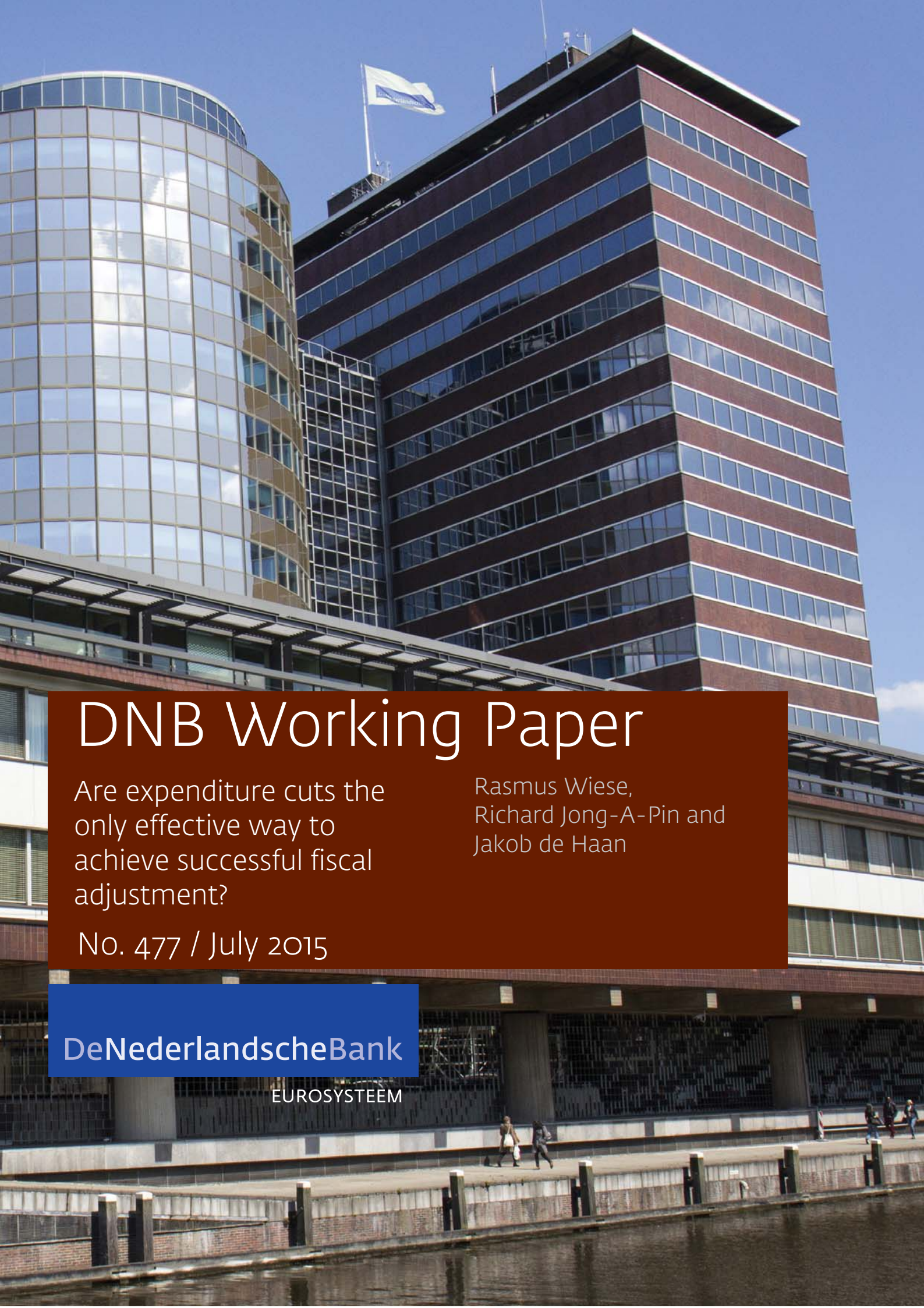

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* Views expressed are those of the authors and do not necessarily reflect official positions of De Nederlandsche Bank.

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Can successful fiscal adjustments only be achieved by spending cuts?

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Abstract
We re-examine the conventional view that to be successful, fiscal adjustments should rely on spending cuts and not on tax increases. We apply the Bai-Perron structural break filter instead of ad hoc rules to identify fiscal adjustments and their successfulness in 20 OECD countries. Our results suggest that the composition of fiscal adjustments is not related to their success. Furthermore, we find that political-economy variables considered are not robustly related to successful fiscal adjustments with one exception: the probability of a successful fiscal adjustment increases if left-wing governments rely on spending cuts and right-wing governments rely on tax increases.

JEL-code: H200; H300; H500; H620

Key words: fiscal adjustments; fiscal consolidation; deficit reduction; fiscal policy reforms; taxes versus spending; taxation; government expenditure

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1. Introduction

Fiscal policies in several countries across the world have become unsustainable. Therefore, fiscal policy adjustments are inevitable to reduce government indebtedness. An important issue is how policymakers should get their fiscal house in order. According to Broadbent and Daly (2010, p. 6), "[t]he consensus within the academic literature is that successful corrections of severe fiscal imbalances share two essential features: they are decisive and they focus on cutting expenditure." Likewise, Alesina and de Rugy (2013, p. 8) argue that "evidence suggests that the types of fiscal adjustment packages that are most likely to reduce debt are those that are heavily weighted toward spending reductions and not tax increases."[1]

It is important to point out that, to the best of our knowledge, this 'consensus' is not based on strong theoretical reasoning but on empirical evidence. Several authors conclude that successful fiscal policy adjustments rely on expenditure cuts rather than increased revenues (cf. Alesina and Perotti 1995; McDermott and Wescott, 1996; Alesina and Ardagna 1998; 2010; Alesina et al. 1998; von Hagen et al. 2001; 2002; Broadbent and Daly, 2010; Biggs et al., 2010; Hernandez de Cos and Moral-Benito, 2012 and Afonso and Jalles, 2012).[2] Most papers in this line of research start by identifying a fiscal adjustment, mostly on the basis of changes in the cyclically adjusted (primary) budget balance, and then examine how successful and non-successful adjustments differ from each other. Success is generally defined in terms of the lasting effect the adjustment program has on reducing the government debt-to-GDP ratio and/or the budget deficit-to-GDP ratio.

As politicians are in charge of fiscal policy, the literature has paid some attention to the political economy of fiscal adjustments. In their seminal paper, Alesina and Perotti (1995, p. 236) summarize their main findings as follows: "Coalition governments are as likely as other governments to try very tight fiscal policies. However, they seem to be unable to carry out the types of expenditure cut that are needed to make adjustment long lasting. As a result, their success rate is drastically lower than that of both minority and single-party governments. Left- and right-wing governments are just about equally likely to carry out successful

[1] The work by Alesina and his co-authors even made it into influential textbooks. For instance, Romer (2012) refers to it. Also in policy-oriented publications several references to this research can be found. For instance, in the IMF's World Economic Outlook, October 2010 the work is described as "extremely influential in the debate regarding the consequences of fiscal adjustment".

[2] Even though the quotes of Broadbent and Daly (2010) and Alesina and de Rugy (2013) would suggest otherwise, there are dissenting views. For instance, Heylen and Everaert (2000) reject the hypothesis that to succeed, consolidation should rely on cutting the government wage bill. Their evidence is based on a model explaining the growth of government debt in 39 fiscal consolidation periods. Similarly, Ardagna (2004) and Holden and Larsson Midthjell (2013) find no indication that it matters for the success of the adjustment whether it is achieved via spending cuts or tax increases. Focusing on medium-term adjustments, Baldaci et al. (2012) conclude that when adjustment needs are large, fiscal adjustments that rely on revenue-enhancing measures are more likely to accelerate debt consolidation than those based on expenditure-based cuts only.

adjustments. Closeness to elections does not influence the likelihood of strong adjustments, or their success rates."

We re-examine the evidence that successful fiscal adjustments are characterized by spending cuts and that certain political-economy factors do (or do not) matter.[3] Our paper makes the following contributions to the literature. First, instead of relying on ad hoc criteria we apply the Bai and Perron (1998, 2003) structural break filter to identify fiscal adjustments and their success. This approach, which was suggested by Wiese (2014) to identify structural reforms, is less subjective than approaches used in this line of literature so far. Adjustments are generally defined in the literature as a discretionary (i.e. cyclically adjusted) and significant decline in the general government's budget balance. Significant in this case does not refer to statistical significance, but rather whether the change in the cyclically adjusted (primary) budget balance exceeds some (arbitrarily selected) threshold. So, these filters are based on a 'one-size-fits-all' principle and they do not take into account that the budgetary processes in some countries may lead to a much more volatile budget balance than those in other countries. A filter that does not take volatility into account is prone to identify fiscal adjustments that are the result of the budgetary institutions in place (or other factors driving fiscal policy volatility), rather than deliberate attempts of politicians to improve the budget balance. As such, empirical analyses that have used these ad hoc filters may suffer from severe measurement error. Using the same train of thought, we also apply the Bai-Perron (BP) approach to identify whether a fiscal policy adjustment has been successful, instead of relying on ad hoc rules as used in previous studies based on the lasting effect the adjustment program has on reducing the government debt-to-GDP ratio and/or the budget deficit-to-GDP ratio.

Our second contribution is that we show that just comparing the composition of successful and non-successful fiscal adjustments (as older studies in this line of literature did) leads to biased results. We provide random-effects probit model estimates for the probability that a fiscal adjustment is successful, conditional on the presence of a fiscal adjustment. Some previous studies that provide empirical estimates of the drivers of successful fiscal adjustments (e.g. Ardagna, 2004 and Schaltegger and Feld, 2009) compare successful adjustments with unsuccessful adjustments and periods of no fiscal adjustment. Instead, our estimates are only based on successful and unsuccessful fiscal adjustments. Our justification is best explained using a simple metaphor: when a doctor wants to evaluate the effectiveness of a medicine in comparison to a placebo, (s)he will allocate the medicine and the placebo only to people having the disease and not to people

[3] It is important to point out what we do not as well (even though our findings may be relevant for these issues as well). We do not address the argument that expenditure-based fiscal adjustments may be less contractionary than usually thought or even be expansionary (see Alesina et al. (1998), Ardagna (2004), IMF (2010), Alesina et al. (2015a), Guajardo et al. (2014) and Alesina and de Rugy (2013) for further discussion). Likewise, we do not address the issue of (the consequences of) fiscal austerity (see, for instance, Alesina et al., 2015b, Beetsma et al., 2015 and Eichengreen and Paniza, 2016 and references cited therein).

without a diagnosis. Our results do not suggest that successful fiscal adjustments rely more on spending cuts than on tax increases.

Third, although some previous studies on the determinants of successful fiscal adjustments have considered some political-economy determinants of successful fiscal adjustments, they did not consider a wide range of potentially important political-economy factors. We consider several political-economy variables that have been suggested by studies focusing on the determinants of fiscal policy outcomes and fiscal adjustments (see section 4 for more details). Our results do not suggest that political-economy variables are robustly related to successful fiscal adjustments, with one exception. In line with the findings of Tavares (2004), we find some evidence that the probability of a successful fiscal adjustment increases when left-wing governments rely on spending cuts and right-wing governments rely on tax increases.

The paper that comes closest to our work is Holden and Larsson Midthjell (2013). These authors redo the analysis of Alesina and Ardagna (2010) using a measure of changes in fiscal policy designed to avoid reverse causality. Our study differs with respect to the methodology to identify (successful) fiscal adjustments and the inclusion of political-economy determinants of successful fiscal adjustments.

The remainder of the paper is structured as follows. Section 2 discusses how previous studies identified (successful) fiscal adjustments and explains our alternative approach. Section 3 outlines our modeling approach and describes the data and presents our estimates without considering political-economy variables. Section 4 offers our results if the latter variables are included. Section 5 concludes.

2. Identifying successful fiscal adjustments

2. 1 Identifying fiscal adjustments

The first step in analyzing differences between successful and non-successful fiscal adjustments is to identify fiscal adjustments. This is not straightforward, as both public expenditures and tax revenues will be affected by changes in the economy as well as by changes in policy. That is why most previous studies employ a statistical threshold for changes in (some measure of) the cyclically adjusted (primary) budget balance to identify fiscal adjustments. For example, in their seminal paper Alesina and Perotti (1995) identify an adjustment if the Blanchard Fiscal Impulse (BFI) measure is less than -1.5% of GDP.[4] Similarly, Alesina and Ardagna (2010) classify a year as a fiscal adjustment period if the cyclically adjusted primary balance (CAPB, as % of GDP) improves by at least 1.5

[4] BFI corrects the budget balance for cyclical adjustments by estimating government spending and revenues if unemployment would have been at the same level as in the previous year. Alesina and Perotti only adjust government transfers. The fiscal impulse is defined as difference between this year's unemployment adjusted primary deficit and the previous year's primary deficit (see footnote 3 in Alesina and Perotti, 1995).

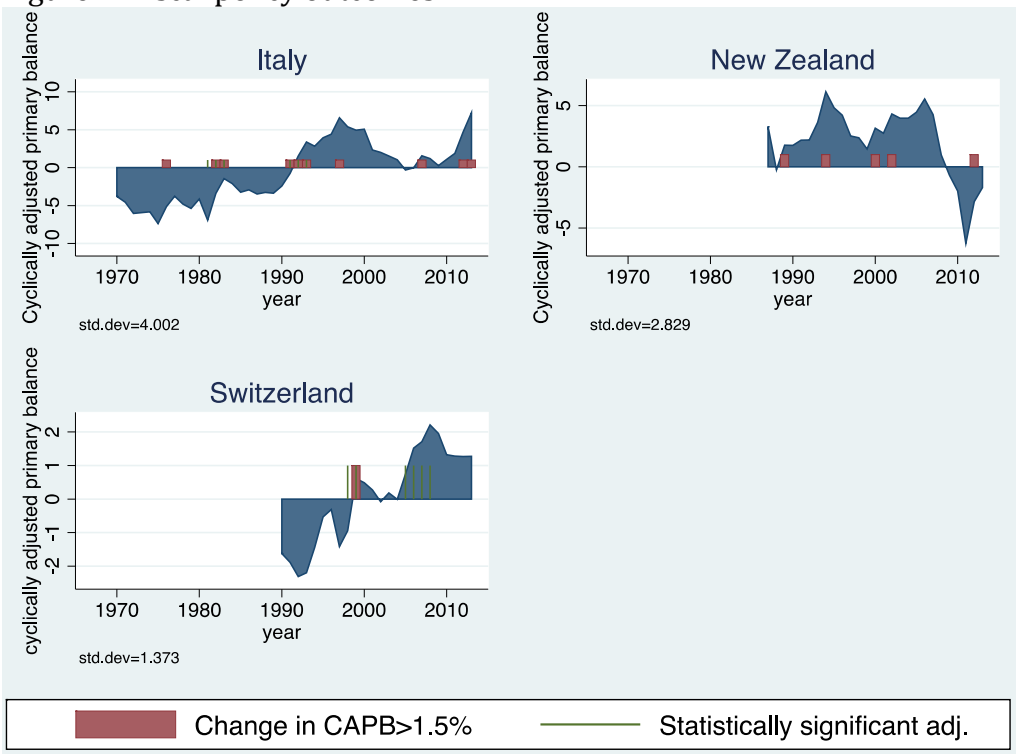
percentage points. Appendix 1 shows that most studies follow this rather arbitrary approach, frequently using different thresholds or different measures for the government budget balance. Most studies focus on one-year adjustments, but some allow for adjustments which last longer than one year. For instance, von Hagen et al. (2001; 2002) define fiscal consolidations as episodes in which the cyclically adjusted government budget balance increased by at least 1.25 percent of cyclically adjusted GDP in two consecutive years, or if the change in the cyclically adjusted budget balance exceeds 1.5 of cyclically adjusted GDP in one year and was positive but perhaps less than 1.25 percent in the preceding year and in the subsequent year. (Note that von Hagen et al. do not employ the primary balance.)

Some studies (including Alesina et al., 1998 and Tavares, 2004) do not employ the cyclically adjusted primary balance, but rely on changes in the primary deficit to define fiscal adjustments. Alesina et al. (1998) define a year of tight fiscal policy as a year when the primary deficit to GDP falls at least by 1.5 percentage points. Like von Hagen et al. (2001; 2002) they exclude interest payments as they are interested in discretionary fiscal policy "and interest payments are not under the direct control of government" (p. 214). In our view, this argument, if anything, would suggest to adjust the budget balance for interest payments.

Even though several studies admit the arbitrariness of the criteria used to identify fiscal adjustments and consider alternative definitions to examine the robustness of their findings (see e.g. Alesina and Ardagna, 1998, Afonso and Jalles, 2012), the use of ad hoc 'one-size-fits-all' filters can be criticized on several grounds. First, it does not take into account that the budgetary processes in some countries may yield much more volatile policy outcomes than those in other countries. To illustrate this point, Figure 1 compares budget balances of Italy, New Zealand and Switzerland. (Figure A2.1 in Appendix 2 provides figures for all countries in our sample). It is clear that the budget balance in Italy and New Zealand is much more volatile than the budget balance in Switzerland (note that the left-hand side scale of the graphs differs). Considering a filter that is based on a 'one-size-fits-all' approach is likely to identify more fiscal adjustments for Italy and New Zealand than for Switzerland (as illustrated by the red bars in Figure 1), simply because the change of the budget balance is the key criterion to identify a fiscal adjustment, i.e. type I errors. Additionally, ad hoc filters are less likely to detect significant changes in fiscal policy in countries where the budgetary process leads to less volatile policy outcomes, such as in Switzerland. In that case ad hoc filters suffer from type II errors.

In case of type I errors, it is questionable whether the identified adjustments really represent deviations from usual policy. It is therefore unlikely that these periods will have an effect on the debt-to-GDP ratio. So, these wrongly identified fiscal adjustments are likely to be categorized as being unsuccessful. Therefore analyses that compare successful and unsuccessful adjustments using ad hoc criteria are likely to suffer from a selection problem.

Figure 1. Fiscal policy outcomes



Notes: This figure shows the cyclically adjusted primary balance (in blue), and years identified as fiscal adjustments using two approaches, namely the requirement that the change in the CAPB is larger than 1.5 percentage points (in red) and the approach outlined in this section (in green).

Second, the methods used to adjust the budget balance for business cycle fluctuations may suffer from measurement errors that are likely to be correlated with economic developments, such as asset price or commodity price movements, resulting in changes in the CAPB that are not necessarily linked to actual policy changes (IMF, 2010).[5] As an alternative, the IMF (2010) identifies fiscal adjustment episodes through examination of accounts and reports.[6] This so-called 'action-based approach' follows the 'narrative approach' used by Romer and Romer (2010) for the identification of tax changes. However, this action-based approach is not without problems either (Holden and Larsson Midthjell, 2013). It might be hard to assess the true intention of a policy change solely by reading policy documents. By including only actions, which are motivated by debt reduction, and thus omitting fiscal actions for stabilization purposes, one may obtain an inaccurate picture of the actual fiscal stance. Furthermore, Perotti (2012) provides examples showing that 'action-based' fiscal data might also be subject to important measurement errors, as governments quite often reverse announced spending cuts in subsequent supplementary budgets.

Alesina and Ardagna (2013) argue that spending-based adjustments are more likely to reduce the debt-to-GDP ratio, regardless of whether fiscal adjustments

[5] Furthermore, changes in the CAPB can be the result of discretionary reactions of fiscal policy to cyclical conditions (Beetsma et al., 2015), while tax elasticities may change over time, which can lead to inaccurate estimates of the CAPB at any moment (Wolswijk, 2007).

[6] See Devries et al. (2011) and Guajardo et al. (2014) for details and Gupta et al. (2017) for an update of Devries et al. (2011).

are defined in terms of improvements in the CAPB or in terms of premeditated policy changes designed to improve a country's fiscal outlook. Likewise, Biggs et al. (2010) report that consolidations identified under the 'action-based' method produce similar results as those identified based on changes in the CAPB.

Our approach to identify the beginning of fiscal adjustments is based on the identification of changes in the Data Generating Process (DGP) of fiscal variables, for example, as a result of a fiscal adjustment (Hansen, 2001). Bai and Perron (1998, 2003) develop a general method for this purpose. Consider a model with m possible structural breaks[7]:

$$y_t = \delta_j + \mu_t \qquad (t=1,\ldots T;\ j=1,\ \ldots m+1) \tag{1}$$

where y_t is the dependent variable (in our case: the budget balance), δ_j is a vector of estimated constants, i.e. the mean at the m + 1 different segments of the time series y_t and u_t is the error term. The Bai and Perron (BP) filter generates the segmented route through the series that yields the lowest Sum of Squared Residuals (SSR) up to a maximum number of breaks. The maximum number of breaks is restricted by a trimming parameter h, which specifies a minimum number of observations that have to occur between consecutive breaks. We have set h=0.15. The process underlying the algorithm is straightforward. First, it searches for all possible sets of breaks up to a maximum, restricted by the trimming parameter h, and determines for each number of breaks the set that minimizes the SSR. Then a series of F-tests determine whether the improved fit produced by allowing an additional break is sufficiently large, compared to what can be expected randomly, on the basis of the asymptotic distribution derived in Bai and Perron (1998). Autocorrelation and potential heteroskedasticity is modeled non-parametrically by running the filter using a Heteroskedasticity and Autocorrelation Consistent (HAC) estimate of the variance–covariance matrix. We use the test procedure recommended by Bai and Perron (2003) to select the optimal number and timing of breaks. That is, dependent on properties of the individual time series we chose the appropriate filter specification and test.

The BP method identifies the break date (fiscal adjustment initiation) as the first year after the structural break. We therefore take a one-year lag to identify the start of the fiscal adjustment. This method will identify the beginning, but not the end of a fiscal adjustment. We decided that the period of fiscal adjustment continues as long as the change in the cyclically adjusted budget balance is positive. We cannot identify breaks in the beginning and end of the sample due to the trimming parameter h (i.e. 0.15 times the country specific sample length). Using this approach, we identify the fiscal adjustments as presented in Table 1. As Table 1 shows, out of 674 yearly observations we identify 108 years with a fiscal adjustment. Table A4.1 in Appendix A4 compares fiscal adjustment periods identified using our proposed method with those identified using the approach suggested by von Hagen et al. (2001; 2002), Alesina and Ardagna (2010), and the updates of the 'action-based' approach of Devries et al. (2011) as provided by Gupta et al. (2017). It is clear that these different methods identify fiscal adjustments that frequently differ substantially from the ones identified under

[7] This part of the paper draws on Wiese (2014).

our approach. Take the case of Italy for which we identify two fiscal adjustment periods, namely 1981-83 and 1991-93, while the other approaches yield many more fiscal adjustment periods (or longer-lasting adjustment periods). As argued above, in our view, this higher number of fiscal adjustments selected under these alternative approaches probably reflects the volatility of the Italian budgetary process. For countries with a more stable budgetary process, like Switzerland, the other approaches yield fewer fiscal adjustments than our approach.

An important issue to note is that (with the notable exception of von Hagen et al. 2001; 2002) most studies in this line of research focus on short-term fiscal adjustments. However, more recently, Alesina et al. (2015a, p. S19) argue that "the correct methodology to answer this question requires studying fiscal plans, rather than individual shifts in fiscal variables as it is normally done in the literature." Although the question Alesina et al. refer to concerns the output effect of fiscal contractions, we believe it also holds for answering the question of whether consolidations based on spending reductions or those based on tax increases are more likely to be successful.[8] The method we propose generally identifies adjustments covering multiple years.

2.2 Identifying successful fiscal adjustments

The next step is how to identify successful fiscal adjustments. As shown in Appendix 1, most papers also follow some ad-hoc approach when it comes to identifying the success of a fiscal adjustment.[9] For instance, Alesina and Perotti (1995) consider an adjustment successful if the gross debt-to-GDP ratio three years after the adjustment is at least 5 percentage points lower than at the time of the adjustment. Some papers use the improvement in the budget balance instead of the debt ratio to identify successful adjustments. For instance, von Hagen et al. (2001; 2002) define an adjustment successful, if two years after the initial adjustment, the government budget balance stands at no less than 75 percent of the balance in the first year of the consolidation episode. In other words, after the adjustment the low level of the budget deficit is sufficiently maintained. Others use a combination of both criteria. For instance, Alesina and Perotti (1996) consider an adjustment successful if either three years after the adjustment the ratio of the CAPB (as % of GDP) is on average at least 2 percentage points below the last year of the adjustment or three years after the adjustment the debt to GDP ratio is 5 percentage points below the level of the last year of the adjustment.

Instead of applying these ad hoc criteria, we identify periods with successful fiscal adjustment by applying the BP method to the growth rate of the debt-to-GDP ratio. We take growth rates of the debt-to-GDP ratio to be able to apply a pure structural change model, i.e. to avoid having to model trend breaks. The BP-

[8] That is why the method of von Hagen et al. (2001; 2002) is used, among others, in comparing the outcomes of our approach and those of some approaches based on ad hoc criteria.
[9] An exception is the study by Heylen and Everaert (2000) who explain the change in the debt ratio itself, thereby avoiding the arbitrary choice of defining "successful" and "unsuccessful" episodes.

test has better test properties when applied to growth rates because this avoids 'trend' properties from entering the errors of the test equation. Regimes with negative debt growth rates are compared to the periods with fiscal adjustment. If fiscal adjustments are identified prior to, or simultaneously with the beginning of regimes with negative growth rates, and the periods are not more than 4 years apart, we code it as a successful fiscal adjustment, as this is evidence that the fiscal adjustment had a statistical significant and lasting negative effect on the debt-to-GDP ratio. As Table 1 shows, out of the 108 years with a fiscal adjustment, we identify 58 as being successful fiscal adjustments.

As an alternative to identify periods with successful fiscal adjustments we apply a criterion frequently used in the literature (see Appendix 1). Following Alesina and Ardagna (2010) we alternatively define an adjustment as successful if the debt-to-GDP ratio has improved by 5%-points or more 3 years after the adjustment; otherwise it is unsuccessful. The final column in Table 1 shows the 50 years with a successful fiscal adjustment identified by this criterion.

To examine whether our approach to identify fiscal adjustments drives our empirical results, we have also followed previous studies in identifying fiscal adjustments. Table 2 shows the outcomes if we use an 'ad hoc' filter to identify fiscal adjustments, defined by von Hagen et al. (2001), i.e. an improvement in the budget balance of 1.25% points in two or more consecutive years, or an improvement of 1.5% points preceded by a positive change in the budget balance. To determine whether these adjustments were successful, we apply the criterion suggested by Alesina and Ardagna (2010). As shown in columns (2) and (3) of Table 2, this yields rather different results. The most interesting observation is that a much larger proportion of the adjustments identified using this filter is classified as unsuccessful. This suggests that this filter to identify fiscal adjustments pick-ups many short periods of fiscal adjustments that may be more a manifestation of 'noise' rather than deliberate policy actions, i.e., so-called type I errors. Additionally we include the 'action-based' fiscal adjustments identified by Gupta et al. (2017) in Table 2 (column 3). When classifying which of these adjustments were successful based on the Alesina-Ardagna criterion, we again find that a large proportion of these adjustments were unsuccessful, confirming our suspicion that many of these adjustment periods may not represent a real change in fiscal policies.

Table 1. Periods with fiscal adjustments, negative debt/GDP growth regimes and successful fiscal adjustments

(1)	(2)	(3)	(4)	(5)
Filter specification: Country and sample length:	Fiscal adjustment (based on Bai-Perron tests; 5% significance level)	Years with negative growth rate in the debt-to-GDP ratio (Bai-Perron tests 5% significance level)	Periods with successful adjustments based on Bai-Perron approach for both steps	Periods with successful adjustments using method of Alesina-Ardagna for second step
Australia, 1989-2013	1996-98	1996-2008	1996-98	1996-98
Austria, 1977-2013	1995-97			
Belgium, 1971-2013	1983-87, 1992-98	1994-01, 2002-07	1992-98	1993-98
Canada, 1970-2013	1986-89, 1995-97	1997-07	1995-97	1995-97
Denmark, 1973-2013	1984-86, 1998-99	1985-89, 1994-03, 2004-07	1984-86	1984-86, 1998-99
Finland, 1977-2013	1995-98	1996-2008	1995-98	1996-98
France, 1978-2013	1995-99, 2001			1998
Germany, 1970-2013	1981-85			
Iceland, 1980-2013	1990-92, 1995-97	1996-2005	1995-97	1995-97
Italy, 1970-2013,	1981-83, 1991-93	1979-84, 1999-07		1981-82
Japan, 1971-2013	1983-90, 2005-06	1987-1992	1983-90	1986-88
Netherlands, 1971-2013	1995-97	1994-01, 2002-07		1995-97
New Zealand, 1987-2013		2002-04		
Norway, 1980-2013	1994-97	1979-84, 1994-99, 2007	1994-97	1995
Portugal, 1981-2013	1984, 2009-13	1995-00		
Spain, 1979-2013	1986-87, 1995-99	1999-07	1995-99	1996-99
Sweden, 1973-2013	1984, 1996-98	1984-90, 1997-13	1984, 1996-98	1984, 1996-98
Switzerland, 1990-2013	1998-99, 2005-08	2005-08	2005-07	2005-06
United Kingdom, 1972-2013	1979-82, 1995-00	1985-90, 1997-2007	1995-00	1997-99
United States, 1967-2013	1994-98	1994-00	1994-9	1995-98
Total no. of years	108		58	50

Notes: This table shows the identification of fiscal adjustments based on the Bai-Perron test and the periods identified as successful fiscal adjustments based on the BP-test and the Alesina and Ardagna (2010) criterion for success. Luxembourg, Greece and Ireland were excluded from the analysis because we had too few observations for these countries to run the Bai-Perron filter.

Table 2. Alternative classifications of fiscal adjustments and successful fiscal adjustments

Filter specification	An improvement in the budget balance of 1.25% points in two or more consecutive years, or an improvement of 1.5% points preceded by a positive change in the budget balance		'Action-based' fiscal adjustments taken from Devries et al. (2011) and Gupta et al. (2017)	
Country	Years with a rapid fiscal adjustment (von Hagen et al. 2001; 2002)	Successful rapid fiscal adjustment, Alesina-Ardagna criterion	Year with 'action-based' fiscal adjustment (Devries et al., 2011; Gupta et al., 2017)	Successful 'action-based' fiscal adjustment, Alesina-Ardagna criterion
Australia	2011-12	Cannot be classified	1985-88, 1994-99	1995-99
Austria	1996-97, 2000-01		1980-84, 1996-97, 2001-02	
Belgium	No adjustment		1982-85, 1987, 1990, 1992-94, 1996-97	1993-94, 1996-97
Canada	1986-87, 1994-97	1995-97	1984-97	1995-97
Denmark	1983-86, 2003-05	1984-86, 2003-04	1983-85, 1995	1983-85, 1995
Finland	1997-98	1997-98	1992-97	1996-97
France	2011-13	Cannot be classified	1979, 1987, 1989, 1991-92, 1995-97, 1999-00	
Germany	1981-82, 1999-00		1982-84, 1991-95, 1997-00, 2003-04, 2006-07	
Iceland	2004-05, 2009-2013	2004	NA	NA
Italy	1976-77, 1982-83, 1990-93, 1996-97, 2006-07	1982, 1997	1991-98, 2004-07	1997-98
Japan	1983-84		1979-83, 1997-98, 2003-07	
Netherlands	1972-73, 1982-83	1972	1981-88, 1991-93, 2004-05	1993, 2004
New Zealand	1993-94	1993-94	NA	NA
Norway	1993-95, 1999-00, 2005-06	1995, 2006	NA	NA
Portugal	1982-84		1983, 2000, 2002-03, 2005-07	
Spain	1986-87, 1995-96	1996	1983-84, 1989-90, 1992-97	1996-97
Sweden	1975-76, 1986-87, 1993-98	1986-87, 1996-98	1984, 1993-98	1984, 1996-98
Switzerland	1998-99	--	NA	NA
United Kingdom	1976-77, 1979-82, 1995-00	1977, 1997-99	1979-82, 1994-99	1997-99
United States	1968-69		1978, 1980-81, 1985-86, 1988, 1990-98	1995-98
Total no. of years	87	28	201	34

This table shows the identification results if we use the rule of von Hagen et al. (2001; 2002) to identify fiscal adjustments or the updates of the 'action-based' adjustments of Devries et al. (2011) as provided by Gupta et al. (2017). 'Action-based' adjustments after 2010 are not classified and not used in the estimations. Successful adjustments are defined in the same way as in column (5) of Table 1.

Next, we follow the approach of Alesina and his co-authors and compare the composition of successful with those of unsuccessful fiscal adjustments using simple comparison of the average change in expenditures and revenues. Table 3 shows the results. They are in line with the 'conventional view'. Regardless of whether our identification method or an 'ad hoc' filter is used, the improvement in the budget balance is a bit larger during successful adjustments compared to unsuccessful adjustments, although often not statistically significant different from each other. Most importantly, successful adjustments are characterized by a statistically significant larger cut in expenditures compared to unsuccessful adjustments. There is no statistical significant difference between successful and unsuccessful adjustments regarding increased revenues. However, such 'simple' comparisons suffer from the drawback that it ignores factors that simultaneously are correlated with the probability that a successful fiscal adjustment occurs and the choice of expenditure cuts or tax increases during the adjustment. Therefore, we estimate panel probit models in the next section.

Table 3. Average expenditures and revenues under successful and unsuccessful fiscal adjustments

	Obs.	Change in fiscal balance (Standard deviation)	Change in expenditures (Standard deviation)	Change in revenues (Standard deviation)
Filter:		**Baseline specification: BP filter for both steps**		
Successful	58	1.229 (1.103)	-0.733 (1.109)	0.493 (0.890)
Unsuccessful	50	0.946 (2.003)	-0.014 (1.165)	0.432 (1.042)
T-test for equal mean P-value		0.376	0.001	0.748
Filter:		**Alternative specification: BP filter for first step, Alesina-Ardagna filter for classification**		
Successful	50	1.254 (1.806)	-0.674 (1.274)	0.534 (1.024)
Unsuccessful	58	0.964 (1.364)	-.140 (1.064)	.405 (0.905)
T-test for equal mean P-value		0.355	0.021	0.492
Filter:		**Rapid fiscal adjustment (von Hagen et al., 2001; 2002), Alesina-Ardagna filter for classification**		
Successful	28	2.117 (1.082)	-1.231 (1.109)	0.776 (0 .856)
Unsuccessful	59	1.684 (1.550)	-0.229 (1.439)	0.838 (1.248)
T-test for equal mean P-value		0.200	0.000	0.802
Filter:		**'Action-based' adjustments (Gupta et al., 2017), Alesina-Ardagna filter for classification**		
Successful	35	1.430 (1.239)	-0.728 (0.857)	0.598 (0 .745)
Unsuccessful	128	0.528 (1.616)	0.033 (1.22)	0.364 (0.909)
T-test for equal mean P-value		0.001	0.000	0.123

This table shows the composition of successful and unsuccessful fiscal adjustments as identified in Tables 1 and 2. The upper part of the table shows the results if successful fiscal adjustments are identified using the Bai-Perron method, while the second part shows the outcome using the method only for identification of the fiscal adjustment, while successfulness relies on an ad hoc criterion suggested by Alesina and Ardagna (2010). The third and fourth parts show the results for the fiscal adjustments identified in Table 2. Expenditures is the average of the change in the GDP share of total expenditures minus interest payments during the adjustment. Revenues is the average of the change in the GDP share of total revenues minus interest payments received during the adjustment. Standard deviations are in parentheses. For the t-tests for equal means a non-paired two-sided hypothesis test was applied.

3. Estimation results

3.1 Model

As the success of a fiscal adjustment is often defined in terms of its impact on government debt, we start by defining the factors that make up the debt-to-GDP ratio in year t, $(D/Y)_t$:

$$(D/Y)_t \equiv \left(\frac{D}{Y}\right)_{t-1} + \left(\frac{Bal}{Y}\right)_t + (iD_{t-1}/Y)_t \quad (2)$$

where D is the debt, Y is GDP, Bal (=T-G) is the primary balance, i.e. taxes (T) minus expenditures excl. interest payments (G), and iD are the interest payments on D. So, the debt-to-GDP ratio in year t equals the amount of outstanding debt from the previous period, plus the deficit in the current period, plus interest payments on outstanding debt. If we move the first term on the right-hand side of eq. (2) to the left side, add $\left(\frac{Bal}{Y}\right)_{t-1}$ on both sides and simplify we obtain eq. (3), where Bal has been substituted with (T-G) in the right most expression:

$$\Delta\left(\frac{D}{Y}\right) = \Delta\left(\frac{Bal}{Y}\right) + \left(\frac{Bal}{Y}\right)_{t-1} + (iD_{t-1}/Y)_t = \Delta((T-G)/Y) + \left(\frac{Bal}{Y}\right)_{t-1} + (iD_{t-1}/Y)_t \quad (3)$$

Alesina and Ardagna (2010) concentrate on the first component on the right hand side of this equation, thereby ignoring the initial balance and the interest payments on outstanding debt, which is driven by the interest rate and the amount of debt outstanding. In our empirical specification we therefore also include the lagged cyclically adjusted budget balance, the debt-to-GDP ratio, and the short-term interest rate as well real GDP growth (cf. Baldaci et al., 2004; 2012). Appendix A3 provides sources and summary statistics of all variables and a correlation matrix.

Our estimation strategy follows a latent variable framework in which we estimate the likelihood of observing a successful adjustment, conditional on the presence of a fiscal adjustment. We consider a panel discrete choice model in which the dependent variable is a dummy equal to 1 if there is a successful fiscal adjustment in country *i* at time *t* ($y_{i,t}$) and 0 when there is an unsuccessful fiscal adjustment. To examine the influence of different variables on the likelihood of successful fiscal adjustments, we assume:

$$\begin{aligned} y_{it} &= 1 \quad if \quad y_{it}^{*} > 0 \\ y_{it} &= 0 \quad if \quad y_{it}^{*} \le 0 \end{aligned} \quad (4)$$

where: $y_{it}^{*} = x'_{it}\beta + \alpha_i + \nu_{it}$. This function can be interpreted as the probability that the government will implement a successful fiscal adjustment, which is dependent on observed variables (*x*), unobserved individual (country)

characteristics (α) and a random error term (ν). The probability that we observe a successful fiscal adjustment is:

$$P(y_{it} = 1) = P(y_{it}^{*} > 0) = P(\nu_{it} > -x'_{it}\,\beta - \alpha_i) = F(x'_{it}\,\beta + \alpha_i) \quad (5)$$

In this framework, the unobserved country characteristics may be treated as fixed or random parameters.

3.2 Results

Table 4 shows the regression results using our preferred data on (successful) fiscal adjustments as shown in columns (2) and (4) in Table 1. The test for fixed-effects (Wald-test of Mundlak, 1978)[10] is never significant as shown in the last row of the table, so we use random effects. The set-up of the table is as follows. We start by only including the changes in revenues and expenditures, after which the size of the adjustment is added (column 2). In column (3) we add the lagged cyclically adjusted budget balance. The next columns add variables reflecting the need for a fiscal adjustment and the economic circumstances. Column (7) includes all these variables and column (8) only the significant ones. Our results suggest that the initial budget balance and GDP growth increase the likelihood of a successful fiscal adjustment, but the coefficient of the size of the adjustment is not significant. This latter result is in contrast to the findings of some previous papers.

To test whether the probability of successful adjustment differs in terms of whether it is expenditure-based or revenue-based we calculate the marginal effects at the means of the random-effects specification (see Table A4.2). As the test is never significant in the models shown in this table, we cannot reject the hypothesis that the effect of the change in expenditures is equal to the effect of the change in revenues. This finding contradicts the 'conventional view'.

Table 5 shows the outcomes if we take the same fiscal adjustments as used in Table 4 (identified using the BP approach; see column (2) of Table 1), but employ the criterion of Alesina and Ardagna (2010) to determine whether they were successful (see column 5 in Table 1). The test for fixed-effects again is not significant so that we use random effects. The results reported in Table 5 are very similar to those shown in Table 4. Most importantly, evaluating the marginal effects at the means we again cannot reject the hypothesis that the effect of the change in expenditures is equal to the effect of the change in revenues in successful fiscal adjustments (results not shown but available on request).

[10] Specifically, we create country specific averages over time for each explanatory variable and use these as additional controls in the random-effects model. A Wald-test is then used to test for joint significance of the averages. Joint significance would imply the presence of country fixed-effects (Mundlak, 1978).

Table 6 shows our results when we use (successful) fiscal adjustments identified using ad hoc criteria in both steps (see Table 2 for details). Note that the number of countries differs compared to the other specifications, which reflects differences in identified (successful) fiscal adjustments. As before, the test for fixed-effects suggests that we should use random effects. Now the results differ. As the change in revenues is never significant, we confirm the results of Alesina and co-authors (based on marginal effects at the mean, which are not shown) that successful fiscal adjustments are characterized by cuts in government spending. Similar results are found if we use both criteria of Alesina and Ardagna (2010) to identify fiscal adjustments (i.e. ΔCPAB > 1.5 percentage points) and their successfulness (not shown, but available on request).

Our findings suggest that the first step, i.e. the identification of fiscal adjustments, is crucial. No matter whether we use our preferred criterion to determine whether these fiscal adjustments are successful or the Alesina-Ardagna criterion, as long as the sample of fiscal adjustments considered is identified using the proposed BP-approach, we cannot reject the hypothesis that increases in government revenues and government spending cuts have an equal effect on the probability that the fiscal adjustment is successful. However, if fiscal adjustments are identified using some ad-hoc criterion, the conventional result that successful fiscal adjustments rely more on spending cuts than tax hikes is confirmed. This not only holds for the criterion suggested by von Hagen et al. (2001; 2002) as shown in Table 6, but also if the Alesina-Ardagna criterion is used to identify fiscal adjustments.

Finally, Table 7 shows the estimation results using the fiscal adjustments identified by Gupta et al. (2017) and the criterion of Alesina and Ardagna (2010) to determine whether these adjustments were successful. It turns out that the significance of the coefficients for the change in expenditures and revenues are highly unstable. In fact, in the specifications shown in the last columns of Table 7 both coefficients are not significant. This suggests that the success of fiscal adjustments is not related to its composition.

Table 4. Base line model: probability of successful fiscal adjustments (identified using preferred method to identify (successful) adjustments)

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success	(5) Success	(6) Success	(7) Success	(8) Success
Δ expenditures	-0.654***	-0.778***	-0.977***	-0.658***	-0.168	-0.614***	-0.379	-0.522
	(0.003)	(0.002)	(0.001)	(0.003)	(0.471)	(0.007)	(0.344)	(0.130)
Δ revenues	0.420*	0.608**	0.811**	0.427*	0.353	0.370	0.398	0.597*
	(0.074)	(0.034)	(0.011)	(0.073)	(0.117)	(0.131)	(0.319)	(0.057)
Fiscal impulse		-0.165					0.222	
		(0.249)					(0.333)	
Budget balance t-1			0.451***				0.357***	0.321**
			(0.000)				(0.009)	(0.013)
Debt/GDP t-1				-0.001			-0.008	
				(0.850)			(0.508)	
GDP growth					0.519***		0.394*	0.389**
					(0.000)		(0.056)	(0.038)
Short-term interest						-0.172***	-0.153*	-0.122*
						(0.003)	(0.071)	(0.098)
Constant	-0.457	-0.413	-0.568	-0.366	-1.654***	0.722	0.143	-0.533
	(0.239)	(0.289)	(0.380)	(0.552)	(0.000)	(0.212)	(0.920)	(0.524)
Observations	108	108	108	108	108	108	108	108
Number of identifiers	19	19	19	19	19	19	19	19
Log-likelihood	-59.76	-59.06	-47.04	-59.74	-51.86	-54.26	-42.38	-43.08
Wald-test of Mundlak averages, P-values	0.161	0.154	0.168	0.165	0.239	0.093	0.152	0.204

Notes: This table shows the random-effects probit results of factors determining the successfulness of fiscal adjustment adjustments. Random effects are used in view of the Mundlak test shown in the last row of the table. The successful adjustments are identified by the B&P approach both to determine when an adjustment took place and whether it leads to an improvement of the debt-to-GDP ratio, see columns (2) and (4) of Table 1 for details. Column (1) in Table 4 only includes the changes in revenues and expenditures, after which the size of the adjustment is added (column 2). In column (3) the lagged cyclically adjusted budget balance is added. The next columns add variables reflecting the need for a fiscal adjustment and the economic circumstances. Column (7) includes all these variables and column (8) only the significant ones.

Table 5. Probability of successful fiscal adjustments using Alesina-Ardagna criterion to identify success

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success	(5) Success	(6) Success	(7) Success	(8) Success
Δ expenditures	-0.702***	-0.803***	-1.153***	-0.701***	-0.422*	-0.769***	-0.910*	-1.012**
	(0.002)	(0.002)	(0.000)	(0.002)	(0.077)	(0.005)	(0.051)	(0.017)
Δ revenues	0.746***	0.903***	1.384***	0.724***	0.703***	0.870***	1.193***	1.369***
	(0.004)	(0.004)	(0.000)	(0.005)	(0.005)	(0.004)	(0.008)	(0.001)
Fiscal impulse		-0.136					0.268	
		(0.348)					(0.246)	
Budget balance t-1			0.416***				0.415***	0.356***
			(0.000)				(0.006)	(0.001)
Debt/GDP t-1				0.010			0.004	
				(0.148)			(0.713)	
GDP growth					0.274**		0.127	0.108
					(0.018)		(0.550)	(0.563)
Short-term interest						-0.201***	-0.107	-0.099
						(0.004)	(0.235)	(0.258)
Constant	-1.102***	-1.076***	-1.534***	-1.777***	-1.760***	-0.021	-1.663	-1.201
	(0.002)	(0.003)	(0.001)	(0.004)	(0.000)	(0.970)	(0.191)	(0.146)
Observations	108	108	108	108	108	108	108	108
Number of identifiers	19	19	19	19	19	19	19	19
Log-likelihood	-61.67	-61.22	-46.08	-60.59	-58.80	-55.51	-43.74	-44.69
Wald-test of Mundlak averages, P-values	0.736	0.855	0.373	0.648	0.776	0.580	0.360	0.647

Notes: This table shows the results using the same fiscal adjustments identified using the BP-approach as in Table 4, but applying the criterion proposed by Alesina and Ardagna (2010) to determine whether the adjustment was successful. The fiscal adjustments are shown in columns (2) and (5) of Table 1. See notes to Table 4 for further explanation.

Table 6. Results using the von Hagen et al. criterion to identify fiscal adjustments and the Alesina-Ardagna criterion to identify success

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success	(5) Success	(6) Success	(7) Success	(8) Success
Δ expenditures	-0.381***	-0.389***	-0.431***	-0.391***	-0.302**	-0.306**	-0.244	-0.433***
	(0.002)	(0.001)	(0.001)	(0.003)	(0.029)	(0.020)	(0.151)	(0.001)
Δ revenues	0.029	-0.012	0.024	0.063	0.024	0.126	-0.003	-0.100
	(0.840)	(0.927)	(0.866)	(0.691)	(0.867)	(0.451)	(0.985)	(0.495)
Fiscal impulse		0.229*					0.576***	0.506***
		(0.050)					(0.001)	(0.002)
Budget balance t-1			0.165***				0.183***	0.209***
			(0.002)				(0.006)	(0.001)
Debt/GDP t-1				0.016*			0.010	0.008
				(0.080)			(0.204)	(0.259)
GDP growth					0.104		0.142	
					(0.282)		(0.195)	
Short-term interest						-0.057	-0.049	
						(0.153)	(0.289)	
Constant	-0.767***	-1.145***	-0.588***	-1.888***	-0.993***	-0.384	-2.210***	-1.913***
	(0.001)	(0.000)	(0.010)	(0.007)	(0.002)	(0.302)	(0.009)	(0.003)
Observations	87	87	87	86	87	83	82	86
Number of identifiers	17	17	17	17	17	17	17	17
Log-likelihood	-48.75	-47.08	-43.45	-46.07	-48.17	-46.24	-35.16	-37.98
Wald-test of Mundlak averages, P-values	0.685	0.680	0.537	0.423	0.719	0.488	0.713	0.417

Notes: This table shows the results using fiscal adjustments identified using the von Hagen et al. (2001) criterion and applying the criterion proposed by Alesina and Ardagna (2010) to determine whether the adjustment was successful. The fiscal adjustments are shown in Table 2. See notes to Table 4 for further explanation.

Table 7. Results using 'action-based' fiscal adjustments (Gupta et al., 2017) and the Alesina-Ardagna criterion to determine success

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success	(5) Success	(6) Success	(7) Success	(8) Success
Δ expenditures	-0.528***	-0.493***	-0.773***	-0.404**	-0.345**	-0.505***	0.227	-0.031
	(0.001)	(0.009)	(0.005)	(0.037)	(0.044)	(0.005)	(0.728)	(0.941)
Δ revenues	0.422***	0.369	1.074***	0.442**	0.451***	0.511***	0.077	-0.067
	(0.009)	(0.105)	(0.001)	(0.016)	(0.006)	(0.004)	(0.911)	(0.901)
Fiscal impulse		0.047					1.634**	1.408**
		(0.741)					(0.026)	(0.010)
Budget balance t-1			0.923***				1.327***	1.268***
			(0.000)				(0.001)	(0.000)
Debt/GDP t-1				0.043*			0.009	
				(0.056)			(0.728)	
GDP growth					0.252**		0.124	
					(0.015)		(0.748)	
Short-term interest						-0.110**	-0.240	
						(0.019)	(0.117)	
Constant	-1.246***	-1.254***	-1.572**	-4.869**	-1.827***	-0.638*	-2.090	-2.389**
	(0.000)	(0.000)	(0.016)	(0.017)	(0.000)	(0.083)	(0.395)	(0.017)
Observations	163	163	163	163	163	163	163	163
Number of identifiers	16	16	16	16	16	16	16	16
Log-likelihood	-72.61	-72.56	-42.22	-68.97	-69.83	-69.22	-33.46	-36.17
Wald-test of Mundlak averages, P-values	0.061	0.125	0.007	0.001	0.032	0.092	0.615	0.020

Notes: This table shows the results using fiscal adjustments identified by Gupta et al. (2017) and applying the criterion proposed by Alesina and Ardagna (2010) to determine whether the adjustment was successful. The fiscal adjustments are shown in Table 2. See notes to Table 4 for further explanation.

4. The political economy of fiscal adjustments

This section zooms in on the political-economy drivers of fiscal adjustments. Section 4.1 first summarizes the findings of previous studies on the influence of elections, government strength, partisan factors, fragmentation and political instability on the occurrence of (successful) fiscal adjustments after which section 4.2 outlines the political economy variables used in our analysis. Section 4.3 reports the results if we include these variables in the models discussed in the previous section. Section 4.4 zooms in on the view that the probability that the adjustment will be successful increases if left-wing (right-wing) governments introduce fiscal adjustments that focus on spending cuts (tax increases).

4.1 Previous studies

According to the political budget cycle (PBC) literature, governments will pursue expansionary fiscal policies before elections in order to get re-elected (see de Haan and Klomp, 2013 for a survey). This would suggest that governments are unlikely to introduce fiscal adjustments when *elections* are near, as that will be politically very costly. Likewise, fiscal adjustments are most likely after a *new government* has taken office.[11]

[11] According to Haggard and Webb (1994: 8), new governments "typically enjoy a period in which the costs of adjustment can be traded against political gains". In line with this view, Alesina

However, several qualifications can be made to the PBC approach. First, in contrast to the assumption in the PBC literature, voters may be 'fiscal conservatives' and therefore not reward expansionary policies at the polls. Pelzman (1992) was among the first to argue against the view of opportunistic manipulation of fiscal policy for electoral purposes, showing that US voters punish politicians who let government spending increase, no matter whether this increase is financed by taxes or borrowing. Brender (2003) and Brender and Drazen (2008) report similar findings for elections in Israel and a sample of 74 countries, respectively. Second, there is evidence suggesting that voters do not punish governments that introduced successful fiscal adjustments. Alesina et al. (1998) report that large consolidations, and those mostly based on public wages and transfers, are not conducive to electoral defeat or a change in government more frequently than average. Likewise, Alesina and Ardagna (1998) report that governments that implement large fiscal adjustments typically remain in office, while in their case studies of fiscal adjustments in several OECD countries Blochliger et al. (2012) find that more than half of the governments that implemented fiscal adjustments were re-elected. Alesina et al. (2013) present similar findings and refute the potential objection of reverse causality (the possibility that only strong governments can implement fiscal adjustments and are not voted out of office despite having reduced the deficits) by taking "government strength" into account in their empirical models.

This analysis implies that elections may increase the probability of the occurrence of a successful adjustment if voters are 'fiscal conservatives'. However, all studies that we are aware of which examine the impact of elections on the occurrence of fiscal adjustments do not distinguish between successful vs. non-successful fiscal adjustments, except for Baldacci et al. (2004; 2012).[12] In their analysis of the determinants of successful fiscal adjustment in 25 emerging market economies from 1980 to 2001, Baldaci et al. (2004) find that successful fiscal consolidations are less likely to occur during election years. Similar results are reported by Baldaci et al. (2012) for a much larger sample.

There is some evidence suggesting that *government strength* matters: Baldacci et al. (2004; 2012) conclude that fiscal adjustment episodes launched in countries where governments enjoy a parliamentary majority are found to be more successful, while Eichengreen and Panizza (2016) find that under a majority government that controls all houses of parliament or congress large surpluses are more likely. Likewise, Alesina et al. (2006) report that countries in which the majority of the government in parliament is large are more likely to introduce fiscal adjustments.

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et al. (2006) report that deficits are more likely to be cut at the beginning of a government's term in office.

[12] Three studies analyse the influence of elections on fiscal adjustments (independent of their success). Based on their analysis of the duration of fiscal consolidations in fifteen Member States that formed the European Union between 1960 and 2004, Illera and Mulas-Granados (2008) conclude that during election years there is a high probability that fiscal consolidations end. Mierau et al. (2007) find that in their sample of OECD countries upcoming elections negatively influence the occurrence of rapid (but not gradual) fiscal adjustments, but in his sample of advanced and developing countries Lavigne (2011) concludes that elections do not influence the occurrence of fiscal policy adjustments.

According to *partisan theory*, political parties will pursue policies that are in the interest of their constituencies. This would suggest that left-wing (right-wing) governments would not rely on expenditure cuts (tax increases) in adjusting fiscal policy. However, in order to be credible fiscal adjustments have to concentrate on the expenditures that are "politically most sensitive" (von Hagen et al., 2002, p. 513). Cukierman and Tomassi (1998) offer a formal model where the credibility advantage on a given issue translates into a policy-position contrary to traditional party positions. Such 'Nixon-goes-to-China' policy dynamics would suggest that left-wing governments may introduce fiscal adjustments that focus on spending cuts instead of tax increases, while right-wing governments may rely on tax hikes (Alesina et al., 1998).

There is mixed evidence that the ideological position of the government affects successful fiscal policy adjustments. Although Eichengreen and Panizza (2016) report that large persistent primary budget surpluses are more likely under left-wing governments, Alesina et al. (1998) find that if there is a fiscal adjustment the probability of success is virtually the same for left- and right-wing governments. However, in his analysis of successful fiscal adjustments in 19 OECD countries between 1960 and 1995 Tavares (2004) reports evidence that during successful adjustments right-wing governments tend to reduce the deficit by raising tax revenues while left-wing governments mostly rely on spending cuts in line with the Cukierman-Tomassi argument.

Apart from elections and government ideology, several other political-economy variables have been suggested that may affect decision-making about fiscal adjustments, which are based on "the notion that a more fragmented decision-making process — whether voting or bargaining or any other aggregation mechanism — leads to an inability to agree on ''efficient' policies and, specifically, to an inability to agree on significant consolidations" (Perotti, 1998, p. 368). Factors such as divided government or a multi-party coalition, will make decisive policy actions less likely due to holdup-power of certain groups, common-pool problems, and a 'war of attrition' within the executive (Weingast et al., 1981; Tsebelis, 1995; Roland, 2002; Gehlbach and Malesky, 2010).

One type of fragmentation is government's *size fragmentation*. According to Perotti and Kontopoulos (2002), size fragmentation affects fiscal policy outcomes due to a common-pool problem in which competing political groups (political parties or spending ministers) vie for government expenditures that are financed using broad-based tax revenues (Mierau et al., 2007). The larger the number of players involved in the decisions about a fiscal policy adjustment—i.e., the more 'fragmented' the decision-making process is—the less these players will be able to agree on a fiscal adjustment and to implement it successfully. Therefore, size fragmentation may negatively influence the likelihood of a successful fiscal adjustment. There is evidence suggesting that size fragmentation matters. Illera and Mulas-Granados (2008) report that the larger the number of spending ministers in the cabinet, the larger the number of accumulated failed adjustments. Alesina and Perotti (1995), Alesina et al. (1998) and Tavares (2004) report that coalition governments reduce the probability of a successful fiscal adjustment; likewise, for the case of Swiss cantons, Schaltegger

and Feld (2009) find some (weak) evidence that coalition cabinets have more difficulties in successfully implementing adjustment policies.

Another type of fragmentation that may affect the probability that successful fiscal adjustments are introduced is *political fragmentation* (Volkerink and de Haan, 2001). Here again, the theoretical impact is ambiguous. On the one hand, governments consisting of political parties with very different ideologies may find it hard to agree on a fiscal adjustment. On the other hand, once such a government agrees on a fiscal consolidation, it will be more likely that such a consolidation will be implemented. As pointed out by Leibrecht and Pitlik (2015, p. 250), if a politically fragmented government reached an agreement this may contribute to "political resoluteness, i.e., 'the ability …. to commit to maintaining a given policy' (Cox and McCubbins, 2001, pp. 26-27)."

Finally, some studies suggest that *political instability* may affect decision-making on fiscal adjustments.[13] A high government turnover may make it less likely that fiscal policy will be successfully adjusted, as the discounted future benefits of such policies will exceed the potentially high short-run costs in view of the high discount rate of politicians. Tabellini and Alesina (1990) and Persson and Svensson (1989) suggest another reason why political instability, in combination with strong differences in preferences across different governments, may matter. If there is there is high uncertainty about the identity and therefore the preferences of the future government in charge of fiscal policy, the current policymaker has an incentive to run a deficit in order to constrain the actions of the future policymaker. There is evidence suggesting that frequent changes in governments tend to be associated with larger fiscal deficits, as documented, for instance, by de Haan and Sturm (1994). Based on a cross-country analysis for 22 OECD countries, Kumar et al. (2007) conclude that higher government stability has significant positive explanatory power for subsequent fiscal consolidation success.

4.2 Variables

To capture the influence of *elections* we include a dummy that is one in case of an upcoming election (i.e., an election, be it regular or early, in the following year). As the PBC literature suggests that the likelihood of a successful fiscal adjustment increases when there is a new government, we include a dummy for a *new government*. This variable is one when there is a post election change in the government, i.e., a new coalition or ruling party, and zero otherwise.

We also consider a variable reflecting the *strength of government* in parliament, defined as the number of government seats above what is needed for a majority, weighted by the total number of seats of the government (see Volkerink and de Haan, 2001). As argued in section 4.1, governments having a strong political position may be in a better position to implement a successful fiscal adjustment.

[13] Analyzing the consequences of fiscal adjustments, Alesina et al. (1998) do not find evidence that deficit reduction policies increase the frequency of political change or that fiscal profligacy is related to longer survival in office.

We follow Mierau et al. (2007) and include a variable for the *ideological position of the government* which is defined as

$$\text{PC}= \sum_j \frac{NSEAT_j \times COLOUR_j}{NSEAT}, \tag{6}$$

where $NSEAT_j$ are the number of seats in parliament taken by party j, while $COLOUR_j$ indicates the ideological complexion of party j (ranging from 1 (left-wing) to 3 (right-wing)). Our data on the ideology and composition of governments come from the World Bank's Database on Political Institutions (DPI; Beck et al., 2001). However, we hand checked the data for the composition of the government using several internet sources, as we discovered that DPI contains several mistakes. A very detailed database, also motivating where and why we deviate from DPI, is available on request.

We include two indicators of *size fragmentation of government*, i.e. government fragmentation captured by the effective number of government parties (see Volkerink and de Haan 2001) and the number of spending ministers in government.

We also consider two indicators of *political fragmentation of government*. A government that consists of political parties that are ideologically not very close to each other may find it difficult to agree on a fiscal adjustment. But once these parties agree on a fiscal adjustment, their commitment to these policies is high as none of the parties wants to be blamed for a failure of the adjustment (Leibrecht and Pitlik, 2015). Following Mierau et al. (2007), the first measure of political fragmentation of the government is defined as:

$$\sum_j \left[\frac{NSEAT_j}{NSEAT} \times (COLOUR_j - PC)^2 \right] \tag{7}$$

where *NSEAT* refers to the total number of seats in parliament by the parties in government and *PC* refers to the ideological position of the entire government, i.e. the weighted position of all parties in government, using the seats in parliament as weights (see above). As an alternative, we also employ the *maximum ideological distance* between the parties forming a government (see also Mierau et al., 2007).

Finally, we include two measures for *political instability*. The first variable counts the number of major cabinet changes. In line with our data source (the Cross National Data Archive), a cabinet change is defined as any situation in which a new president/prime minister is appointed or when at least 50% of the ministers are replaced. In addition, we employ a variable that counts the number of major government crises. The Cross National Data Archive defines a major crisis as a rapidly developing situation that threatens to bring the downfall of the present regime.

4.3 Results

Table 8 shows the results if the political-economy variables outlined in the previous section are subsequently added to the model shown in column (8) of Table 4 (copied in column (1) of Table 8). It is quite remarkable that none of the political-economy variables is significant, including the variables that some previous studies found to be significant. To examine whether the results of previous studies have been driven by the identification of (successful) fiscal adjustments, we have redone the estimates in Table 8 using the data shown in columns (2) and (3) of Table 2, i.e. fiscal adjustments are identified using the criteria of von Hagen et al. (2001; 2002), while their success is determined following Alesina and Ardagna (2010). Table 9 shows the results. It turns out that again none of the political-economy variables is significant. This also holds if the Alesina-Ardagna criteria are used to identify fiscal adjustments and their success (results not shown but available on request). Finally, we have used the fiscal adjustments identified by the 'action-based' approach of Devries et al. (2011) in combination with the Alesina-Ardagna criterion for success (see the final columns of Table 2). As shown in Table 10, in this case the only political-economy variable with a weakly significant coefficient is government ideology.

Table 8. Adding political-economy variables to the baseline model of Table 4.

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success	(5) Success	(6) Success	(7) Success	(8) Success	(9) Success	(10) Success	(11) Success
Δ expenditures	-0.522	-0.529	-0.452	-0.445	-0.516	-0.520	-0.542	-0.650*	-0.642	-0.517	-0.528
	(0.130)	(0.127)	(0.190)	(0.199)	(0.145)	(0.129)	(0.109)	(0.093)	(0.102)	(0.138)	(0.130)
Δ revenues	0.597*	0.591*	0.613*	0.577*	0.620**	0.613*	0.634**	0.657*	0.617*	0.628**	0.602*
	(0.057)	(0.060)	(0.054)	(0.059)	(0.048)	(0.050)	(0.040)	(0.067)	(0.079)	(0.050)	(0.056)
Budget balance t-1	0.321**	0.324**	0.331**	0.302**	0.306**	0.317**	0.296**	0.335**	0.342**	0.329**	0.332**
	(0.013)	(0.013)	(0.014)	(0.019)	(0.017)	(0.014)	(0.014)	(0.022)	(0.022)	(0.014)	(0.016)
GDP growth	0.389**	0.388**	0.439**	0.420**	0.409**	0.415**	0.384**	0.488**	0.468**	0.395**	0.397**
	(0.038)	(0.038)	(0.031)	(0.027)	(0.031)	(0.029)	(0.034)	(0.029)	(0.039)	(0.043)	(0.038)
Short-term interest	-0.122*	-0.123*	-0.119	-0.127*	-0.111	-0.110	-0.111	-0.156*	-0.156*	-0.113	-0.126*
	(0.098)	(0.098)	(0.115)	(0.083)	(0.128)	(0.147)	(0.112)	(0.089)	(0.097)	(0.120)	(0.095)
Upcoming election		-0.095									
		(0.839)									
New government			-0.612								
			(0.201)								
Strength of government				-2.471							
				(0.319)							
Ideological position					-0.275						
					(0.357)						
Effective # of gov. parties						-0.066					
						(0.483)					
# of spending ministers							-0.365				
							(0.407)				
Political fragmentation								2.012			
								(0.125)			
Max. ideological distance									0.761		
									(0.266)		
Major cabinet changes										0.314	
										(0.515)	
Government crises											0.207
											(0.683)

Constant	-0.533	-0.502	-0.493	-0.340	-0.132	0.306	0.005	-1.175	-1.138	-0.698	-0.556
	(0.524)	(0.556)	(0.563)	(0.684)	(0.888)	(0.838)	(0.996)	(0.262)	(0.311)	(0.441)	(0.512)
Observations	108	108	108	108	108	108	108	108	108	105	108
Number of identifiers	19	19	19	19	19	19	19	19	19	19	19
Log-likelihood	-43.08	-43.06	-42.23	-42.61	-42.67	-42.83	-42.83	-41.43	-42.19	-41.49	-43.01

This table shows random effects probit estimates of the tested down model specification in Table 4, including political variables described in section 4.2. The Bai & Perron filter is used to determine whether an adjustment took place and whether it was successful. P-values in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 9. Adding political variables to model with ad hoc identified (successful) fiscal adjustments

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success	(5) Success	(6) Success	(7) Success	(8) Success	(9) Success	(10) Success	(11) Success
Δ expenditures	-0.421***	-0.441***	-0.426***	-0.419***	-0.428***	-0.388***	-0.444***	-0.449***	-0.435***	-0.398***	-0.428***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.001)	(0.006)	(0.002)
Δ revenues	-0.118	-0.082	-0.104	-0.145	-0.102	-0.208	-0.116	-0.134	-0.105	-0.228	-0.122
	(0.410)	(0.573)	(0.473)	(0.331)	(0.479)	(0.226)	(0.425)	(0.358)	(0.466)	(0.189)	(0.402)
Fiscal impulse	0.519***	0.542***	0.516***	0.524***	0.501***	0.622***	0.533***	0.529***	0.517***	0.622***	0.520***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.004)	(0.001)	(0.001)	(0.002)	(0.004)	(0.001)
Budget balance t-1	0.222***	0.231***	0.226***	0.231***	0.224***	0.219***	0.223***	0.227***	0.220***	0.227***	0.223***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Upcoming election		-0.499									
		(0.193)									
New government			0.056								
			(0.885)								
Strength of government				-1.753							
				(0.289)							
Ideological position					-0.172						
					(0.401)						
Effective # of gov. parties						0.053					
						(0.228)					
# of spending ministers							-0.247				
							(0.319)				

Political fragmentation								-0.787			
								(0.210)			
Max. ideological distance									-0.113		
									(0.599)		
Major cabinet changes										0.288	
										(0.346)	
Government crises											0.038
											(0.861)
Constant	-1.345***	-1.291***	-1.372***	-1.271***	-1.029*	-2.315***	-1.032**	-1.275***	-1.323***	-1.514***	-1.361***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.058)	(0.006)	(0.036)	(0.001)	(0.001)	(0.000)	(0.000)
Observations	87	83	82	82	83	84	83	83	83	84	87
Number of identifiers	17	16	16	16	16	16	16	16	16	17	17
Log-likelihood	-38.80	-35.69	-36.31	-35.92	-36.21	-37.35	-36.05	-35.73	-36.43	-37.53	-38.79

This table shows random effects probit estimates of the tested down model specification in Table 4, including political variables described in section 4.2. Fiscal adjustments are identified using the von Hagen et al. (2001) criterion and the Alesina and Ardagna (2010) criterion is used to determine whether the adjustment was successful. P-values in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 10. Adding political variables to model with 'action-based' fiscal adjustments, ad hoc successfulness criteria

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success	(5) Success	(6) Success	(7) Success	(8) Success	(9) Success	(10) Success	(11) Success
Δ expenditures	-0.031	-0.045	-0.040	-0.052	0.163	-0.033	-0.039	-0.041	-0.047	-0.043	0.026
	(0.941)	(0.918)	(0.924)	(0.905)	(0.760)	(0.937)	(0.925)	(0.922)	(0.913)	(0.918)	(0.950)
Δ revenues	-0.067	-0.044	-0.062	-0.040	-0.291	-0.068	-0.047	-0.172	-0.232	-0.053	-0.076
	(0.901)	(0.939)	(0.910)	(0.944)	(0.635)	(0.900)	(0.931)	(0.763)	(0.692)	(0.923)	(0.888)
Fiscal impulse	1.408**	1.513**	1.405***	1.386**	1.848**	1.410**	1.418***	1.438**	1.474**	1.393**	1.381**
	(0.010)	(0.011)	(0.010)	(0.012)	(0.023)	(0.010)	(0.009)	(0.010)	(0.010)	(0.013)	(0.010)
Budget balance t-1	1.268***	1.363***	1.277***	1.252***	1.481***	1.270***	1.259***	1.272***	1.289***	1.265***	1.208***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Upcoming election		-0.599									
		(0.289)									
New government			0.181								
			(0.737)								
Strength of government				-0.593							

				(0.870)							
Ideological position					-0.873*						
					(0.058)						
Effective # of gov. parties						0.015					
						(0.925)					
# of spending ministers							-0.286				
							(0.710)				
Political fragmentation								0.825			
								(0.390)			
Max. ideological distance									0.553		
									(0.252)		
Major cabinet changes										0.027	
										(0.969)	
Government crises											-0.926
											(0.338)
Constant	-2.389**	-2.411**	-2.443**	-2.339**	-1.215	-2.625	-1.969	-2.605**	-2.786**	-2.384**	-2.076**
	(0.017)	(0.026)	(0.016)	(0.022)	(0.331)	(0.341)	(0.181)	(0.015)	(0.013)	(0.026)	(0.024)
Observations	163	163	163	163	163	162	163	163	163	152	163
Number of identifiers	16	16	16	16	16	16	16	16	16	16	16
Log-likelihood	-36.17	-35.55	-36.11	-36.15	-33.61	-36.16	-36.10	-35.78	-35.45	-36.14	-35.65

This table shows random effects probit estimates of the tested down model specification in Table 4, including political variables as described in section 4.2. Action-based fiscal adjustments from Devries et al. (2011) are used. The Alesina and Ardagna (2010) criterion is used to determine whether adjustment was successful. P-values in parentheses: *** p<0.01, ** p<0.05, * p<0.1

4.4 Credibility effects

As discussed in section 4.1, some studies suggest that the probability of a successful fiscal adjustment increases if left-wing governments rely on spending cuts and right-wing governments rely on tax increases when adjusting fiscal policy (cf. Tavares, 2004). Table 11 shows the results when we interact the spending cuts and tax hikes with our ideology variable. We find some evidence in favour of the 'Nixon-goes-to-China' hypothesis. In columns (1) and (2) in Table 11 the interaction between expenditure changes and ideology is positive. It should be noticed that the significance and the marginal effect of the interaction terms in Table 11 cannot be directly assessed (see Ai and Norton, 2003). We therefore follow the approach suggested by these authors and plot the marginal effect and significance of the interaction term in Figures 2 and 3. Figure 2 shows that when expenditure changes is interacted with ideology the marginal effect of this interaction switches sign at predicted probabilities of successful fiscal adjustments close to 1. Also, it shows that this interaction is significant at the 5% level for predicted probabilities between 0.25 and 0.75. Figure 3 shows that when revenue changes is interacted with ideology the marginal effect of this interaction switches sign at predicted probabilities of successful fiscal adjustments close to 0. It also shows that for hardly any observations this interaction is statistically significant at the 5% level.

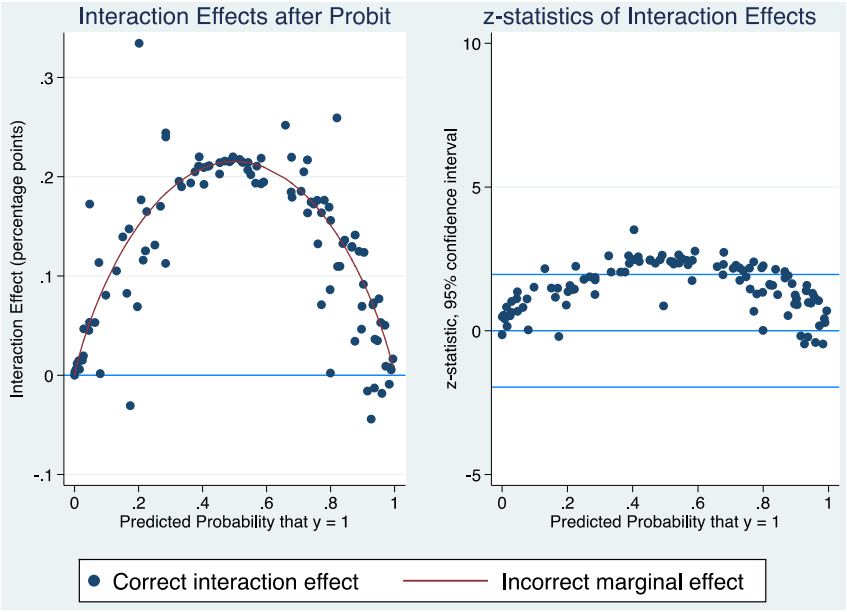
The interpretation is that adjustments by positive changes in expenditure by governments further to the right increase the probability of becoming successful. The more meaningful interpretation is that negative changes in expenditures are more likely to become successful if implemented by governments further to the left. Likewise, in columns (3) and (4) of Table 11 the interaction term between revenue changes and ideology is positive. The interpretation is that an adjustment by a positive revenue change by a government further to the right is more likely to become successful.

Table 11. Baseline successful adjustment, interaction between fiscal instrument and ideology of government

VARIABLES	(1) Success	(2) Success	(3) Success	(4) Success
Δ expenditures	-1.013*	-1.465**		-0.657*
	(0.078)	(0.025)		(0.086)
Δ revenues		0.675**	-0.238	-0.075
		(0.039)	(0.586)	(0.881)
Δ expenditures*Ideological position	0.718*	0.761**		
	(0.054)	(0.042)		
Δ revenues*Ideological position			0.600*	0.760*
			(0.097)	(0.059)
Ideological position	0.216	0.190	-0.586*	-0.687*
	(0.542)	(0.594)	(0.087)	(0.085)
Budget balance t-1	0.217**	0.280**	0.245**	0.342**
	(0.034)	(0.011)	(0.024)	(0.014)
GDP growth	0.539***	0.529***	0.646***	0.486**
	(0.005)	(0.007)	(0.000)	(0.020)
Short-term interest	-0.109	-0.093	-0.121*	-0.116
	(0.131)	(0.203)	(0.094)	(0.123)
Constant	-1.051	-1.639*	-0.389	-0.293
	(0.261)	(0.096)	(0.603)	(0.746)
Observations	108	108	108	108
Number of identifiers	19	19	19	19
Log-likelihood	-42.86	-40.48	-42.30	-40.48

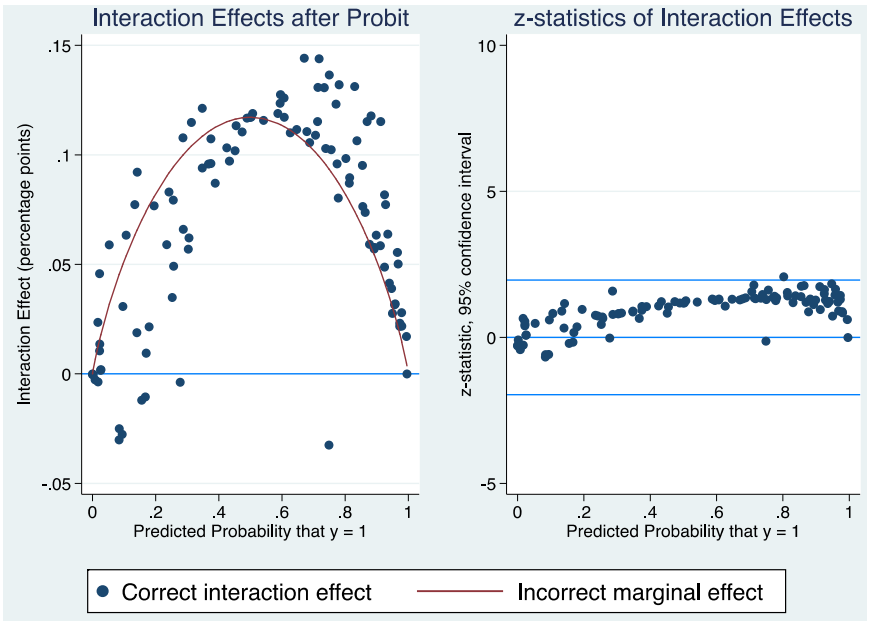
This table shows random effects probit estimates of the tested down model specification in table 4, including the interaction between ideological position of government and the fiscal instrument, excluding either the change in revenues or expenditures in columns 1 and 3. Columns 2 and 4 include the additional fiscal instrument. The Bai-Perron filter is used to determine whether and adjustment took place and whether it was successful. P-values in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Figure 2. Marginal effect and significance of interaction effects, change in expenditures and ideology (based on pooled probit specification of column 1 in Table 11)



Notes: The left panel in the figure plots the interaction effect on the y-axis for each observation in the sample against the predicted probability of observing a successful fiscal adjustment on the x-axis. The concave red line shows the incorrect marginal effect of the interaction effect, calculated as the partial derivative of the likelihood of observing a successful adjustment wrt. the interaction term, without accounting for that the interaction effect depends on all covariates in the model, see Ai and Norton (2003). The right panel in the figure plots the z-statistics of the interaction term on the y-axis, against the predicted probability of observing a successful fiscal adjustment on the x-axis. Dots/observations outside the outer blue lines are significant at the 5% level.

Figure 3. Marginal effect and significance of interaction effects, change in revenues and ideology (based on pooled probit specification of column 3 in Table 11)



Notes: see notes to Figure 2.

5. Conclusions

In this paper we re-examined whether successful fiscal adjustments are characterized by spending cuts. In addition, we considered several potential political-economy determinants of successful fiscal adjustments. Instead of relying on ad hoc methods, we applied the Bai and Perron (1998, 2003) structural break filter to detect statistically significant changes in fiscal policy in OECD countries and to determine whether the identified fiscal adjustments were successful. These data were used to in random effects models to examine whether successful fiscal adjustments are characterized by spending cuts and whether they are affected by a host of political-economy variables.

Our regressions suggest that the conclusion of most previous studies that successful fiscal adjustments rely on expenditure cuts is not robust. In our models, in which we control for factors such as indebtedness and the initial government budget balance, we cannot reject the hypothesis that the change in expenditure is equal to the change in revenues. This is an important conclusion. It suggests that the results of most previous studies are driven by the use of ad hoc criteria to identify (successful) fiscal adjustments. We also estimate models in which we use (successful) fiscal adjustments identified using ad hoc criteria. These results suggest that especially the first step, i.e. identifying fiscal adjustments, drives our results. One other interesting result is that also if fiscal adjustments are identified using the 'action-based' approach, the conventional view is not supported. However, as discussed in the paper, we feel that the 'action-based' approach has several limitations and identifies too many or to few fiscal adjustments just as the approach based on ad hoc criteria.

Another important finding is that all political-economy variables considered turn out to be insignificant. We only find some evidence that the probability of a successful fiscal adjustment increases if left-wing governments rely on spending cuts and right-wing governments rely on tax increases. This result is in line with the findings of Tavares (2004).

Our study has some limitations. The most important one is that, following most previous studies, our analysis is only based on advanced economies. We leave it for future research to extend the analysis to emerging and developing countries.

Appendices

Appendix 1. Definitions of fiscal adjustment and criteria for their success

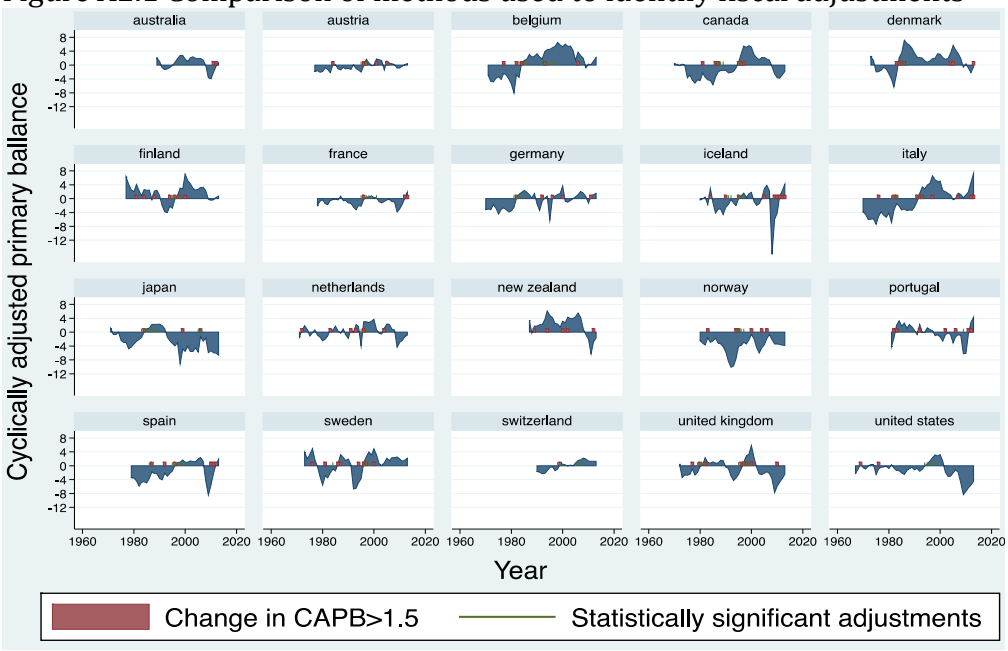
Paper	Fiscal adjustment	Successful fiscal adjustment	Multivariate analysis?	Sample
Alesina & Perotti (1995)	Blanchard Fiscal Impulse (BFI) is less than 1.5% of GDP.	Three years after the adjustment the gross debt to GDP ratio is at least 5 percentage points lower.	No.	20 OECD countries, 1960-92
McDermott & Wescott (1996)	CAPB improves by at least 1.5 percentage points over two years and does not decrease in either of these years.	Reduction of at least 3 (or 5) percentage points of debt to GDP ratio in second (or third) year after the adjustment.	Logit model, conditional on adjustment taking place.	20 OECD countries, 1970-95
Alesina & Perotti (1996)	BFI falls by more than 1.5 per cent of GDP or a period of two consecutive years in which BFI falls by at least 1.25 per cent per year in both years.	If either (i) in the three years after the adjustment the ratio of the CAPB (as % of GDP) is on average at least 2 percentage points below the last year of adjustment (ii) three years after the adjustment the debt to GDP ratio is 5 percentage points below the level of the last year of the adjustment.	No.	20 OECD countries, 1960-94
Alesina & Ardagna (1998)	CAPB (as % of GDP) improves by at least 2 percentage points, or a period of two consecutive years in which the CAPB improves by at least 1.5 percentage points per year, in both years.	If either (i) in the three years after the adjustment, the ratio of the CAPB (as % of GDP) is on average at least 2 percentage points below its value in the year of adjustment, or (ii) three years after the adjustment, government debt (as % of GDP) is 5 percentage points below its level in the adjustment year.	Probit estimates for successful fiscal adjustment, conditional on adjustment taking place, but do not include spending and revenues simultaneously.	20 OECD countries, 1960-96
Alesina et al. (1998)	The ratio of the primary deficit to GDP is reduced by at least 1.5 percentage points.	If (i) either in the three years following the adjustment year, the deficit-to-GDP ratio is on average at least 2 percentage points below its level in the adjustment year; or (ii) three years after the adjustment, the debt-to-GDP ratio is at least 5 percentage points below its level in the adjustment year.	Only probit estimates for consequences of fiscal adjustments on political economy variables. All years included, or all years where the change in the deficit is positive.	19 OECD countries, 1960-95
Heylen & Everaert (2000)	Periods of at least two consecutive years when the CAPB (as % of GDP) improved by at least 2 percentage points. Furthermore, in the first year of the consolidation period the CAPB improves by at least 0.25 percentage points, whereas in all other years its change is positive.	These authors do not define successful adjustments but estimate model for the change in the debt/GDP ratio as dependent variable.	OLS estimates using periods when adjustment took place.	19 OECD countries, 1975-95
von Hagen et al. (2001; 2002)	The cyclically adjusted (total) government budget balance increases by at least 1.25% of cyclically adjusted GDP in two consecutive years, or the cyclically adjusted budget balance increases by at least 1.5% of cyclically adjusted GDP in one year and was positive but perhaps less than 1.25% in both the preceding and the subsequent year	Two years after the initial adjustment, the government budget balance stands at no less than 75% of the balance in the first year of the consolidation episode	Probit models for successful adjustments (but do not include spending and revenue changes).	20 OECD countries, 1960-98
Baldacci et al. (2004)	Year (or set of years) in which the general government primary budget balance improves by at	Primary balance exceeds the sustainability threshold at least for one year during the adjustment episode or during the	Probit model to determine the	25 emerging market

Paper	Fiscal adjustment	Successful fiscal adjustment	Multivariate analysis?	Sample
	least 0.5 percentage point of GDP per year.	following two years. A country's fiscal position is deemed sustainable when its primary balance is such that debt stock is not increasing as a share of GDP.	contribution of economic and political factors in successful fiscal adjustments.	economies, 1980-2001
Tavares (2004)	The change in the primary deficit is -1.5 GDP or less.	If the total change in the primary deficit in the 3 years after the adjustment is -1% (or less) of GDP or, 3 years after the initial adjustment year, the debt-to-GDP ratio is 5% below its level before the adjustment.	Probit model. Only adjustment periods considered.	19 OECD countries, 1960-95
Ardagna (2004)	The CAPB must increase by at least 1.5 % of potential GDP over two years and not decrease.	A successful fiscal stabilization is an episode in which the cyclically adjusted primary balance improves, and, 2 years after, the debt-to-GDP ratio is at least three percentage points lower than in the year of the fiscal tightening.	Probit model, but sample also includes years without adjustment.	17 OECD countries, 1975-2002
Alesina & Ardagna (2010)	A period of fiscal adjustment (stimulus) is a year in which the CAPB improves (deteriorates) by at least 1.5% of GDP	If the cumulative reduction of the debt-to-GDP ratio 3 years after the beginning of a fiscal adjustment is greater than 4.5 percentage points (the value of the 25th percentile of the change of the debt-to- GDP ratio empirical density in all episodes of fiscal adjustments).	OLS, growth regression using only periods where an adjustment took place	OECD 1970-07
Schaltegger & Feld (2009)	A period of fiscal adjustment is defined as a year in which the (cantonal and local) primary balance per GDP improves by at least 1 percentage point, or a period of two consecutive years in which the primary balance improves by at least 0.8 percentage points, in both years	A period of fiscal adjustment is successful if, in the three years after adjustment, the (cantonal and local) primary balance improved on average by at least half a percentage point.	Probit model, but sample also includes years without adjustment.	Swiss cantons from 1981 to 2001
Biggs et al. (2010)	CAPB improves by at least 1.5% of GDP and data of Devries et al. (2011).	Debt to potential GDP ratio has declined three years following the first year of the consolidation by at least 4.5 percentage points.	No.	21 (15) OECD countries, 1970-2007 (1980-2007)
Baldacci et al. (2012)	Authors do not provide definition of fiscal adjustments as their analysis focuses on public debt reduction, defined as periods of at least two consecutive years of continuous reduction in the ratio of public debt to GDP.	The length of successful debt consolidation spell is the time interval between periods in which the ratio of debt to GDP declined from a high level to reach the prudent threshold. This threshold is 60% of GDP for advanced economies and 40% of GDP for emerging economies.	Survival analysis of the length of the successful period.	120 countries, 1980-2010
Hernandez de Cos & Moral-Benito (2013)	A fiscal consolidation episode in a given year if the cyclically adjusted primary balance improves by at least 1.5 per cent of GDP. Alternatively, we also consider the narrative approach.	NA	OLS and IV regressions concerning expansionary adjustments	20 OECD countries 1994-2006
Afonso & Jalles (2012)	Four different definitions, including those of Devries et al. (2011).	Improvement in the CAPB for two consecutive years is at least 1 standard deviation of the CAPB in the full panel.	Logit model.	18 OECD countries, 1970-2010

Paper	Fiscal adjustment	Successful fiscal adjustment	Multivariate analysis?	Sample
Alesina & Ardagna (2013)	Either (1): a 2-year period in which the CAPB improves in each year and the cumulative improvement is at least two points of the balance/ GDP ratio or (2): a 3-year or more period in which the CAPB improves in each year and the cumulative improvement is at least three percentage points.	If the debt to GDP ratio 2 years after the end of a fiscal adjustment is lower than the debt to GDP ratio in the last year of the adjustment.	A growth regression on whether fiscal shocks impact growth (not fiscal adj.). All years are included, not only adjustment years.	21 OECD countries, 1970-10
Holden & Larsson Midthjell (2013)	A period of fiscal adjustment (stimulus) is a year in which the CAPB improves (deteriorates) by at least 1.5% of GDP.	If the cumulative change in the debt/GDP ratio from the year of adjustment and two years forward is smaller than the 25th percentile of the same variable's density in all episodes of fiscal adjustments. Variables are measured as ratio to GDP for the two years prior to the adjustment, and as ratio to trend GDP for the adjustment year and the two years after the adjustment.	No	24 OECD countries, 1970-2007
Gupta et al. (2017)	Updates data of Devries et al. (2011).	Analyses difference between the size of planned fiscal adjustment and the size of the realized fiscal adjustment as measured by changes in the primary budget balance (all expressed in percent of GDP).	Analyses difference between planned and actual fiscal consolidations.	17 OECD countries, 1978-2015

Appendix 2. Fiscal policy outcomes

Figure A2.1 Comparison of methods used to identify fiscal adjustments



Notes: This figure shows cyclically adjusted primary balance (in blue), and years identified as fiscal adjustments using two approaches, namely the requirement that the change in the CAPB is larger than 1.5 percentage points (in red) and the approach outlined in section 2 (in green).

Appendix 3. Summary statistics

Table A3.1 Summary statistics for data used in Tables 4 and 8

VARIABLES	N	Mean	St.dev.	Min.	Max.	Source:
Δ expenditures	108	-0.387	1.190	-3.221	4.326	OECD.org
Δ revenues	108	0.465	0.959	-2.851	4.504	OECD.org
Fiscal impulse	108	1.098	1.583	-5.635	6.971	OECD.org
Budget balance t-1	108	-0.518	2.771	-9.733	5.358	OECD.org
Debt/GDP t-1	108	72.54	29.19	30.23	175.3	OECD.org
GDP growth	108	2.786	1.929	-3.374	7.147	OECD.org
Short-term interest	108	7.049	4.463	0.057	24.90	OECD.org
Upcoming election	108	0.287	0.454	0	1	Update of Mierau et al. (2007)
New government	108	0.259	0.440	0	1	Update of Mierau et al. (2007)
Strength of government	108	0.083	0.124	-0.129	0.494	Update of Beck et al. (2001)
Ideological position	108	2.080	0.819	1	3	Update of Beck et al. (2001)
Effective # of gov. parties	108	1.705	0.830	1	3.783	Update of Mierau et al. (2007)
# of spending ministers	108	15.93	4.827	7	26	Update of Beck et al. (2001)
Political fragmentation	108	0.240	0.365	0	1	Update of Beck et al. (2001)
Max. ideological distance	108	0.685	0.893	0	2	Update of Beck et al. (2001)
Major cabinet changes	105	0.371	0.593	0	3	Cross National Data Archive
Government crises	108	0.167	0.588	0	5	Cross National Data Archive

Table A3.2 Correlation matrix of data used in Table 4 and 8

	I	II	II	IV	V	VI	VIII	IX	X	XI	XII	XIII	IXV	XV	XVI
Δ expenditures	1														
Δ revenues	0.51	1													
Fiscal impulse	-0.1	0.48	1												
Budget balance t-1	-0.05	-0.21	-0.3	1											
Debt/GDP t-1	0.03	0.05	0	0.27	1										
GDP growth	-0.59	-0.24	-0.07	0.13	-0.11	1									
Short-term interest	0.37	0.11	0.09	-0.28	-0.16	-0.44	1								
Upcoming election	-0.13	-0.07	0.13	0.08	0	-0.02	0.09	1							
New government	0.12	0.03	-0.09	0.02	0	-0.12	0.08	-0.19	1						
Strength of government	0.08	-0.04	-0.06	0.01	-0.09	-0.09	-0.16	0.04	-0.02	1					
Ideological position	0.2	0.1	-0.08	0.04	0.06	-0.04	0.07	-0.07	0.01	0.13	1				
Effective # of gov. parties	0.07	0.16	0.09	-0.17	0.02	0.04	0.26	0.05	-0.08	-0.06	0	1			
# of spending ministers	-0.17	-0.14	0.02	0.11	0.1	-0.13	-0.13	0.09	0	0.49	0.04	-0.4	1		
Political fragmentation	-0.01	-0.21	-0.07	0.22	0.23	-0.26	-0.07	0.01	0.15	0.32	-0.14	-0.44	0.6	1	
Max. ideological distance	0.04	-0.09	0	0.15	0.18	-0.32	0.04	0.06	0.12	0.34	-0.16	-0.4	0.73	0.92	1
Major cabinet changes	0.25	0.18	-0.04	-0.23	0.11	-0.15	0.27	-0.05	-0.19	-0.03	0.06	0.39	-0.12	-0.07	0.04

Table A3.3 Summary statistics for data used in Tables 6 and 9

VARIABLES	N	Mean	St.dev.	Min.	Max.	Source:
Δ expenditures	87	-0.539	1.406	-4.882	3.760	OECD.org
Δ revenues	87	0.810	1.157	-2.937	4.841	OECD.org
Fiscal impulse	87	1.865	1.421	0.024	10.08	OECD.org
Budget balance t-1	87	-1.723	3.621	-16.04	4.410	OECD.org
Debt/GDP t-1	86	66.08	24.20	27.98	133.5	OECD.org
GDP growth	87	2.498	2.293	-6.672	7.836	OECD.org
Short-term interest	83	8.089	4.957	0.811	24.90	OECD.org
Upcoming election	84	0.298	0.460	0	1	Update of Mierau et al. (2007)
New government	83	0.289	0.456	0	1	Update of Mierau et al. (2007)
Strength of government	83	0.031	0.125	-0.500	0.275	Update of Beck et al. (2001)
Ideological position	83	1.893	0.841	1	3	Update of Beck et al. (2001)
Effective # of gov. parties	83	1.556	0.767	1	3.783	Update of Mierau et al. (2007)
# of spending ministers	85	17.26	4.009	7	28	Update of Beck et al. (2001)
Political fragmentation	83	0.140	0.271	0	0.979	Update of Beck et al. (2001)
Max. ideological distance	83	0.530	0.786	0	2	Update of Beck et al. (2001)
Major cabinet changes	84	0.393	0.560	0	3	Cross National Data Archive
Government crises	87	0.307	0.748	0	5	Cross National Data Archive

Table A3.4 Correlation matrix of data used in Tables 6 and 9

	I	II	II	IV	V	VI	VIII	IX	X	XI	XII	XIII	IXV	XV	XVI
Δ expenditures	1														
Δ revenues	0.12	1													
Fiscal impulse	-0.24	0.41	1												
Budget balance t-1	0.03	0.02	-0.05	1											
Debt/GDP t-1	0.11	0.04	0.03	0.3	1										
GDP growth	-0.64	-0.08	0.14	0.06	-0.09	1									
Short-term interest	0.39	0.17	0.25	-0.23	-0.04	-0.36	1								
Upcoming election	-0.05	0.02	0.16	0.07	-0.01	-0.18	0.13	1							
New government	0.09	-0.01	-0.14	0.04	0.02	0.03	0.08	-0.29	1						
Strength of government	0.13	-0.13	-0.03	0.16	0.02	-0.06	0.12	0.16	-0.04	1					
Ideological position	0.18	0.08	-0.04	0.03	-0.09	-0.1	0.07	0.01	-0.03	-0.12	1				
Effective # of gov. parties	0.13	0.18	0.1	-0.1	0.44	-0.11	0.28	0.06	-0.16	-0.09	-0.1	1			
# of spending ministers	-0.08	-0.07	0.1	-0.04	0.04	-0.08	-0.05	0.2	-0.1	0.22	0.26	-0.32	1		
Political fragmentation	-0.04	-0.17	0.06	0.02	-0.16	-0.19	0.13	0.06	0.04	0.48	-0.07	-0.29	0.53	1	
Max. ideological distance	0.05	-0.01	0.13	-0.08	-0.02	-0.24	0.19	0.12	0.01	0.35	0	-0.14	0.72	0.86	1
Major cabinet changes	0.17	0.27	0.18	-0.07	0.24	-0.26	0.25	0	-0.16	0.06	0.03	0.25	-0.06	0.02	0.13

Table A3.5 Summary statistics for data used in Tables 7 and 10

VARIABLES	N	Mean	St.dev.	Min.	Max.	Source:
Δ expenditures	162	-0.116	1.134	-3.256	4.967	OECD.org
Δ revenues	162	0.424	0.864	-1.625	2.618	OECD.org
Fiscal impulse	162	0.709	1.513	-6.960	5.232	OECD.org
Budget balance t-1	162	-1.008	2.476	-8.075	6.566	OECD.org
Debt/GDP t-1	162	71.94	30.97	24.81	175.3	OECD.org
GDP growth	166	2.335	1.795	-3.485	6.206	OECD.org
Short-term interest	166	7.367	4.098	0.0515	22.71	OECD.org
Upcoming election	166	0.253	0.436	0	1	Update of Mierau et al. (2007)
New government	166	0.325	0.470	0	1	Update of Mierau et al. (2007)
Strength of government	166	0.0546	0.0895	-0.129	0.297	Update of Beck et al. (2001)
Ideological position	166	2.131	0.888	1	3	Update of Beck et al. (2001)
Effective # of gov. parties	166	1.482	0.615	1	3.392	Update of Mierau et al. (2007)
# of spending ministers	166	16.27	3.701	10	26	Update of Beck et al. (2001)
Political fragmentation	166	0.137	0.309	0	1	Update of Beck et al. (2001)
Max. ideological distance	166	0.386	0.736	0	2	Update of Beck et al. (2001)
Major cabinet changes	162	0.333	0.486	0	2	Cross National Data Archive
Government crises	166	0.229	0.619	0	5	Cross National Data Archive

Table A3.6 Correlation matrix of data used in Tables 7 and 10

	I	II	II	IV	V	VI	VIII	IX	X	XI	XII	XIII	IXV	XV	XVI
Δ expenditures	1														
Δ revenues	0.31	1													
Fiscal impulse	-0.35	0.44	1												
Budget balance t-1	-0.08	-0.15	-0.19	1											
Debt/GDP t-1	-0.18	-0.06	0.09	0.22	1										
GDP growth	-0.65	-0.18	0.07	0.09	-0.07	1									
Short-term interest	0.21	0.24	0.16	-0.24	-0.33	-0.16	1								
Upcoming election	-0.05	0.02	0.17	-0.05	0.04	-0.1	0.01	1							
New government	0.06	0.1	-0.01	-0.03	-0.07	0.06	0.01	-0.25	1						
Strength of government	-0.02	0.14	0.06	-0.01	0.05	0.06	-0.08	-0.03	-0.05	1					
Ideological position	0.14	0.06	-0.02	-0.13	0.07	-0.12	-0.04	0.08	-0.02	0.03	1				
Effective # of gov. parties	-0.02	0.12	0.01	-0.16	0.04	0.08	0.07	0.08	-0.09	0.28	0.02	1			
# of spending ministers	-0.12	0.04	0.16	-0.03	0.1	-0.12	-0.05	0.1	0	0.2	0.28	-0.15	1		
Political fragmentation	-0.05	0.07	0.06	0.15	0.27	-0.1	-0.06	-0.04	0.02	0.38	-0.1	-0.24	0.49	1	
Max. ideological distance	-0.02	0.1	0.1	0.09	0.21	-0.17	-0.04	-0.01	0.05	0.26	-0.09	-0.16	0.58	0.91	1
Major cabinet changes	0.1	0.04	0.01	-0.13	0.07	-0.2	0.07	-0.15	-0.18	0.12	0.01	0.24	-0.09	0.02	0.05

Appendix 4. Additional tables

Table A4.1 Comparison of outcomes under several approaches to identify fiscal adjustments

Identification method: Country and sample length:	Fiscal adjustment (Bai-Perron test 5% significance level)	Years with a rapid fiscal adjustment (according to von Hagen et al. (2001; 2002 approach)	Action-based adjustments identified by Devries et al. (2011) and updated by Gupta et al. (2017)	Fiscal adjustments when change in CAPB>1.5%
Australia	2011-12	Cannot be classified	1985-88, 1994-99, 2010-12	1995-99
Austria	1996-97, 2000-01		1980-81, 1984, 1996-97, 2001-02, 2011-12	
Belgium	No adjustment		1982-85, 1987, 1990, 1992-94, 1996-97, 2010-13	1993-94, 1996-97
Canada	1986-87, 1994-97	1995-97	1984-97, 2010-13	1995-97
Denmark	1983-86, 2003-05	1984-86, 2003-04	1983-86, 1995, 2012	1984-86, 1995
Finland	1997-98	1997-98	1992-97, 2011	1996-97
France	2011-13	Cannot be classified	1979, 1987, 1989, 1991-92, 1995-97, 1999-2000, 2011-13	
Germany	1981-82, 1999-00		1982-1984, 1991-95, 1997-2000, 2003-04, 2006-07, 2011-12	
Iceland	2004-05, 2009-2013	2004	NA	NA
Italy	1976-77, 1982-83, 1990-93, 1996-97, 2006-07	1982, 1997	1991-98, 2004-07, 2010-13	1997-98
Japan	1983-84		1997-98, 2003-07	
Netherlands	1972-73, 1982-83	1972	1981-88, 1991-93, 2004-05, 2011-13	1993, 2004
New Zealand	1993-94	1993-94	NA	NA
Norway	1993-95, 1999-00, 2005-06	1995, 2006	NA	NA
Portugal	1982-84		1983, 2000, 2002-03, 2005-07, 2010-13	
Spain	1986-87, 1995-96	1996	1983-84, 1989-90, 1992-97, 2009-13	1996-97
Sweden	1975-76, 1986-87, 1993-98	1986-87, 1996-98	1984, 1993-98, 2011	1984, 1996-98
Switzerland	1998-99	--	NA	NA
United Kingdom	1976-77, 1979-82, 1995-00	1977, 1997-99	1979-82, 1994-99, 2010, 2012	1997-99
United States	1968-69		1978, 1980-81, 1985-86, 1988, 1990-98, 2011, 2013	1995-98
Total no. of years	87	28	201	35

Table A4.2 Baseline model (Table 4): marginal effects at means

VARIABLES	(1) .	(2) .	(3) .	(4) .	(5) .	(6) .	(7) .	(8) .
Δ expenditures	-0.261***	-0.310***	-0.390***	-0.262***	-0.067	-0.244***	-0.151	-0.208
	(0.003)	(0.002)	(0.001)	(0.003)	(0.471)	(0.006)	(0.344)	(0.130)
Δ revenues	0.167*	0.242**	0.323**	0.170*	0.141	0.147	0.159	0.238*
	(0.074)	(0.034)	(0.011)	(0.072)	(0.117)	(0.130)	(0.319)	(0.057)
Fiscal impulse		-0.066					0.088	
		(0.249)					(0.333)	
Budget balance t-1			0.180***				0.142***	0.128**
			(0.000)				(0.009)	(0.013)
Debt/GDP t-1				-0.001			-0.003	
				(0.850)			(0.508)	
GDP growth					0.207***		0.157*	0.155**
					(0.000)		(0.057)	(0.038)
Short-term interest						-0.068***	-0.061*	-0.049*
						(0.003)	(0.071)	(0.098)
Observations	108	108	108	108	108	108	108	108
Wald-test stat. -1* Δ.exp= Δ.rev	1.611	0.780	0.555	1.556	0.755	1.337	0.004	0.068
Prob > Chi2 of Wald-test	0.204	0.377	0.456	0.212	0.385	0.248	0.947	0.795

This table shows the marginal effects at the means of the determinants of successful fiscal adjustments estimated in Table 4. As shown in the last row, the Wald-test of the null hypothesis that the marginal effect of the change in expenditures equals the marginal effect of changes in revenues is never significant.

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