		0.136
		(0.131)		(0.188)		(0.144)
Consolidation	0.036		-0.078		-0.238***	
	(0.067)		(0.068)		(0.068)	
Consolidation (t-1)	0.007		-0.082		-0.023	
	(0.067)		(0.068)		(0.069)	
Consolidation (t-2)	-0.025		0.002		-0.020	
	(0.068)		(0.069)		(0.069)	
Observations	662	662	611	611	662	662
R-squared	0.395	0.401	0.447	0.452	0.407	0.413
Countries	21	21	21	21	21	21
R-squared within	0.395	0.401	0.447	0.452	0.407	0.413
R-squared between	0.921	0.928	0.954	0.941	0.850	0.745
R-squared overall	0.407	0.417	0.468	0.475	0.410	0.415

Notes: The table reports point estimates and heteroscedasticity-robust standard errors. All specifications contain full set of country and time fixed effects (not reported in the table).
*** Significant at 1%, ** significant at 5%, * significant at 10%.

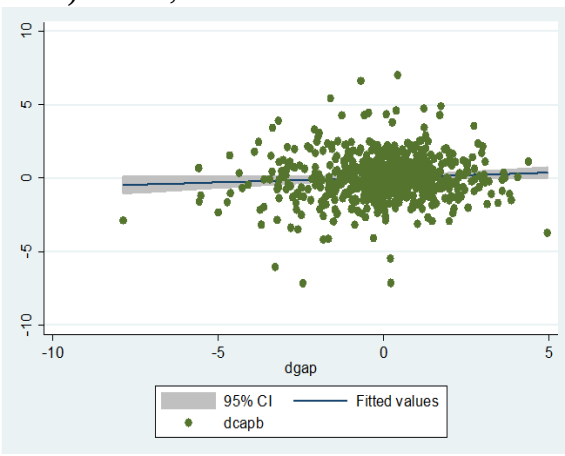
Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Figure 1: Indicators of fiscal policy (A&P and OECD) vs. output gap

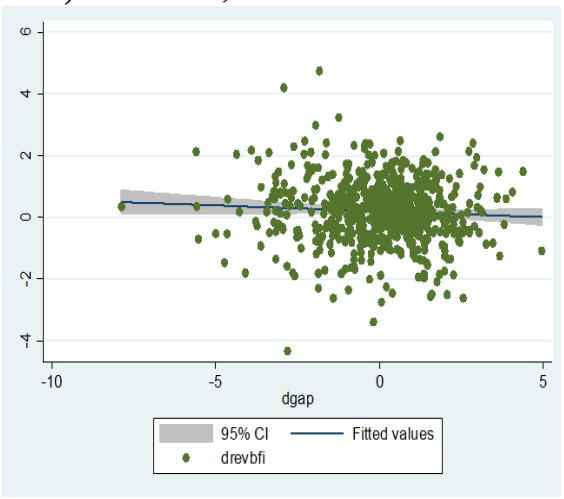
a) CAPB, A&P



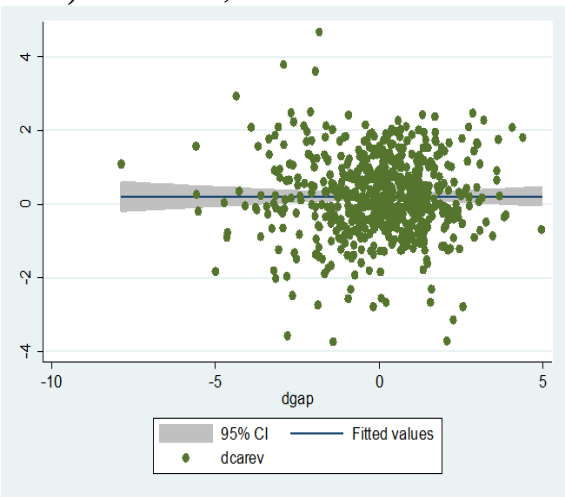
b) CAPB, OECD



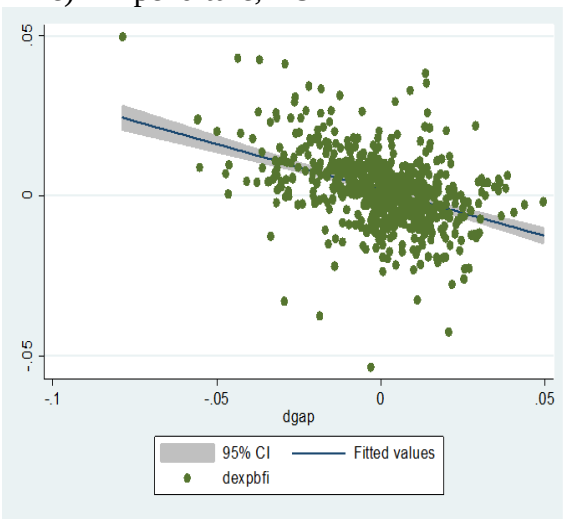
c) Revenues, A&P



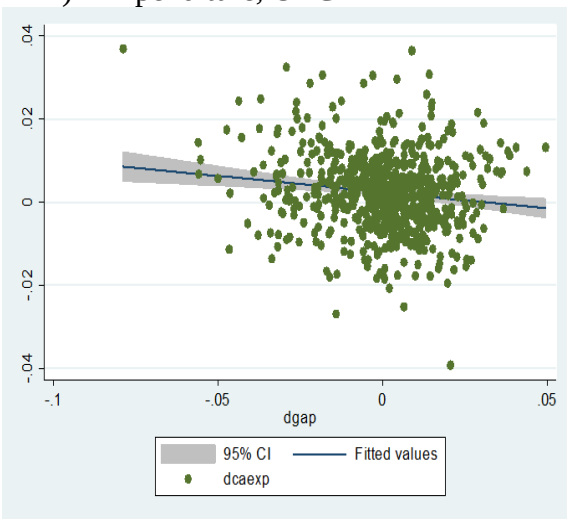
d) Revenues, OECD



e) Expenditure, A&P

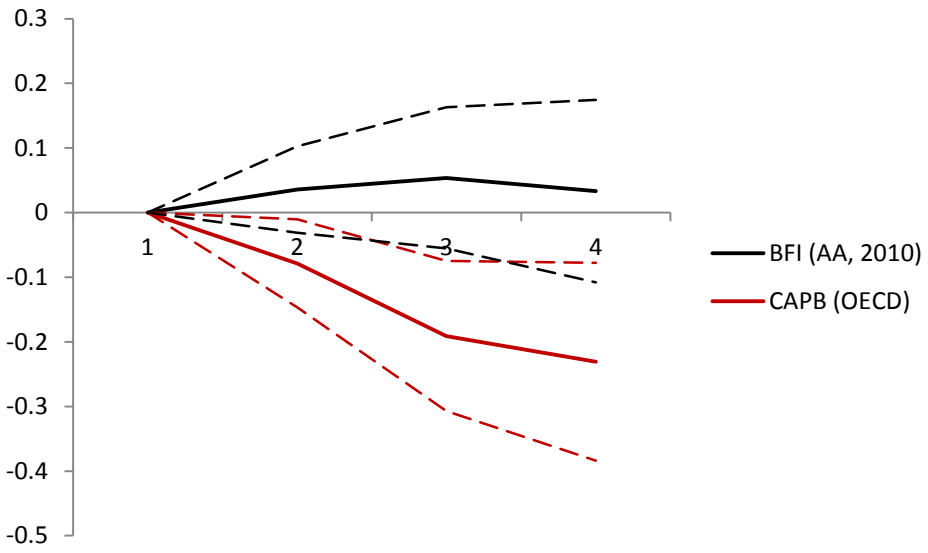


f) Expenditure, OECD



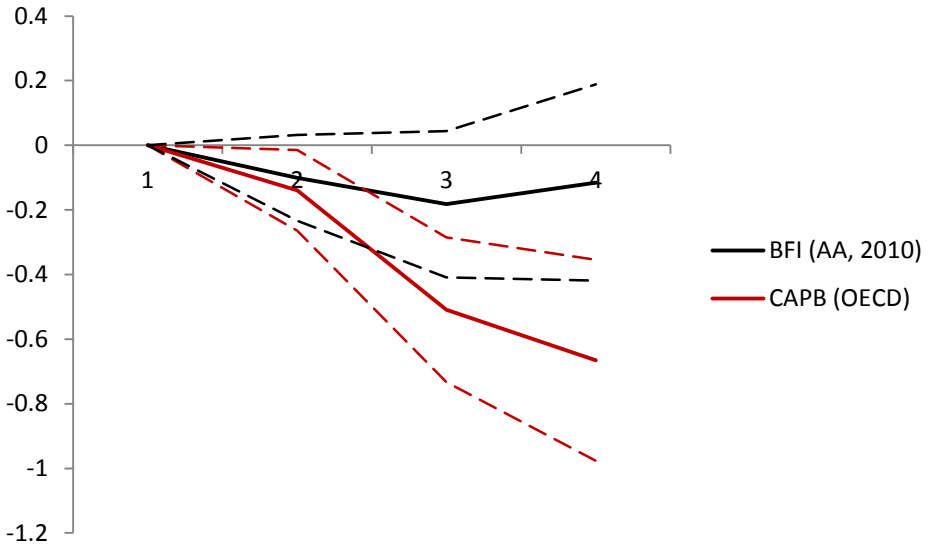
Source: Alesina and Ardagna (2010), OECD Economic Outlook No. 84.

Figure 2: Effects of a 1 percent of GDP fiscal consolidation



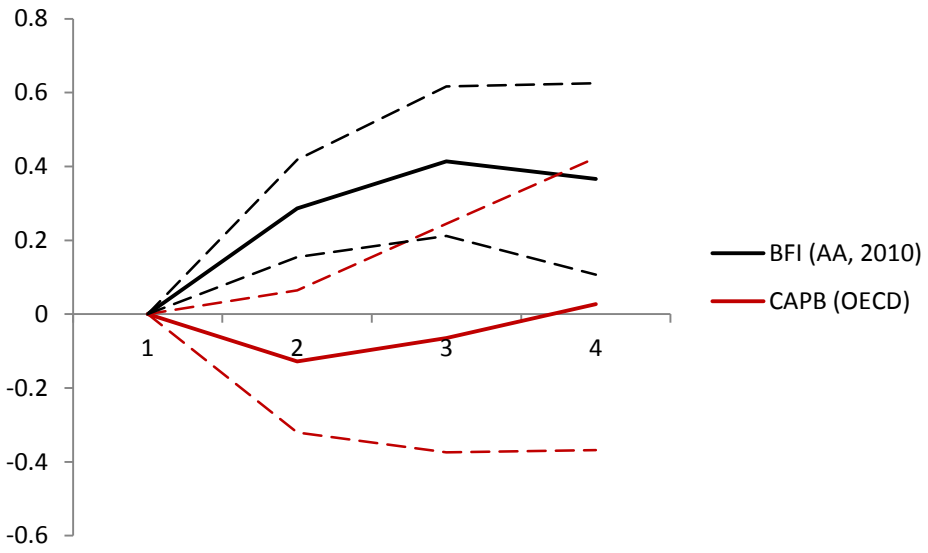
Note: t=0 denotes the year of a 1 percent of GDP fiscal consolidation on GDP. Dotted lines delineate one standard error confidence bands.

Figure 3: Effects of a 1 percent of GDP revenue-based fiscal consolidation



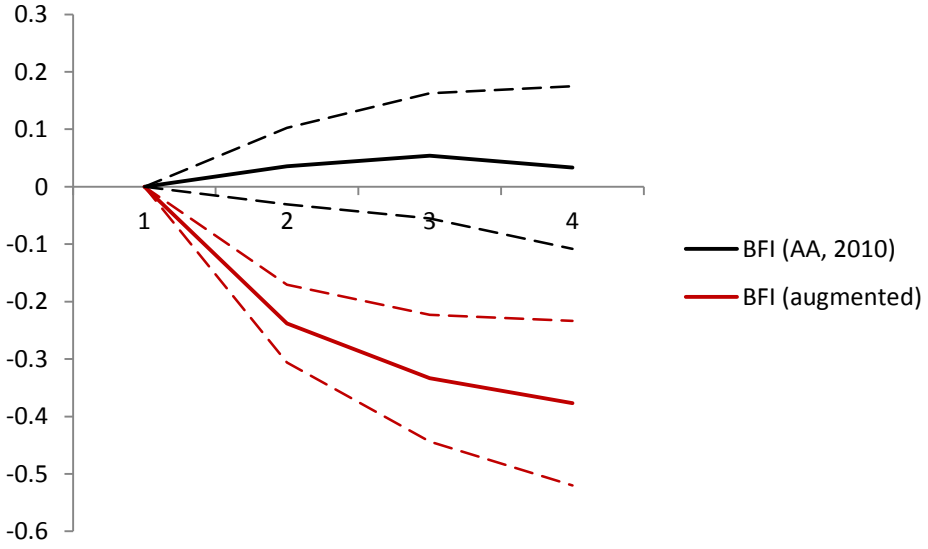
Note: t=0 denotes the year of a 1 percent of GDP revenue-based fiscal consolidation on GDP. Dotted lines delineate one standard error confidence bands.

Figure 4: Effects of a 1 percent of GDP expenditure-based fiscal consolidation



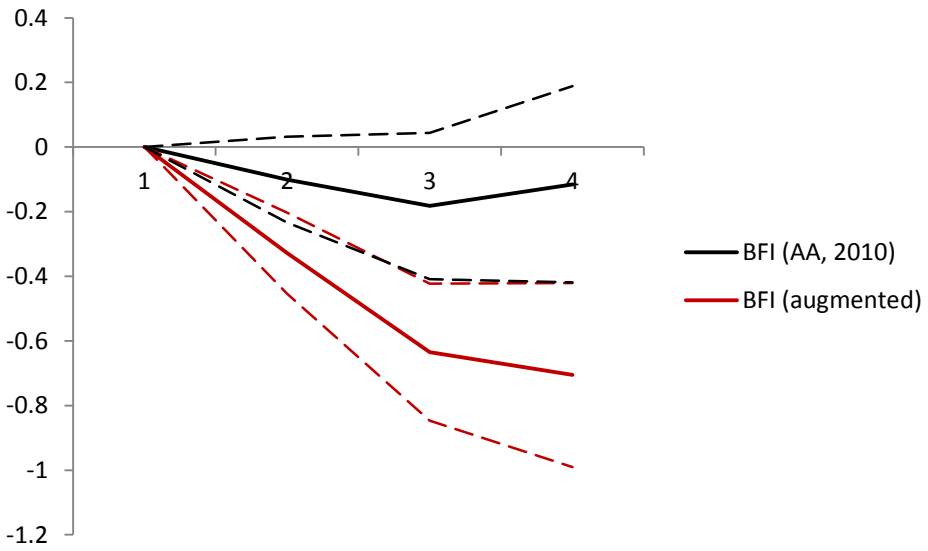
Note: t=0 denotes the year of a 1 percent of GDP expenditure-based fiscal consolidation on GDP. Dotted lines delineate one standard error confidence bands.

Figure 5: Effects of a 1 percent of GDP fiscal consolidation ("old" BFI vs. "new" BFI)



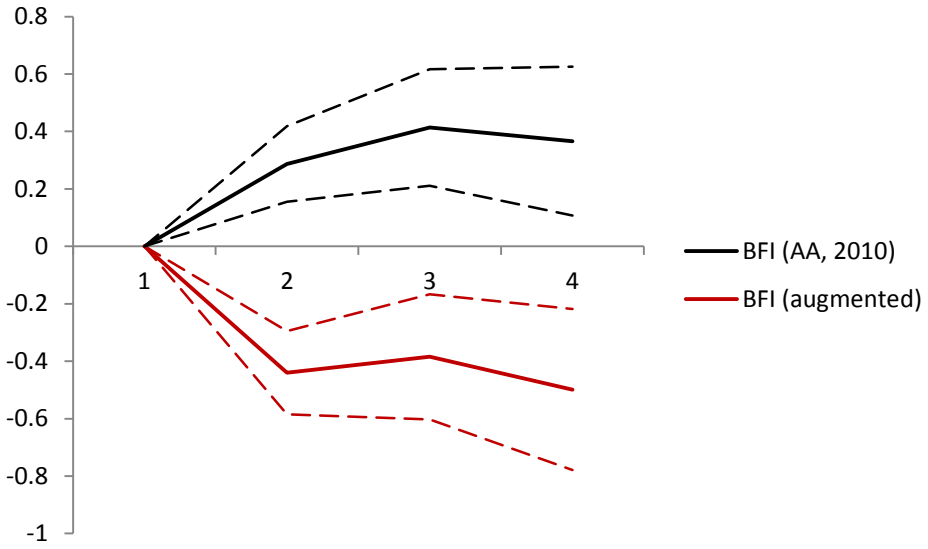
Note: t=0 denotes the year of a 1 percent of GDP fiscal consolidation on GDP. Dotted lines delineate one standard error confidence bands.

Figure 6: Effects of a 1 percent of GDP revenue-based fiscal consolidation ("old" BFI vs. "new" BFI)



Note: t=0 denotes the year of a 1 percent of GDP revenue-based fiscal consolidation on GDP. Dotted lines delineate one standard error confidence bands.

Figure 7: Effects of a 1 percent of GDP expenditure-based fiscal consolidation ("old" BFI vs. "new" BFI)



Note: t=0 denotes the year of a 1 percent of GDP expenditure-based fiscal consolidation on GDP. Dotted lines delineate one standard error confidence bands.

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Appendix A: Cases

Table A1

Fiscal Stimuli ("old" BFI)

Country	Fiscal Stimuli (c.a. with the "old" Blanchard method)								
Australia	1990	1991							
Austria	1975	2004							
Belgium	1975	1981	2005						
Canada	1975	1982	1991	2001					
Denmark	1974	1975	1980	1981	1982				
Finland	1978	1982	1983	1987	1990	1991	1992	2001	2003
France	1975	1981	1992	1993	2002				
Germany	1995	2001							
Greece	1981	1985	1989	1995	2001				
Ireland	1974	1975	1978	2001	2007				
Italy	1972	1975	1981	2001					
Japan	1975	1993	1998	2005	2007				
Netherlands	1975	1980	1995	2001	2002				
New Zealand	1988								
Norway	1974	1976	1977	1986	1987	1991	1998	2002	2007
Portugal	1978	1985	1993	2005					
Spain	1981	1982	1993						
Sweden	1974	1977	1978	1979	1980	1991	1992	2001	2002
Switzerland									
U. Kingdom	1971	1972	1973	1990	1991	1992	2001	2002	2003
United States	2002								

Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Table A2

Fiscal Adjustments ("old" BFI)

Country	Fiscal Adjustment (c.a. with the "old" Blanchard method)									
Australia	1987	1988								
Austria	1984	1996	1997	2005						
Belgium	1982	1984	1987	2006						
Canada	1981	1986	1987	1994	1995	1996	1997			
Denmark	1983	1984	1985	1986	2005					
Finland	1973	1976	1981	1984	1988	1994	1996	1998	2000	
France	1979	1996								
Germany	1996	2000								
Greece	1976	1986	1991	1994	1996	2005	2006			
Ireland	1976	1984	1987	1988	1989	2000				
Italy	1976	1980	1982	1990	1991	1992	1997	2007		
Japan	1984	1999	2001	2006						
Netherlands	1972	1973	1983	1988	1991	1993	1996			
New Zealand	1987	1989	1993	1994	2000					
Norway	1979	1980	1983	1989	1996	2000	2004	2005		
Portugal	1982	1983	1986	1988	1992	1995	2002	2006		
Spain	1986	1987	1994	1996						
Sweden	1981	1983	1984	1986	1987	1994	1995	1996	1997	2004
Switzerland										
U. Kingdom	1977	1982	1988	1996	1997	1998	2000			
United States										

Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Table A3

Fiscal Stimuli (CAPB)

Country	Fiscal stimuli (CAPB)								
Australia	1991								
Austria	1975	2004							
Belgium	1972	1980	1981	2005					
Canada	1975	1977	2001						
Denmark	1975	1982							
Finland	1978	1979	1982	1987	1990	1991	1992	2001	
France									
Germany	1995	2001							
Greece	1981	1985	1988	1989	1995	2001	2003	2004	
Ireland	2001	2007							
Italy	1975	1981	2001						
Japan	1972	1975	1978	1993	1998				
Netherlands	1975	1978	1989	1995	2001				
New Zealand	1988								
Norway	1987	1990	1991	1992	1996	2000	2003		
Portugal	1985	1993	2005						
Spain	1990								
Sweden	1974	1977	1978	1979	1980	1991	1992	2001	2002
Switzerland									
U. Kingdom	1973	1978	1990	1992	2002	2003			
United States	1975	2001	2002						

Source: OECD Economic Outlook No. 84, own calculations.

Table A4

Fiscal Adjustments (CAPB)

Country	Fiscal adjustment (CAPB)							
Australia	1998							
Austria	1984	1996	1997	2001	2005			
Belgium	1977	1982	1984	1993	2006			
Canada	1981	1986	1987	1995	1996	1997		
Denmark	1983	1984	1986	2004	2005			
Finland	1981	1984	1988	1994	1996	1998	2000	
France	1996							
Germany	1996							
Greece	1986	1987	1991	1994	1996	2005	2006	
Ireland	1983	1984	1986	1987	1988			
Italy	1976	1982	1983	1991	1992	1993	1997	2007
Japan	1984	1999	2006					
Netherlands	1972	1983	1991	1993	1996	2004		
New Zealand	1987	1989	2000					
Norway	1983	1994	1995	2007				
Portugal	1982	1983	1984	1986	1992	2002	2006	
Spain	1987	1992	1996					
Sweden	1976	1981	1986	1987	1994	1996	1997	1998
Switzerland								
U. Kingdom	1980	1982	1996	1997	1998			
United States	1976							

Source: OECD Economic Outlook No. 84, own calculations.

Table A5

Fiscal Stimuli (BFI, augmented)

Country	Fiscal Stimuli (c.a. with the augmented Blanchard method)									
Australia										
Austria	1975	1976	2004							
Belgium	1972	1976	1980	1981	2005					
Canada	1975	2001								
Denmark	1975	1982	1994	2006						
Finland	1972	1978	1979	1982	1983	1987	1991	2001	2003	
France										
Germany	1995	2001								
Greece	1972	1975	1981	1985	1988	1989	1995	2001	2003	2004
Ireland	1974	1975	1978	2001	2007					
Italy	1972	1975	1981	2001						
Japan	1972	1975	1993	1998	2005	2007				
Netherlands	1974	1975	1989	1995	2001					
New Zealand	1988									
Norway	1974	1976	1977	1986	1991	1997	1998	2002	2007	
Portugal	1978	1985	1990	2005						
Spain	1993									
Sweden	1974	1977	1978	1979	1980	1992	2001	2002		
Switzerland										
U. Kingdom	1971	1972	1973	1978	1992	2001	2002	2003		
United States	2002									

Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Table A6

Fiscal Adjustments (BFI, augmented)

Country	Fiscal Adjustment (c.a. with the augmented Blanchard method)									
Australia										
Austria	1984	1996	1997	2005						
Belgium	1982	1984	1987	1993	2006					
Canada	1981	1986	1995	1996	1997					
Denmark	1983	1984	1986	2005						
Finland	1976	1981	1984	1988	1994	1996	2000			
France	1996									
Germany	1996	2000								
Greece	1986	1987	1991	1994	2005	2006				
Ireland	1976	1983	1984	1986	1987	1988	1989	2003	2004	2006
Italy	1982	1990	1991	1992	1997	2007				
Japan	1984	1999	2001	2006						
Netherlands	1982	1983	1988	1991	1993	1996	2005			
New Zealand	1987	1989	2000							
Norway	1979	1980	1983	1989	1999	2000	2004	2005		
Portugal	1982	1983	1984	1986	1992	2002	2006			
Spain	1983	1987	1994	1996						
Sweden	1976	1981	1986	1987	1993	1994	1996	1997		
Switzerland										
U. Kingdom	1977	1980	1982	1996	1997	1998	2000			
United States										

Source: A&A (2010), OECD Economic Outlook No. 84, own calculations.

Appendix B: Edogeneity of the BFI

We quantitatively explore the cyclical pattern of the fiscal indicators ΔF_{it} with regressions of the following form[26]

(A1) $$\Delta F_{it} = \mu_i + \lambda_t + \gamma \, \Delta Gap_{it} + u_{it}$$

Table A7 shows the estimated coefficients γ. As expected, it is shown that the unadjusted primary balance entails a cyclical pattern (no cyclical adjustment). This pattern seems to be lower but persistent in the A&P measure (imperfect cyclical adjustment), while the CAPB of the OECD appears to be uncorrelated to changes in the economic cycle. The augmented BFI even depict a countercyclical behavior. Looking at government revenues, the unadjusted series are negatively correlated to the output gap, pointing to a short-run elasticity of < 0. However, after applying any cyclical adjustment procedure, the cyclicality of revenues disappears.

As proposed by hypothesis 2, the indicators of government expenditures (as a ratio of GDP) are negatively associated with the economic cycle, which is strongly pronounced in the case of the unadjusted indicators. Adjusting the expenditure ratio with the *Blanchard-method (A&P)*, the counter-cyclical pattern remains at a slightly lower level, while the relationship disappears after applying the OECD measure and even turns into opposite after applying the augmented version of the BFI. Thus, the A&P method does not sufficiently control for cyclical effects in government expenditure, as suspected in equation (15).[27]

[26] Guajardo et al. (2014) analyze fiscal cyclicality in a comparable framework to show that the CAPB (as used in A&A) obtain a cyclical pattern, while the narrative measure of fiscal activity does not. Different from Guajardo et al. (2014) I do not use narrative measures of fiscal policy as a reference, but CAPB based on standard definitions, as provided by the OECD, and use the change in the output gap as cyclical indicator rather than GDP growth rate revisions.

[27] The results are very much in line if we use GDP growth as an alternative cyclical indicator, rather than the output gap.

Table A7: Fiscal policy and changes in the output gap

Equation estimated: $\Delta F_{it} = \mu_i + \lambda_t + \gamma \Delta Gap_{it} + \varepsilon_{it}$				
Measure of ΔF	β	s.e.	R-squared	*Obs*
ΔPB	0.350***	0.061	0.298	669
ΔCAPB (BFI, A&A)	0.188***	0.059	0.228	668
ΔCAPB (OECD)	0.019	0.052	0.160	653
ΔCAPB (Augmented BFI)	-0.116**	0.055	0.168	668
Current revenues	β	s.e.	R-squared	Obs
ΔR	-0.107*	0.060	0.179	669
ΔCAR (BFI, A&A)	-0.063	0.046	0.122	668
ΔCAR (OECD)	-0.006	0.055	0.168	653
ΔCAR (Augmented BFI)	-0.031	0.047	0.120	668
Current expenditures	β	s.e.	R-squared	Obs
ΔE	-0.409***	0.062	0.540	669
ΔCAE (A&A)	-0.222***	0.047	0.331	668
ΔCAE (OECD)	0.007	0.042	0.255	668
ΔCAE (Augmented BFI)	0.092**	0.038	0.217	668

Notes: The table reports point estimates and heteroscedasticity-robust standard errors. All specifications contain full set of country and time fixed effects (not reported in the table).
*** Significant at 1%, ** significant at 5%, * significant at 10%.

Appendix C. Large Changes in Fiscal Policy

A&A (2010) identify episodes of large changes in fiscal policy. According to their definition, an episode of a large fiscal stimulus is an episode when the BFI (primary deficit, c.a. with the Blanchard method) increases by more than 1.5 pp. of GDP in the same year, while an episode of a large fiscal adjustment is an episode when the BFI (primary deficit, c.a. with the Blanchard method) decreases by more than 1.5 pp. of GDP. Following the hypotheses above, it is conceivable that the selection of these episodes is endogenous to economic growth. In particular, the identification as an episode of large fiscal stimulus will be influenced by negative changes in the output gap, while positive changes in the output gap will increase the likelihood of identifying this episode as a large fiscal consolidation.

Table A8 shows the 40 largest cases of economic recessions (negative changes in the output gap) in OECD history (in the dataset of A&A, 2010). While this selection focuses on episodes during the oil price crises of 1975 and 1981, some of these episodes are selected as large episodes of fiscal expansion, according to A&A (2010). To test whether this selection is based on the cyclical adjustment strategy of A&P, the BFI in these episodes is compared with the CAPB (c.a. with OECD method) and it is shown that the CAPB, as estimated with the OECD method, identifies several large recessions as episodes of discretionary fiscal stimulus, however several of the episodes identified by A&A (2010) are not large expansionary episodes if the CAPB of the OECD is used. For instance, Canada in 1982 and 1991, as well as Belgium and France in 1975 did not increase the CAPB by more than 1.5. percent, while A&A (2010) identify these years as episodes of large fiscal expansions (because the BFI increases by > 1.5 percent). This selection points to the two problems highlighted by Perotti (2013), the countercyclical response problem (a), as well as the incomplete cyclical adjustment problem (b).

First, the countercyclical response problem (a) appears if fiscal policy behaves countercyclical and increases deficits as a consequence of an economic recession. Table A8 depicts that this problem appears in both cases, whether we rely on the BFI or the CAPB. Governments tend to increase the CAPB in periods of economic slack as a countercyclical policy response, whether the cyclical adjustment strategy is the *Blanchard method* or the OECD method. This countercyclical response problem is one

reason for the critique of the data-based approach. However, the CAPB (OECD method) selects substantially fewer recessions as episodes of fiscal stimuli, compared to the BFI. This, secondly, points to an incomplete cyclical adjustment problem (b) for the BFI (hypothesis 1). Since this article focuses on the question of how to correct for cyclical effects and whether an incomplete cyclical adjustment influences the results of the fiscal multiplier, we do not elaborate on the countercyclical response problem in more detail, but focus on the incomplete cyclical adjustment problem.

While the BFI selects 15 of the 40 largest recessions as episodes of fiscal stimulus, the CAPB only selects 9. It is thus more likely that the BFI interprets an economic downturn as an episode of fiscal expansionism. The imperfect cyclical adjustment problem (b) in the BFI thus might amplify the countercyclical response problem (a).

Table A9 shows a similar picture for the case of economic upturns and fiscal consolidations. The results are less striking as in the case of fiscal stimuli in times of recession. While the BFI selects 9 of the 40 largest economic upturns as episodes of fiscal consolidation, the CAPB only selects 4. For instance, United Kingdom in 1988 and New Zealand in 1993 and 1994 shows up as a case of large fiscal consolidation, while the CAPB-based approach does not show an increase in the CAPB of more than 1.5 percentage points. It seems that the countercyclical response problem is less distinctive in the case of responding to economic upturns, however, the number of cases in which the BFI selects a large episode of economic expansion as period of fiscal consolidation significantly increases (more than doubled), so that the effect of the imperfect cyclical adjustment (in A&P) should not be underrated. Figure A1 shows the correlation between changes in the economic cycle (output gap) and the CAPB (based on the Blanchard method) in the 40 largest episodes of economic upswings and downturns. It shows a clear negative relationship, suggesting that the BFI-based CAPB tends to be clearly more expansionary in economic recessions, compared to the large episodes of economic upswings (when the BFI-based CAPB seems to be more contractionary). From this picture, it is reasonable to assume a positive correlation between fiscal adjustments and GDP (either through a countercyclical response problem or expansionary austerity).

Figure A2 depicts the same variables, but now the CAPB is calculated with standard assumptions of the OECD. The clear negative relationship decreases substantially.

While the positive relationship is particularly pronounced in the case of economic downturns, it is less significant in the case of economic upswings, pointing to a small remaining countercyclical response problem in times of recessions (probably as a reaction to the oil price crises in 1975 and 1981), while there is little support for a large countercyclical response problem in the case of upswing episodes.[28]

In summary, the CAPB based on the BFI appears to be highly correlated with changes in the economic cycle, while the CAPB based on conventional methods is not. This suggests that the BFI as proposed by A&P and applied by A&A (2010) suffers from an incomplete cyclical adjustment problem, as suggested by hypothesis (1). It is shown that the incomplete cyclical adjustment problem increases the likelihood of selecting an economic recession as a fiscal expansion and an economic upswing as an episode of fiscal consolidation.

[28] The same is true if the BFI (as computed by A&A) is contrasted with the augmented version of the BFI, rather than the CAPB of the OECD. The results are available upon request.

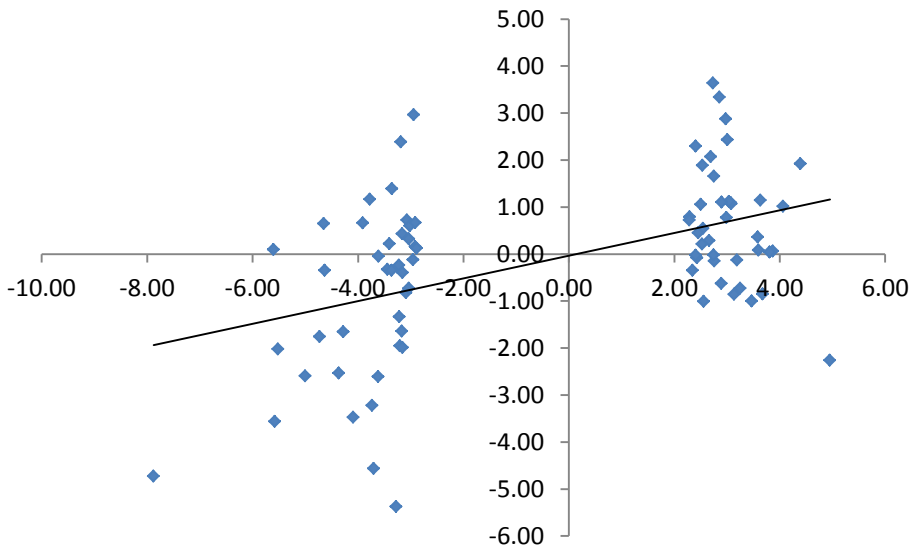
Table A8: 40 largest cases of economic downturns

Country	Year	BFI	DCAPB	DGAP	BFI>1.5	CAPB<-1.5
Finland	1991	4.73	-2.90	-7.88	1	1
Japan	1974	-0.09	0.69	-5.60		
Italy	1975	3.56	-1.63	-5.58	1	1
Canada	1982	2.02	-1.20	-5.52	1	
Portugal	1993	2.59	-2.34	-5.00	1	1
Finland	1992	1.75	-1.64	-4.73	1	1
Portugal	1984	-0.65	1.53	-4.65		
United States	1982	0.34	-1.02	-4.63		
Belgium	1975	2.53	0.34	-4.37	1	
Canada	1991	1.65	-0.67	-4.28	1	
Spain	1993	3.47	-0.48	-4.09	1	
United Kingdom	1980	-0.66	1.79	-3.91		
Greece	1987	-1.17	2.47	-3.78		
Austria	1975	3.22	-2.16	-3.73	1	1
Sweden	1977	4.56	-3.16	-3.71	1	1
Australia	1991	2.61	-1.96	-3.62	1	1
United States	1974	0.05	-0.09	-3.61		
Switzerland	1991	0.32	-0.09	-3.44		
Ireland	1986	-0.22	1.50	-3.40		
Austria	1978	0.35	0.44	-3.36		
Ireland	1983	-1.39	3.42	-3.36		
Japan	1998	5.38	-6.06	-3.28	1	1
United States	1980	0.24	-0.74	-3.23		
United States	1975	1.34	-2.85	-3.22		1
France	1975	1.96	-0.52	-3.20	1	
Portugal	1983	-2.39	3.91	-3.19		
United Kingdom	1991	1.64	-0.62	-3.17	1	
New Zealand	1991	-0.43	1.10	-3.16		
Australia	1982	0.39	-0.10	-3.16		
Denmark	1981	1.99	-1.36	-3.16	1	
United Kingdom	1981	0.82	0.47	-3.09		
Sweden	1993	-0.72	0.38	-3.07		
Ireland	1991	0.73	0.06	-3.04		
Austria	1981	-0.32	1.24	-3.03		
United States	1991	-0.60	0.39	-3.02		
Australia	1983	0.12	0.19	-2.96		
Norway	1989	-2.97	-0.74	-2.94		
United Kingdom	1974	-0.16	0.65	-2.91		
Belgium	1993	-0.67	2.10	-2.91		
Norway	1988	-0.12	-0.36	-2.89		

Table A9: 40 largest cases of economic upswings

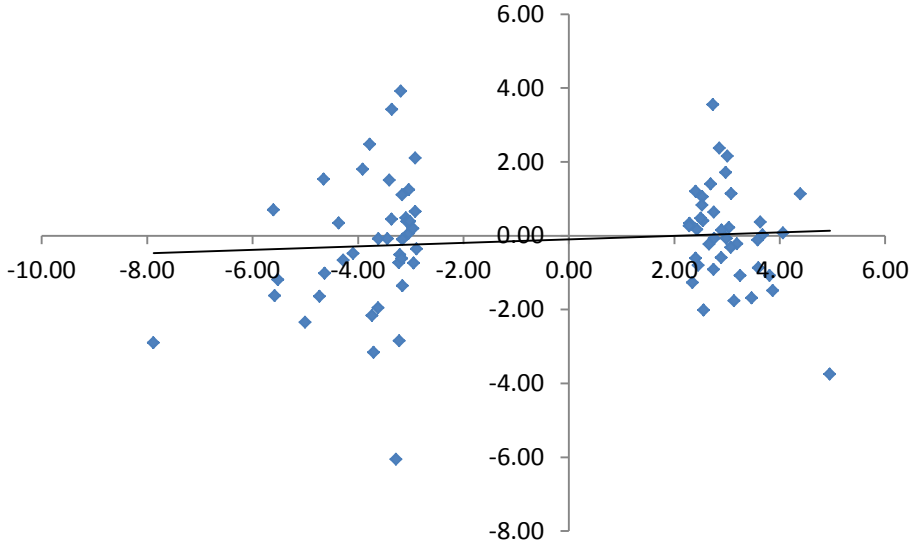
Country	Year	BFI	DCAPB	DGAP	BFI<-1.5	DCAPB>1.5
United Kingdom	1973	2.26	-3.75	4.95		
Portugal	1988	-1.92	1.12	4.39	1	
Denmark	1976	-1.01	0.07	4.06		
Ireland	1990	-0.06	-1.49	3.87		
Greece	1978	-0.04	-1.09	3.81		
United States	1984	0.85	0.02	3.67		
Norway	1985	-1.15	0.37	3.63		
Portugal	1989	-0.08	-0.88	3.59		
Japan	1973	-0.36	-0.12	3.59		
Finland	1979	1.00	-1.69	3.47		
Portugal	1987	0.73	-1.09	3.25		
Australia	1984	0.13	-0.22	3.19		
Japan	1972	0.86	-1.77	3.13		
Finland	1997	-1.07	1.14	3.08		
Belgium	1973	-1.09	-0.32	3.07		
Finland	1989	-1.12	0.21	3.04		
Italy	1976	-2.43	2.15	3.01	1	1
Canada	1984	-0.77	-0.07	2.99		
Spain	1987	-2.88	1.71	2.98	1	1
Ireland	1997	-1.10	0.15	2.90		
Denmark	1994	0.62	-0.60	2.89		
Finland	1988	-3.34	2.37	2.85	1	1
Japan	1988	0.15	-0.07	2.76		
United Kingdom	1988	-1.66	0.63	2.75	1	
Belgium	1976	0.02	-0.92	2.74		
Denmark	1986	-3.64	3.55	2.73	1	1
New Zealand	1994	-2.07	1.40	2.69	1	
Austria	1979	-0.29	-0.23	2.66		
Greece	1988	1.01	-2.02	2.56		
United States	1973	-0.55	0.40	2.55		
New Zealand	1993	-1.89	1.05	2.53	1	
Netherlands	1976	-0.21	0.83	2.53		
Canada	1973	-1.06	0.47	2.50		
Belgium	1988	-0.45	-0.81	2.45		
United States	1978	0.08	0.17	2.43		
Italy	1979	0.03	-0.61	2.41		
Sweden	1984	-2.30	1.20	2.41	1	
Ireland	1999	0.35	-1.27	2.34		
Canada	1999	-0.79	0.33	2.29		
Canada	1988	-0.72	0.26	2.28		

Figure A1: ΔCAPB (A&P) vs. ΔGap in large episodes of up- and downswing



Source: A&A (2010), OECD Economic Outlook, No. 84, own calculations.

Figure A2: ΔCAPB (OECD) vs. ΔGap in large episodes of up- and downswing



Source: OECD Economic Outlook, No. 84, own calculations.