
On the Determinants of Fiscal Adjustment

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This paper examines the role of fragmentation of the government's fiscal policymaking process in determining the size (or performance) of deficit reductions during periods of fiscal adjustment. The empirical analysis employs an OECD dataset from 1980 to 2002. The results show that institutional arrangements are effective for the reduction of public deficits during periods of fiscal adjustment in European countries. However, in non-European countries the political leadership of single party majority governments is the key determinant of deficit reduction.

Keywords: politics, budgetary institutions, fiscal adjustments, test for selectivity bias in panel data, Hausman–Taylor estimation

JEL classification : E61, E63, H61, H62

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1 Introduction

Many OECD (Organization for Economic Co-operation and Development) countries have run government deficits since the mid-1970s. Policymakers experiencing fiscal problems have had to reduce their budget deficits to consolidate government budgets. As a result, in some cases, the public financial position has recovered.

Once governments implement fiscal adjustments, the size of deficit reductions during periods of fiscal adjustment is not always sufficiently large. For example, the Italian government has implemented fiscal adjustments since 1989. However, Alesina and Perotti (1996) show that the size of the adjustment is much smaller than in other countries analyzed in their study, with the debt to GNP ratio reaching 125% in 1994. Moreover, the size of improvements in the government budget balances of European countries meeting entry requirements of the European Monetary Union differs in each country¹. These facts tell us that even if fiscal authorities attempt to reduce deficits during the fiscal adjustment period, the size of the reductions is sometimes small.

Differences in the “size (or performance)” of deficit reductions during periods of fiscal adjustment may be caused by the strength and durability of the government and the budget process. In support of this, Ihuri and Itaya (2001) examine the dynamic properties of fiscal reconstruction by a differential game among interest groups. They show that the steady state level of government debt under the Pareto efficient (cooperative) outcome chosen by a benevolent government is smallest among all strategies. In other words, Ihuri and Itaya (2001) show that debt accumulation under a benevolent government, which may correspond to a government with strong leadership, is smallest during periods of fiscal adjustment². These results suggest that while a government with a unified governance structure can reduce budget deficits successfully during periods of fiscal adjustment, a government that does not set numerical targets for the budget balance, or develop procedural

¹See von Hagen et al. (2001) for an analysis of the adjustment experience of individual European Union (EU) member states during the Maastricht convergence process.

²The case of local governments is investigated theoretically in Ihuri and Itaya (2004).

rules to be used in the budget negotiation process or by the coalition government, is unlikely to significantly reduce budget deficits.

On the other hand, empirical research on the relationship between fiscal adjustment and the government decision making process has focused on the credibility of fiscal adjustment. This is how persistent the initial change in the deficit is believed to be among nations. Relevant studies include Alesina and Perotti (1996), Alesina et al. (1998), Tavares (2004), Lavigne (2006), and Mierau et al. (2007). In particular, Alesina et al. (1998) demonstrate that coalition governments were unlikely to achieve long-term deficit reductions even when they coped with fiscal adjustment, and Tavares (2004) examines the relationship between the persistency of fiscal adjustment and the ideology of governing parties using probit estimation. Similarly, Lavigne (2006) and Mierau et al. (2007) explore the “decision” of fiscal adjustment with logistic methods, i.e., the government’s decision to make an effort to consolidate their budget. These last two papers also consider the credibility or persistence of fiscal adjustment in selecting episodes of fiscal adjustment.

However, to our best knowledge, no rigorous empirical study of the influence of the government decision making process on the size of deficit reductions during periods of fiscal adjustment has been undertaken. As mentioned earlier, some empirical studies have considered the persistence of fiscal adjustments. However, these studies do not explicitly deal with the “size (or performance)” of the deficit or the spending cut when the government continues its efforts to consolidate the budget as shown in Ihori and Itaya (2001).

Incidentally, the theoretical arguments proposed by Ihori and Itaya (2001) imply that the “fragmented government”, which may be a coalition or a government without “good” institutions, tends to be influenced by interest groups and cannot reduce the government’s budget deficits substantially. Here, “fragmentation” refers to the influence of two factors: political fragmentation is the number of governing parties and their ideologies, and procedural fragmentation refers to numerical targets for government expenditure and procedural rules in the budget negotiation process³. Our analysis focuses attention on the effects of these two factors and we investigate how

³See Perotti (1998) and Perotti and Kontopoulos (2002) for detailed discussion of fragmentation in the fiscal policy decision making process.

they influence deficit reductions during periods of fiscal adjustment.

In contrast, most of the literature only deals with political factors and neglects the effect of budgetary institutions. The reason why previous work does not consider the effect of institutions could be that countries with good institutions probably need smaller fiscal adjustments because they may not run large deficits in the first instance. Lavigne (2006) has statistically shown this point. However, on a practical level, countries that have procedural rules for negotiation and numerical targets for government expenditures sometimes suffer from large government deficits that they have had to reduce. For example, European countries like Denmark and Ireland set limits based on numerical targets. However, the public financial condition of Denmark deteriorated rapidly starting in the late 1970s, reaching its highest deficit in 1982, and it then had to reduce its government budget deficits. In Ireland, although the government has employed specific quantitative targets since the beginning of the 1980s, the fiscal balance continued to deteriorate from the early to mid-1980s, and it needed to launch an adjustment program in 1987 with a different character to the earlier failed program⁴. Furthermore, in the UK and Germany, the Prime Minister or Finance Minister strongly influences their governments' budget negotiation processes. However, it is difficult for German governments to meet the targets established by the Maastricht Treaty because fiscal authorities in Germany have had some difficulty in reducing their budget deficits. Among non-European countries, like Canada and the US, there are limits or targets on ministerial spending before they submit their requirements for budget. However, the US suffered from large budget deficits from the mid-1980s to the mid-1990s and the government was obliged to consolidate the budget. During the sample period in this paper, we confirmed that fiscal conditions may sometimes plague countries with good institutions and strong fiscal authorities and this situation requires a reduction in the budget deficit. Hence, we should also consider the effects of institutional arrangements.

The objective of this paper is to provide empirical evidence regarding the effects of political and budgetary institutional factors on the size (or per-

⁴For a case study of these countries, see Alesina and Perotti (1995). On the fiscal targets in Ireland, see De Haan et al. (1999).

formance) of deficit reductions during fiscal adjustment periods in OECD countries. The empirical results suggest that although institutional arrangements are effective for the reduction of public deficits during periods of fiscal adjustment in European countries, the political leadership of single party majority government is a key determinant in non-European countries.

The paper is structured as follows. In Section 2, we present an empirical specification and the variables used in the estimation. Section 3 details the empirical strategies and the results. Section 4 concludes.

2 Empirical framework

The following set of variables determines budget deficits:

$$\Delta DEF = f(X, POL, Z), \quad (1)$$

where ΔDEF is the change in the budget deficit and X, POL, and Z are vectors of institutional variables, political variables, and economic variables, respectively. DEF is measured as a difference in order to specify the outcomes of the efforts for deficit reduction during periods of fiscal adjustment. X is a variable that indicates “procedural fragmentation”, while POL is related to “political fragmentation”. In other words, both X and POL indicate the strength of fiscal authorities.

From Equation (1), the basic regression specification is as follows:

$$\begin{aligned} \Delta PB_{it} = & \alpha_1 D_{EU} * X_i + \alpha_2 D_{EU92} * X_i + \alpha_3 D_{NEU} * X_i \\ & + \alpha_4 D_{EU} * PC1_{it-1} + \alpha_5 D_{EU92} * PC1_{it-1} \\ & + \alpha_6 D_{NEU} * PC1_{it-1} + \alpha_7 D_{EU} * Left_{it-1} \\ & + \alpha_8 D_{EU92} * Left_{it-1} + \alpha_9 D_{NEU} * Left_{it-1} \\ & + \alpha_{10} D_{EU} * Right_{it-1} + \alpha_{11} D_{EU92} * Right_{it-1} \\ & + \alpha_{12} D_{NEU} * Right_{it-1} \\ & + \beta_1 \Delta UNE_{it} + \beta_2 \Delta CPI_{it} \\ & + d_t + \epsilon_{it}, \end{aligned} \quad (2)$$

where i and t are country and year indices, d_t is a set of year dummies, and ϵ_{it} is an error term.

For the change in the budget deficit, we use the difference in the cyclically adjusted primary government balance as a ratio of potential GDP, ΔPB_{it} , instead of using budget deficits directly. Cyclically adjusted primary government balance is calculated by subtracting government expenditures from government revenues. Thus, if the government financial conditions become better, the value of ΔPB_{it} becomes positive. We use primary government balance by excluding interest payments so that the interest rate is not under the direct control of the government. To identify the outcome of efforts for deficit reduction during periods of fiscal adjustment, we use cyclically adjusted data. Furthermore, in estimation the cyclically adjusted primary government balance is scaled by potential GDP.

To reflect country-specific factors in the estimated coefficients, we employ three regional dummies, D_{EU} , D_{EU92} , and D_{NEU} . D_{EU} is a dummy variable that takes a value 1 for European countries from 1980 to 1991 and 0 otherwise; D_{EU92} takes a value 1 for European countries after 1992 and 0 otherwise; and D_{NEU} takes a value 1 for countries outside Europe and 0 otherwise. We multiply these by the institutional and political variables. The reason for dividing the sample period for EU countries that most European countries have striven to reduce government deficits to meet targets established by the Maastricht Treaty concluded in 1992. It is therefore necessary to account for foreign pressure for compliance⁵.

We employ institutional index (X_i) based on Perotti and Kontopoulos (2002). To maintain compatibility with theoretical argument in Ihuri and Itaya (2001), we modify the indices of Perotti and Kontopoulos (2002) according to the strength of fiscal discipline. First, TARGET1 takes a value of 1 if there are limits or targets on aggregate spending or on each minister's spending before ministers submit their budget requests and 0 otherwise. Second, TARGET2 is assigned a score of 2 for each country if the limits or targets are set by the Finance Minister, the Prime Minister, or both, and 1

⁵Norway does not join the EU. Therefore, we re-estimate equation (2) by omitting Norway from the D_{EU92} group but the estimation results are largely unchanged.

if they are set by a committee or the entire cabinet, and 0 otherwise⁶. In other words, if some governments have a value of 1 in TARGET1 or 2 in TARGET2, they have strong leadership in the government’s decision making process, corresponding to the benevolent government in Ihori and Itaya (2001). The coefficients of X_i are expected to be positive because the stronger fiscal discipline is, the smaller the budget deficits will be.

The sample period of the indices used in Perotti and Kontopoulos (2002) ends in 1995. In the 1990s, some countries reformed their institutions. In particular, in 1995 Sweden decided to adopt expenditure ceilings, and Australia set limits for annual expenditures based on forward estimates after the Charter of Budget Honesty Act was established in 1998. Because these reforms are related to the issues considered in our study, we exclude these two countries after the first year of institutional reforms in selecting the periods of fiscal adjustment in Section 3. For other reforms, changes to the process did not concern the aspects that we consider here and the trial was temporary⁷. In accordance with these features, we use the indices from Perotti and Kontopoulos (2002) and present these in Table 1.

Please see Table 1.

$PC1_{it-1}$ is a dummy variable that equals 1 for a single party majority government and 0 otherwise, and both $Left_{it-1}$ and $Right_{it-1}$ are a variable that indicates the ideology of the government party. We now explain the political variables, $PC1_{it-1}$, $Left_{it-1}$, and $Right_{it-1}$.

First, we use the variable $PC1_{it-1}$ because a single party government is

⁶Perotti and Kontopoulos (2002) use the variable “NEGOT”, which takes a value of 0 if the negotiations are conducted by the Finance Minister, the Prime Minister or both, and 1 if they are conducted by a committee or the entire cabinet. However, there are no countries in the sample where the entire cabinet actually participates in the budget negotiations. Therefore, we believe it is inappropriate to attempt to measure the power of fiscal authorities and do not employ it as a variable in this paper.

⁷For example, Japan conducted fiscal reform from 1997 by enforcing the Fiscal Structural Reform Act, but the act was suspended in December 1998. See von Hagen (2006) for a discussion. Further, as mentioned in Perotti and Kontopoulos (2002), the reforms in Belgium and Italy do not relate to the aspects considered here.

more likely to succeed in its attempts to undertake fiscal adjustment. $PC1_{it-1}$ is also a proxy for the degree of parliamentary support for the government party. Incidentally, other possibilities are an index of the political cohesion of national governments, as in Roubini and Sachs (1989) and De Haan and Sturm (1997), or directly specifying the number of government parties (or cabinet size). However, $PC1_{it-1}$ is used in this paper in order to emphasize the strength of a single party government explicitly. We use the one-period lagged value because the government in period $t-1$ will formulate the budget between period t and $t-1$. We expect α_4 , α_5 and α_6 to have a positive sign. As assumed in Ihuri and Itaya (2001), this indicates a government where the power of interest groups is weak, because single party governments tend not to be influenced by as many interest groups as coalition governments.

Second, $Left_{it-1}$ and $Right_{it-1}$ are used as explanatory variables because some earlier studies, such as Alesina and Perotti (1996), Alesina et al. (1998), and Tavares (2004) show that the ideology of governing parties determines the success and failure of fiscal adjustment. Left governing party seats as a percentage of all legislative seats ($Left_{it-1}$) and right governing party seats as a percentage of all legislative seats ($Right_{it-1}$) are used to indicate ideology. Needless to say, these variables also indicate the degree of parliamentary support for a government just as well as $PC1_{it-1}$ since these are based on the share of governing parties. If these variables take a positive value, the outcome of deficit cuts may be helped by the support of the government parties and their ideologies. We also use their one-period lagged values for $PC1_{it-1}$. We expect the coefficients of $Left_{it-1}$ and $Right_{it-1}$ to be positive.

The number of spending ministers may also be specified as another variable to measure the degree of political fragmentation. However, this is less important because institutional arrangements may reduce the number and power of spending ministers⁸.

ΔUNE_{it} is the change in the unemployment rate, ΔCPI_{it} is the rate of

⁸We estimate equation (2) including this variable, but the estimated coefficient is not significant.

inflation of the consumer price index⁹¹⁰. Both ΔUNE_{it} and ΔCPI_{it} are used as explanatory variables representing the economic environment¹¹. These two variables have two basic justifications. First, ΔUNE_{it} captures the effects of policymakers' countercyclical discretionary policy, and second, ΔCPI_{it} captures the negative effect of lowering real tax revenue through high inflation and the positive effect of bracket creep on income tax revenue. Hence, we expect β_1 to have a negative sign. For β_2 , both positive and negative signs are expected.

3 Empirical results

All economic data sets are from the OECD Economic Outlook database. $PC1_{it-1}$ comes from the Europa Year Book. $Left_{it-1}$ is the LEFTGS (the left governing party seats as a percentage of all legislative seats) and $Right_{it-1}$ is RIGHTGS (right governing party seats as a percentage of all legislative seats) from the Comparative Parties Data set on Swank's website¹². This corrected a deficiency in the ideological data on governing parties obtained from the Europa Year Book. Our annual panel covers the period 1980–2002 for 18 OECD countries.

In our estimation, we restrict the sample to periods when each government implemented fiscal adjustment. From the fiscal adjustment episodes defined in earlier studies, we select the periods during which the budget surplus is positive and lasts several periods in order to specifically reflect the outcome of strong and deliberate efforts by the government for deficit reduc-

⁹We can use unemployment data because we use cyclically adjusted fiscal data from the OECD and OECD cyclical adjustment takes into account only movements in GDP, not unemployment.

¹⁰We estimate equation (2) by adding outstanding debt to GDP to independent variables. However, the estimated coefficients for this variable are not significant.

¹¹Equation (2) is also assumed to use these variables with a lag to account for the lags from policymakers in response to the economic environment for ΔUNE and the simultaneity that the budget deficits induce in inflation for ΔCPI . However, the coefficient estimates for these variables do not change significantly.

¹²<http://www.marquette.edu/polisci/Swank.html>

tions. Thus, a period of fiscal adjustment is defined as one in which ΔPB_{it} was tightened by at least 1.5 percentage points for two years. These periods are based on McDermott and Wescott (1996) and are similar to those in Giavazzi et al. (2000). The episodes of some earlier work may include periods during which the difference in the budget is negative. However, selection methods based on McDermott and Wescott (1996) can avoid this problem and thus we define the periods based on their work.

In a cross-country sample, the specific circumstances of each country (e.g., wars, natural disasters and so on) are more crucial and these factors may sometimes have an excessive influence on the government budget¹³. On this basis, including outliers will result in the selection of incorrect periods, even though they are not “true” periods of fiscal adjustment. Therefore, we remove ΔPB_{it} where more than 2σ and less than -2σ from the original datasets¹⁴. In addition, as discussed earlier, we exclude Australia and Sweden after the first period of reform when selecting the period of fiscal adjustment. We select 95 fiscal adjustment periods and present these in Table 2.

Here we confirm whether the periods selected encompass actual episodes of fiscal adjustment. Firstly, the episodes for the US in this analysis correspond to the Clinton Administration’s reforms aimed at deficit reduction. The episodes for Ireland in the 1980s involve fiscal reforms centered on the privatization of public enterprises. The reforms referred to as “fiscal reconstruction without tax increase” in Japan in the early 1980s and Canadian fiscal reform after 1993 are also included in the selected fiscal adjustment periods. From these and other episodes that we examine, it would be fair to say that the selected periods in this paper almost exactly coincide with

¹³For example, in the US from 2001 to 2002, ΔPB_{it} decreased by 3.15 percentage points. The events of September 11 and tax reductions may have worsened the government budget. Moreover, in Germany, ΔPB_{it} decreased by 3.3 percentage points from 1989 to 1990 when East and West Germany were reunified. These episodes are judged as outliers by the procedures used in this analysis.

¹⁴If we do not remove these data, 112 adjustment episodes are selected. Although we estimate equation (2) based on these 112 episodes, the coefficients of $D_{NEU} * PC1_{it-1}$ and $D_{EU92} * Right_{it-1}$ are significant. However, the level of significance of the coefficient of $D_{NEU} * PC1_{it-1}$ is 10%, while it is 5% as shown in Table 3. Therefore, we conclude that the estimation results obtained by including outliers are unfavorable.

actual periods of reducing budget deficits during periods of fiscal adjustment.

Our basic regression equation does not include the set of country dummies because X_i is time invariant and not separately identifiable from the country dummy variables, although the institutional variable and ϵ_{it} that may contain country dummies will be correlated. However, because the dummy variables D_{EU} and D_{EU92} divide the sample period for European countries, $D_{EU} * X_i$ and $D_{EU92} * X_i$ become time variant. Hence, in our estimation we can add a set of dummy variables for European countries¹⁵.

It is important to note that the data used comprise an incomplete panel because we omit some periods and countries. Moreover, although we assume that the countries implement fiscal adjustment implicitly, the economic conditions and political factors may also influence decision making related to fiscal adjustment, as shown in von Hagen et al. (2001), Lavigne (2006), and Mierau et al. (2007). Hence, we need to check the presence of selectivity bias. Some earlier studies, including Verbeek and Nijman (1992), Wooldridge (1995), and Vella (1997) deal with selectivity bias in panel data models. To be certain, we check the attrition bias using the method described in Wooldridge (1995)¹⁶. In the first step, we estimate equation (2) by standard Tobit and calculate the residuals for the whole sample ($22 \times 18 = 396$). Here we omit the year dummies and include the outstanding debt per GDP¹⁷. The reason why we include outstanding debt to GDP in the selection equation is to show the probability that countries in “fiscal need” execute programs of fiscal adjustment. In the second step, we add the residuals and the dummy variables for the European countries and years to equation (2). In this step, we restrict the sample to the 95 episodes shown in Table 2. We then test the coefficients of the Tobit residuals to check for sample selection bias and

¹⁵Including all the European country dummies would involve exact collinearity and make estimation impossible. We deal with this problem by removing the dummy for the UK. However, changing the reference or omitted category country may change the estimated coefficient on $D_{EU} * X_i$. To be certain, we re-estimate equation (2) by omitting the dummy variables for other countries in X_i one by one, while we include the dummy variable indicating the UK in equation (2). However, the results shown in Table 3 are almost unchanged.

¹⁶For more details, see Wooldridge (1995) and Baltagi (2005).

¹⁷For more details, please see Appendix A.

the results are shown in Table 3. We conclude that there is no bias resulting from sampling selection because in all cases the estimates of the coefficients of the Tobit residuals are not significant.

Table 4 reports the results of the least squares estimation. The coefficients of X_i are of the expected sign and significant except $D_{NEU} * TARGET2$. $PC1_{it-1}$ is found to be significant only in non-European countries. Because these countries have single party majority governments throughout almost all periods, strong political leadership of single party majority governments appears to outweigh the effect of budgetary institutions. For IDE_{it-1} , only the coefficient of $D_{EU} * Right_{it-1}$ is negative and significant. ΔUNE_{it} is estimated to be negative but insignificant, and ΔCPI_{it} is estimated to be positive and insignificant.

One reason the estimates of $D_{NEU} * X_i$ may be inconsistent is because of the correlation between $D_{NEU} * X_i$ and ϵ_{it} . Moreover, despite adding the set of dummy variables for the European countries, the coefficients of $D_{EU} * X_i$ and $D_{EU92} * X_i$ may be biased because of other time-variant factors. Hence we also estimate equation (2) by the instrumental variable method of Hausman and Taylor (1981) because $D_{NEU} * X_i$ is a time-invariant variable. As an instrumental variable for $D_{NEU} * X_i$, we specify the variable “two-party”. This assigns a value of 1 for countries with a two-party system (Canada, Portugal, Spain, the UK, and the US) and 0 elsewhere¹⁸. We also note that Canada and the UK are not strictly two-party systems because of the presence of some small political parties. However, because only one of two major parties usually forms a majority in government, we classify these countries as two-party systems. For $D_{EU} * X_i$ and $D_{EU92} * X_i$, we use other time-variant variables as instruments.

The results of the instrumental variable estimation using the Hausman and Taylor (1981) method are shown in Table 5. The estimation results are almost identical to those in Table 4. The coefficients of X_i are of the ex-

¹⁸Both two-party and $PC1_{it-1}$ appear to take on very similar values and if we use this variable as an instrumental variable, problems with multicollinearity may arise. However, the correlation may not be strong because two-party contains other countries included in $PC1_{it-1}$. In fact, the coefficient of correlation is 0.65. Therefore, we can use two-party as an instrument for $D_{NEU} * X_i$.

pected sign in all cases and significant except for $D_{NEU} * X_i$, and $PC1_{it-1}$ is estimated to be positive and significant only for non-European countries. ΔUNE_{it} is estimated to be negative but insignificant, though ΔCPI_{it} is estimated to be positive and significant.

To check the effects of political factors, we re-estimate equation (2) by multiplying $PC1_{it-1}$ by $Left_{it-1}$ and $Right_{it-1}$. The results are shown in Table 6. All of the coefficients in X_i are positive and significant, as in Table 4. For the political variables, only $Left * PC1_{it-1}$ is found to be positive and significant. This may reflect the fact that most of the episodes in non-European countries were fiscal reforms completed under left governing parties, such as the Democrats in the US and the Labor Party in Australia.

For another test of robustness, we re-estimate equation (2) by specifying the dependent variable in levels. However, if we estimate the cyclically adjusted primary government balance as a ratio of potential GDP in levels, the coefficients of the Tobit residuals are significant and we reject the null that there is no selectivity bias as shown in Table 7. Since the estimation results are unreliable, we do not report the results here.

4 Conclusion

This paper investigates how both political factors and budgetary institutions influence the size (or performance) of deficit reductions during periods of fiscal adjustment. Our empirical findings using OECD data indicate that while countries with budgetary rules and procedures are likely to reduce their budget deficits successfully at a time of fiscal adjustment in Europe, the political leadership of a single party government is the key determinant of fiscal adjustment in non-European countries.

Our results show that countries with a fiscal target or strong fiscal authorities in the negotiation process reduce budget deficits successfully when the government makes genuine efforts to restore fiscal conditions. In fact, even countries with institutional arrangements had to cut budget deficits or expenditures for several years in order to meet their target values. Reflecting this point, the results may also suggest that institutional arrangements

are effective in supporting temporal efforts for deficit reduction. Above all, in European countries, the effect of budgetary institutions is robust. Many earlier studies of budgetary institutions in European countries have shown that the effectiveness of fiscal rules or the strength of fiscal authorities depends on the political environment¹⁹. However, our findings show that both institutional factors are effective in deficit reductions during periods of fiscal adjustment without relation to political factors. On the other hand, for non-European countries in our sample (Australia, Canada, Japan and USA) we demonstrate that a single-party majority government reduces budget deficits successfully during periods of fiscal adjustment. Above all, since single-party usually takes over the reins of government in Canada and USA, common-pool problem can be avoidable. Therefore, the strong leadership of a single party government may be robustly confirmed.

Incidentally, to maintain consistency with Ihori and Itaya's (2001) theoretical hypothesis, we consider both political and institutional factors here. However, another factors such as the potential role of election years (upcoming elections) and the possibility of broad policy reform might also affect the size of fiscal adjustments. Moreover, in selecting the periods of fiscal adjustment, it is necessary to choose periods based on "successful" fiscal adjustment episodes. This procedure allows us to investigate the relationship between the attributes of fiscal adjustment and political or institutional factors. Finally, for institutional indices, recent studies such as IMF (1998), OECD (2001), and Alt and Lassen (2006) develop a "transparency index". We may then need to analyze further the issues arising in this paper in terms of fiscal transparency. Future work should deal with these interesting extensions.

¹⁹For example, see von Hagen and Harden (1995), Hallerberg and von Hagen (1999), and von Hagen et al. (2001).

A Selection Equation of Attrition Bias Test

To test the attrition bias, we use the method in Wooldridge (1995). In this specification, we define a selection equation as follows:

$$\begin{aligned}
 \Delta PB_{it}^* = & \gamma_1 D_{EU} * X_i + \gamma_2 D_{EU92} * X_i + \gamma_3 D_{NEU} * X_i \\
 & + \gamma_4 D_{EU} * PC1_{it-1} + \gamma_5 D_{EU92} * PC1_{it-1} \\
 & + \gamma_6 D_{NEU} * PC1_{it-1} + \gamma_7 D_{EU} * Left_{it-1} \\
 & + \gamma_8 D_{EU92} * Left_{it-1} + \gamma_9 D_{NEU} * Left_{it-1} \\
 & + \gamma_{10} D_{EU} * Right_{it-1} + \gamma_{11} D_{EU92} * Right_{it-1} \\
 & + \gamma_{12} D_{NEU} * Right_{it-1} \\
 & + \delta_1 \Delta UNE_{it} + \delta_2 \Delta CPI_{it} \\
 & + \delta_3 \Delta DEBT_{it} + u_{it},
 \end{aligned} \tag{3}$$

where $\Delta PB_{it} = \Delta PB_{it}^*$ if ΔPB_{it}^* was tightened by at least 1.5 percentage points for two years and 0 otherwise. $\Delta DEBT_{it}$ is outstanding debt to GDP and u_{it} is an error term. Detailed results are shown in Table A.1. We then calculate the residuals and test the selectivity bias by adding the residuals and the dummy variables for the European countries and years to equation (2). Needless to say, in this step, we restrict the sample to the 95 episodes shown in Table 2. As mentioned in Section 3, the results of the test are shown in Table 3.

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Table 1
 Institutional Indices

	TARGET1	TARGET2
Australia	0	0
Austria	1	2
Belgium	0	0
Canada	1	1
Denmark	1	2
Finland	0	0
France	0	0
Germany	1	2
Greece	0	0
Ireland	1	1
Italy	0	0
Japan	0	0
The Netherlands	1	1
Norway	1	1
Portugal	0	0
Spain	0	0
Sweden	0	0
UK	1	1
US	1	1

Table 2

Periods of fiscal adjustment

Australia	81-82; 82-83; 83-84; 84-85; 93-94; 94-95; 95-96; 96-97
Austria	83-84; 84-85; 95-96; 96-97
Belgium	84-85; 85-86; 86-87; 92-93; 93-94
Canada	85-86; 86-87; 93-94; 94-95; 95-96; 96-97
Denmark	83-84; 84-85; 85-86; 86-87; 95-96; 96-97; 97-98; 98-99
Finland	92-93; 93-94; 97-98; 98-99
France	82-83; 83-84; 94-95; 95-96; 96-97
Germany	80-81; 81-82; 82-83; 90-91; 91-92; 92-93; 93-94
Ireland	80-81; 81-82; 85-86; 86-87; 87-88; 88-89
Italy	89-90; 90-91; 91-92; 92-93; 94-95; 95-96; 96-97
Japan	82-83; 83-84; 84-85
The Netherlands	80-81; 81-82; 82-83; 95-96; 96-97
Norway	92-93; 93-94; 98-99; 99-00
Portugal	80-81; 81-82
Spain	85-86; 86-87; 94-95; 95-96; 96-97
Sweden	82-83; 83-84; 93-94; 94-95
UK	81-82; 82-83; 94-95; 95-96; 96-97; 97-98; 98-99
US	92-93; 93-94; 94-95; 96-97; 97-98

Table 3

The results of testing selectivity bias. Dependent variables: The change in cyclically adjusted primary government balance (percent of potential GDP). Number of observations=95.

The number of X_i (independent variable)	The case of TARGET1	The case of TARGET2
Residual of Tobit	0.3337 (0.5484)	0.4854 (0.5679)

The set of other independent variables is not shown for the sake of brevity. Standard errors are in parentheses.

Table 4

Estimation results of equation (2) by least squares. Dependent variables: The change in cyclically adjusted primary government balance (percent of potential GDP). Number of observations=95.

independent variable		
$D_{EU} * TARGET1$	2.3479**	
	(1.0008)	
$D_{EU92} * TARGET1$	2.1406**	
	(0.9927)	
$D_{NEU} * TARGET1$	0.7838*	
	(0.6061)	
$D_{EU} * TARGET2$	2.2704**	
	(0.9695)	
$D_{EU92} * TARGET2$	2.1675**	
	(0.9789)	
$D_{NEU} * TARGET2$	0.7925	
	(0.6087)	
$D_{EU} * PC1_{t-1}$	-0.4025	-0.3930
	(0.7980)	(0.8029)
$D_{EU92} * PC1_{t-1}$	-0.9498	-0.9612
	(0.7736)	(0.7804)
$D_{NEU} * PC1_{t-1}$	0.7692**	0.7771**
	(0.3285)	(0.3269)
$D_{EU} * Left_{t-1}$	-0.0104	-0.0107
	(0.0075)	(0.0073)
$D_{EU92} * Left_{t-1}$	-0.0013	-0.0014
	(0.0085)	(0.0085)
$D_{NEU} * Left_{t-1}$	0.0076	0.0077
	(0.0137)	(0.0137)
$D_{EU} * Right_{t-1}$	-0.0150*	-0.0143*
	(0.0099)	(0.0093)
$D_{EU92} * Right_{t-1}$	-0.0078	-0.0074
	(0.0082)	(0.0086)
$D_{NEU} * Right_{t-1}$	-0.0054	-0.0055
	(0.0082)	(0.0075)
ΔUNE_t	-0.0277	-0.0244
	(0.1164)	(0.1154)
ΔCPI_t	-0.0822	-0.0850
	(0.1219)	(0.1230)

The set of dummy variables representing European countries and years is included in the regressions (not shown for the sake of brevity). Standard errors based on White's (1980) heteroskedasticity-consistent covariance matrix are in parentheses. Levels of significance are indicated by asterisks: * = 10%, ** = 5% and *** = 1%.

Table 5

Estimation results of equation (2) by the instrumental variable method of Hausman and Taylor (1981). Dependent variables: The change in cyclically adjusted primary government balance (percent of potential GDP). Number of observations=95.

independent variable		
$D_{EU} * TARGET1$	0.6640** (0.3186)	
$D_{EU92} * TARGET1$	0.5297* (0.3422)	
$D_{NEU} * TARGET1$	-0.3000 (0.7543)	
$D_{EU} * TARGET2$		0.4836** (0.2073)
$D_{EU92} * TARGET2$		0.3377* (0.2166)
$D_{NEU} * TARGET2$		0.3838 (0.7530)
$D_{EU} * PC1_{t-1}$	-0.7531* (0.5646)	-0.6615 (0.5701)
$D_{EU92} * PC1_{t-1}$	-0.4407 (0.5148)	-0.3879 (0.5180)
$D_{NEU} * PC1_{t-1}$	0.5332* (0.3838)	0.5432* (0.3854)
$D_{EU} * Left_{t-1}$	-0.0042 (0.0064)	-0.0073 (0.0065)
$D_{EU92} * Left_{t-1}$	0.0061 (0.0067)	0.0065 (0.0067)
$D_{NEU} * Left_{t-1}$	0.0030 (0.0100)	0.0034 (0.0101)
$D_{EU} * Right_{t-1}$	0.0056 (0.0058)	0.0079* (0.0056)
$D_{EU92} * Right_{t-1}$	0.0011 (0.0052)	0.0008 (0.0053)
$D_{NEU} * Right_{t-1}$	-0.0029 (0.0069)	-0.0026 (0.0070)
ΔUNE_t	-0.0787 (0.0865)	-0.0730 (0.0859)
ΔCPI_t	0.2366*** (0.0595)	0.2273*** (0.0609)

Standard errors are in parentheses. Levels of significance are indicated by asterisks:

* = 10%, ** = 5% and *** = 1%.

Table 6

Estimation results of equation (2) by least squares. Dependent variables: The change in cyclically adjusted primary government balance (percent of potential GDP). Number of observations=95.

independent variable		
$D_{EU} * TARGET1$	1.1279**	
	(0.6223)	
$D_{EU92} * TARGET1$	0.9026*	
	(0.6554)	
$D_{NEU} * TARGET1$	0.8625*	
	(0.5330)	
$D_{EU} * TARGET2$		1.0498**
		(0.5905)
$D_{EU92} * TARGET2$		0.9323*
		(0.6281)
$D_{NEU} * TARGET2$		0.8804**
		(0.5135)
$D_{EU} * Left * PC1_{t-1}$	0.0106	0.0100
	(0.0288)	(0.0287)
$D_{EU92} * Left * PC1_{t-1}$	0.0027	0.0024
	(0.0167)	(0.0121)
$D_{NEU} * Left * PC1_{t-1}$	0.0167*	0.0171*
	(0.0112)	(0.0109)
$D_{EU} * Right_{t-1} * PC1_{t-1}$	-0.0127	-0.0118
	(0.0135)	(0.0135)
$D_{EU92} * Right_{t-1} * PC1_{t-1}$	-0.0109	-0.0109
	(0.0173)	(0.0173)
$D_{NEU} * Right_{t-1} * PC1_{t-1}$	0.0018	0.0017
	(0.0078)	(0.0078)
ΔUNE_t	-0.0669	-0.0602
	(0.1194)	(0.1177)
ΔCPI_t	-0.0843	-0.0897
	(0.1186)	(0.1141)

The set of dummy variables representing European countries and years is included in the regressions (not shown for the sake of brevity). Standard errors based on White's (1980) heteroskedasticity-consistent covariance matrix are in parentheses. Levels of significance are indicated by asterisks: * = 10%, ** = 5% and *** = 1%.

Table 7

The results of testing selectivity bias. Dependent variables: Cyclically adjusted primary government balance (percent of potential GDP). Number of observations=95.

The number of X_i (independent variable)	TARGET1	TARGET2
Residual of Tobit	1.4628*** (0.4318)	1.5308*** (0.4521)

The set of other independent variables is not shown for the sake of brevity. Standard errors are in parentheses. Levels of significance are indicated by asterisks: * = 10%, ** = 5% and *** = 1%.

Table A.1

Estimation results of equation (3) by Tobit estimation. Dependent variables: The change in cyclically adjusted primary government balance (percent of potential GDP). Number of uncensored observations=95.

independent variable		
$D_{EU} * TARGET1$	0.7272** (0.3658)	
$D_{EU92} * TARGET1$	0.8532** (0.4024)	
$D_{NEU} * TARGET1$	-0.0712 (0.6704)	
$D_{EU} * TARGET2$		0.4753** (0.2236)
$D_{EU92} * TARGET2$		0.4818** (0.2428)
$D_{NEU} * TARGET2$		-0.9948 (0.6673)
$D_{EU} * PC1_{t-1}$	-0.2860 (0.5012)	-0.0995 (0.6673)
$D_{EU92} * PC1_{t-1}$	-0.0351 (0.5013)	0.1860 (0.4874)
$D_{NEU} * PC1_{t-1}$	0.6661 (0.7430)	0.6727 (0.7421)
$D_{EU} * Left_{t-1}$	0.0031 (0.0092)	-0.0002 (0.0091)
$D_{EU92} * Left_{t-1}$	-0.0075 (0.0094)	-0.0072 (0.0094)
$D_{NEU} * Left_{t-1}$	0.0201 (0.0192)	0.0189 (0.0190)
$D_{EU} * Right_{t-1}$	0.0065 (0.0090)	0.0070 (0.0090)
$D_{EU92} * Right_{t-1}$	0.0198*** (0.0082)	0.0193*** (0.0082)
$D_{NEU} * Right_{t-1}$	0.0094 (0.0102)	0.0089 (0.0102)
$\Delta DEBT_t$	0.0176*** (0.0052)	0.0171*** (0.0052)
ΔUNE_t	0.0663 (0.1169)	0.0548 (0.1163)
ΔCPI_t	0.0303 (0.0858)	0.0377 (0.0860)
const	-2.9647*** (0.6657)	-2.918*** (0.6547)

Standard errors are in parentheses. Levels of significance are indicated by asterisks:

* = 10%, ** = 5% and *** = 1%.