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**Conference Paper**

## Asymmetries in the Responses of Sub-Central Governments to Changes in Grants: Evidence From an Event Study

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# **DO GRANT CUTS INDUCE FISCAL DISCIPLINE?**

## **EVIDENCE FROM 14 OECD COUNTRIES**

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### **Abstract:**

In this paper we examine sub-central government fiscal policy during periods when their grant allocations are cut. Existing empirical studies of sub-central fiscal policy tend to be restricted to analysis of individual countries. In this paper we examine a cross-country dataset spanning 14 OECD countries. We employ event study analysis to obtain a description of the behavior of sub-central fiscal policy during periods of fiscal squeeze instigated by central government. We show that the dominant sub-central response is to adjust expenditure rather than to offset grant cuts by raising 'own' revenues. We are able to demonstrate that these spending cuts tend to be focused on the sub-central governments' wage bill, social transfers and, disproportionately, on capital expenditure. Even in countries that in principle have greater flexibility to offset the centrally imposed cuts through a relatively high degree of revenue autonomy we show that they tend not to exercise the option. In summary, centrally imposed grant cuts result in expenditure restraint at the sub-central level, but the adjustment appears to be focused disproportionately on capital spending and hence we argue that the induced adjustment suffers from short-termism.

**JEL Codes: E62, E63, H62, H77**

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## I. INTRODUCTION

The relationships between different levels of government, and particularly their fiscal interactions, have been the subject of considerable scrutiny in recent years. There are broadly two strands to this literature. The first examines the optimal assignment of public service provision, and how this is financed, between different levels of government. This is the classic literature on fiscal federalism, with a survey provided in Oates (1999). The 'tax assignment problem', and the degree to which decentralized states use intergovernmental grants, tax sharing schemes, sub-central taxes and user charges, respectively, have been important areas of debate. A number of interesting issues have been identified, primarily in studies that examine how different levels of government deploy grants, share taxation revenues, and react to changes in the balance between central government grants and local revenues. For instance, a number of researchers have studied and interpreted the so-called 'fly-paper effect', whereby spending by lower levels of government increases more markedly in response to increases in intergovernmental grants than to equal sized increases in locally raised revenues (see Gramlich, 1977, Oates, 1994, Hines and Thaler, 1995). This literature has been developed further in studies that examine whether lower levels of governments react differently to increases and decreases in intergovernmental grants. Gramlich (1987) suggests that a significant asymmetry is evident in US state and local government behavior. However, evidence against this 'super-fly-paper effect' is presented in Gamkhar and Oates (1996).

The second broad strand in the literature relates to macroeconomic management in multi-tiered governments. This literature is rather less developed, although it has received recent attention from the OECD (see Joumard and Kongsrud, 2003), and in academic studies (see Triesman, 2000, Rodden, 2002 and Rodden and Wibbels, 2002 and 2005). This body of work emphasizes that the increasing tendency towards both decentralization and fiscal federalism and raises the issue of how to maintain sustainable public finances in this framework.

A number of industrialized economies have adopted fiscal coordination mechanisms to address this problem directly, as surveyed in Joumard and Kongsrud (2003). The mechanisms discussed range from formal sub-national fiscal rules (e.g. expenditure and borrowing ceilings as in the USA and the UK or 'internal' Growth and Stability Pacts as

in Austria) to informal coordination mechanisms. A key issue here concerns the incentives faced by multi-tiered fiscal authorities. For instance, the problem of 'soft budget constraints' faced by lower tiers of government has attracted considerable attention in some countries. For example, Rodden (2003) highlights how the possibility of cost-shifting can lead to expectations of budget bailouts for the fiscally weaker German Lander, and Bordignon (2000) demonstrates that in Italy the decentralization of essential services (health) has led to weak budgetary controls in the expectation of a central government bailout.

Much of the empirical evidence on the way in which sub-central governments react to changes in central government policies has focused on individual countries, particularly the US. However, the contribution of sub-central governments to attempts by central government to adjust their overall fiscal stance does seem to be an important issue in most OECD countries. For example, in Darby *et al.* (2005a and 2005b) we show that quantitatively, sub-central tiers of government play a significant role in overall fiscal consolidation attempts. An important result from this analysis was the finding that central government grants play a critical role in 'forcing the hand' of sub-central government to adjust their own fiscal positions.

In this paper we present a more explicit analysis of how sub-central tiers of government react to major discretionary shifts in intergovernmental grants received from central government<sup>1</sup>. Specifically, we construct a panel dataset for the major OECD economies and use Event Analysis to assess how components of sub-central expenditure and revenue respond to cuts in central government grants. We examine the extent to which sub-central governments adjust expenditures and/or use their own fiscal powers (where available) to offset the cuts in their grant allocations. In addition we group countries using key characteristics to test whether particular patterns are applicable to certain individually defined groups of countries.

An advantage of our event study approach is that we are able to improve on existing studies by focusing not just on the actual period of grant tightening but also periods

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<sup>1</sup> Whilst it is difficult to analyze these issues in countries where the relationship between tiers of government has changed over time, we do take steps to account for major shifts in fiscal responsibility that have occurred during our sample.

immediately prior to and following these grant cuts. This is important as we believe that in order to fully understand the behavior of sub-central governments during such episodes a clear picture is required over a longer time horizon than simply the year of cut in grants.

Initially we focus upon all instances in our sample where grants are cut and this is where the majority of our analysis is centered. There is however, a possibility that our results may be affected by reverse causality – i.e. changes in sub-central fiscal behavior may drive changes in central government transfers. With this in mind, and in order to check the robustness of our results, we modify an approach taken by Gamkhar and Oates (1996) and run for each country auxiliary regressions to obtain an estimate of predicted and un-predicted grant cuts. These un-predicted changes are less likely to suffer from any problems of endogeneity. As we will observe, our qualitative results alter little suggesting that our analysis of raw changes in grants is robust.

Our paper highlights a number of points. First, in response to, and in some cases, in anticipation of, cuts in their grants, sub-central governments tend to undertake significant and prolonged downward adjustments in their expenditure. In some respects this is akin to the 'fly-paper effect'<sup>2</sup> but working in reverse. Second, we observe that a substantial proportion of the overall adjustment to sub-central expenditures is borne by cuts in capital investment programs. This result is consistent with evidence presented in Darby et al. (2005a). There we found that, during attempted fiscal consolidation episodes, a disproportionate amount of the overall sub-central contribution to consolidation attempts is accounted for by cuts in capital expenditure. This might reasonably be interpreted as a variant of the effect identified by Gramlich (1987) with sub-central governments apparently seeking to defend current service provision, and in particular maintaining their spending on wages, rather than defending spending on infrastructure. Third, we find that sub-central governments tend to react to cut-backs in grants by raising own source revenues significantly, at least in the immediate term. Furthermore, sub-central taxation increases do appear to be sustained. However, the dominant impact of grant cuts is quite clearly felt by sub-central expenditure. This failure to fully replenish revenues by raising

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<sup>2</sup> It should be stressed that originally (Gramlich, 1977) the term 'fly-paper effect' was used to describe the observation that the expenditure stimulus to local public expenditures from unconditional grants was in excess of equal increases in private income. However, since then, empirical studies (see e.g. Gamkhar and Oates, 1996, and Oates, 1999) have associated the term 'fly-paper effect' with tests of the extent to which changes in government grants impact on local expenditures without reference to changes in private income.

sub-central taxation and user charges is surprisingly most evident in those countries with the greatest degree of fiscal autonomy. This result is consistent with the observations of Gamkhar and Oates (1996). However, in contrast to their findings we observe some evidence of an asymmetric response in taxation to grant changes, a result more in line with Gramlich (1987). Specifically, by comparing changes in sub-central tax revenues during periods of grant cuts and increases, we detect that tax revenues rise during periods of grant cuts, but we detect far less movement during periods of grant increases.

The structure of the remainder of the paper is as follows. In Section II we discuss the data and the scope of the study. In Section III we discuss the econometric methodology we employ. Section IV presents our key results while Sections V and VI discuss some extensions. Section V concludes.

## **II. SCOPE OF THE STUDY**

The data used in our study are annual and are taken primarily from the IMF's Government Financial Statistics (GFS), 2002 Edition, supplemented with data from the OECD Statistical Compendium, 2002 Edition. GFS provides the best internationally comparable data on fiscal variables for our fourteen OECD countries<sup>3</sup>, disaggregated by tier of government. In those countries with both state and local governments we combine data provided in the GFS to obtain an overall measure of sub-central fiscal policy. This results in an unbalanced panel dataset with 318 observations covering the period 1970-99. A full description of the data is provided in an Appendix. The dataset covers not only federal, but also unitary countries; in practice, as we show in Darby et al. (2003) the distinction between these two categories in terms of the devolution of spending and financing arrangements is not as clear-cut as one might think.

Use of the GFS data allows us to examine not only the key aggregates of sub-central fiscal policy such as total expenditure and revenue but also a number of important components such as wages, capital expenditure and taxation. However, the dataset does have some weaknesses. First, little or no distinction is made between revenues from taxes

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<sup>3</sup> Australia, Austria, Canada, Denmark, Finland, France, Germany, Ireland, the Netherlands, Norway, Spain, Sweden, the UK and the USA.

according to the extent of control available to the sub-central tier, that is whether they have control of tax rates and/or the tax base or whether their receive revenues result from tax sharing arrangements. To go some way toward addressing this we have supplemented the GFS data with information provided in Stegarescu (2005). We use this extra information in two ways. Firstly, we check the robustness of our key results and secondly we test for significant differences between countries grouped according to their varying degrees of fiscal autonomy to deduce the extent to which fiscal autonomy impacts on our results<sup>4</sup>.

A second weakness is that, to the extent that central government's can exert influence on sub-central spending patterns through directives (see Ebel and Yilmaz, 2002), GFS will overstate the true nature of sub-central expenditure autonomy. To the best of our knowledge there is no way of correcting this weakness consistently across all countries hence the GFS data remain the best available for our purposes.

### **III. ECONOMETRIC METHODOLOGY**

Event studies offer a regression based approach to examining the time profile of key variables of interest around the occurrence of defined events, in our case cuts in grants received by sub-central governments. Event studies are relatively uncommon in macroeconomics, but fairly commonplace in finance<sup>5</sup>. The econometric methods we employ are similar to those employed by Tornell and Westermann (2002) in their analysis of business cycles around the time of financial crises.

We apply event analysis here to obtain the predicted time profile for each of the fiscal variables (expressed as percentages of GDP) immediately prior to, during and following years in which cuts in the grants paid from central to sub-central governments occurred, as compared to 'normal' or reference conditions. Specifically, each fiscal variable is regressed on a set of time dummies designed to capture the time profile of the variables

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<sup>4</sup> One limitation of this data is that it only provides information on total taxation revenues and not on an individual tax basis. One has to assume therefore that any changes in taxation in a particular year are split according to the central and sub-central shares of total tax revenue.

<sup>5</sup> See for instance MacKinlay (1997) and Campbell et al. (1997). For example, in finance these methods are used to examine the impact of 'news', such as the announcement of profit figures, on share prices in the immediate and surrounding periods.

during the event window. All regressions are estimated over the entire sample, for all countries,  $i$ , and all time periods,  $t$ . The coefficients on the time dummies capture the differences between each period in the event window and the reference years. The regressions are estimated using panel methods. The regressions all include fixed effects to account for cross-country heterogeneity and use Weighted Least Squares (WLS) to account for the effects of heteroscedasticity<sup>6</sup>.

The “events” are identified as years in which there was a cut in sub-central governments’ grant receipts as a percentage of their previous period total revenue, so focus on “real” grant cuts. From this we excluded three episodes, those relating to the UK in 1990/91, Spain in 1985/86 and Sweden in 1995. In all three cases the adjustments in grants were linked to major reforms in local government finance<sup>9</sup>. Ultimately this provides a total of 75 identified ‘events’ in our dataset. The chronology of the identified grant cuts is provided in Table 1.

Each event window comprises four years; one year prior to the period of cut in grants, the event period itself, and the two years that follow. The length of the event window is a choice variable, and was chosen based upon the significance of the time dummies in the full set of regressions. Our results suggest that the window encompassing one year prior to the cut and two years after is appropriate<sup>10</sup>.

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<sup>6</sup> In a recent paper Bertrand *et al.* (2004) note that ‘difference in differences’ estimates might be affected by the presence of serial correlation. Although our study is not a conventional ‘difference in differences’ study, the presence of serial correlation may result in inconsistent standard error estimates. In order to check if this is a problem, we conducted two robustness checks: first we added a lagged dependent variable to our event study regressions; and second, we re-estimated our regressions using a GLS (Cochrane-Orcutt) estimator. In all cases we found little change in the sign, size and significance of the time dummy variables. We continue to report the OLS estimates because of the difficulty in plotting event windows in the presence of lagged dependent variables. We are grateful to our discussant at the NBER/CESifo TAPES ‘Fiscal Federalism’ conference, Thiess Buettner, for pointing this issue out to us.

<sup>9</sup> In addition, we have also examined our data and eliminated any significantly large increases in grants which again are likely to reflect government re-organisation and/or constitutional change rather than the types of grant changes that we are wishing to focus upon.

<sup>10</sup> Initially we experimented with an event window which included two years prior to the cut in grants. However, the coefficients for the dummy variables in this period were never significant in the regressions and hence we have chosen to narrow the event period and eliminate the T-2 dummy from this analysis.



Table 1: Chronology of Grant Cuts

	<i>Year of cut in grants</i>	<i>Largest cut in grants</i>
USA	1982 & 83	1982
UK	1977, 78, 79, 80, 82, 85, 88, 93, 95, 97 & 98	1977, 80, 85, 88, 93 & 97
Austria	1985 & 89	1985
Denmark	1981, 83, 85, 87, 95, 96 & 97	1981, 85, 87 & 96
France	1985 & 1996	1985 & 1996
Germany	1976, 77, 81, 82, 83, 93, 94, 95 & 97	1982, 94, 95 & 97
Netherlands	1980, 84, 86, 87, 89, 93, 94 & 96	1984, 87, 89, 93 & 96
Norway	1983, 93, 95 & 96	1993 & 96
Sweden	1978, 82, 83, 85, 86, 88, 91, 96 & 99	1982, 85, 88, 96 & 99
Canada	1980, 84, 86, 88, 93, 95, 96 & 97	1980, 93 & 96
Finland	1993	None
Ireland	1984, 86, 88 & 89	1988 & 89
Spain	1982 & 97	/
Australia	1982, 86, 87, 88, 89 & 94	1988 & 89
<b>Total</b>	<b>75</b>	<b>37</b>

Source: Identified using sample averages of data from IMF Government Financial Statistics

In the main body of the paper we carry out two sets of regressions. We begin by examining all episodes of grant cuts collectively, through the event window, by estimating

$$y_{i,t} = \alpha_i + \beta_1 D_{i,T-1} + \beta_2 D_{i,T} + \beta_3 D_{i,T+1} + \beta_4 D_{i,T+2} + \varepsilon_{1i,t} \quad (1)$$

where  $y_{it}$  is the fiscal variable of interest (expressed as a % of GDP) in country  $i$  at period  $t$ ,  $T$  denotes the actual year of cut in grants and  $D_{i,T+j}$  are time dummies such that:

$$\begin{aligned} D_{i,T\pm j} &= 1, j \text{ periods from grant cut (Period } T) \\ &= 0 \text{ otherwise} \end{aligned}$$

The sub-central fiscal variables we concentrate on are: total expenditure, total revenue, the government wage bill, social transfers, expenditure on goods and services, and capital expenditure as well as taxation revenues, fees and user-charges.

Second, since grant cuts appear in the sample regardless of size, we also divide the events into two categories; 'large' and 'small' cuts in grants. One issue this allows us to

investigate is whether there is evidence of some form of non-linear effect present that could not be captured in the initial regressions. For instance it might be possible, given a certain degree of fiscal autonomy, for a sub-central government to react to a small cut in their grant allocation by raising their “own” tax revenues. In contrast, it might be less feasible to accommodate a large cut in their grant in this way. A significant cut in sub-central expenditure might be the only available response. Furthermore it is also possible that large and small cuts in grants might be sustained to different extents, and this too should have an impact on the feasible and likely responses. For example, if large grant cuts tend to be reversed in subsequent periods we would expect them to have a very different impact on the behavior of sub-central governments from that of a series of small but sustained cuts.

Given the above concerns, and in order to check whether the results are affected by the size of the grant cut, we ranked the 75 cuts by their size as a proportion of total sub-central revenues and divided them into two sub-samples representing ‘large’ and ‘small’ cuts respectively. The largest cuts averaged 2.77% of total sub-central government revenues, whilst the smallest cuts averaged 0.59% of total revenues. To investigate whether grant cuts are sustained or temporary and reversed we can note that on average, in the year following a large cut, grants are only increased by 0.1%. In contrast, small cuts tend to be partially but not wholly reversed, with an average post cut increase of 0.27%.

Having subdivided the events in this way we then perform the following event study regression:

$$y_{i,t} = \alpha_i + \delta_1 D_{i,P-1}^L + \delta_2 D_{i,P}^L + \delta_3 D_{i,P+1}^L + \delta_4 D_{i,P+2}^L + \varphi_1 D_{i,Q-1}^S + \varphi_2 D_{i,Q}^S + \varphi_3 D_{i,Q+1}^S + \varphi_4 D_{i,Q+2}^S + \varepsilon_{2i,t} \quad (2)$$

where again  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ ,  $D_{i,P\pm j}^L$  and  $D_{i,Q\pm j}^S$  are time dummies such that:

$$\begin{aligned} D_{i,P\pm j}^L &= 1, j \text{ periods from large cut in grants (Period } P) \\ &= 0 \text{ otherwise} \\ D_{i,Q\pm j}^S &= 1, j \text{ periods from small cut in grants (Period } Q) \\ &= 0 \text{ otherwise} \end{aligned}$$

The coefficients  $(\beta_k, \delta_k, \zeta_k)$  capture the estimated difference between period  $k$  in the event window and the average position in years when grant allocations either remained constant or were increased. Thus, for instance, if the dependent variable is the annual change in sub-central government expenditure, a negative and significant  $\beta_l$  implies that in the year prior to the cut in grants, the change in sub-central expenditure was significantly lower than in years when grants were not cut (the 'normal', or reference period). We also test, by way of F-tests, the extent to which the descriptive patterns in sub-central fiscal policy differ following large and small changes in grant allocations.

Having estimated the standard event study regression it is useful to test whether individual countries or groups of countries display significantly different behavior from the rest of the countries in the event sample. For instance, we might wish to consider whether countries with different levels of sub-central fiscal autonomy respond differently from each other. Equation 1 can be modified to incorporate tests of these hypotheses by including an interactive dummy variable:

$$y_{i,t} = \alpha_i + \beta_1 D_{i,T-1} + \beta_2 D_{i,T} + \beta_3 D_{i,T+1} + \beta_4 D_{i,T+2} + \lambda_1 C_l D_{i,T-1} + \lambda_2 C_l D_{i,T} + \lambda_3 C_l D_{i,T+1} + \lambda_4 C_l D_{i,T+2} + \varepsilon_{3i,t} \quad (3)$$

where  $C_l$  is a dummy variable which takes a value of unity in the case of a particular country or group of countries and is equal to zero in all other cases.

The estimated coefficient on the interactive dummy variable captures the additional effect of this category of country over and above that identified by the standard dummies. For instance, taking the previous example, if  $C_l$  is a dummy representing countries with high levels of sub-central fiscal autonomy, a significantly negative  $\lambda_l$  would indicate that in the year of the cut in central government grants, sub-central expenditure is significantly lower in countries with high as opposed to low fiscal autonomy.

Another key econometric issue relates to the potential endogeneity of the grant cut and the causal link implied by the event study. Above, we have made the implicit assumption that grants cuts instigated by central government are exogenous and in turn *cause* reactions in sub-central fiscal policy. However, if in fact central grants adjust in response

to the expenditure or taxation decisions made by sub-central governments this approach would be questionable<sup>11</sup>. Gamkhar and Oates (1996) take account of potential endogeneity by instrumenting the cut in grants variable in their regressions. However, instrumenting is not an option in the event study regressions since the potentially endogenous variable, the cuts in grants, do not actually enter the regression. The question instead is whether one should test and adjust for the potential endogeneity when determining the periods in which exogenous cuts in grants have occurred. We have looked therefore at auxiliary regressions in which the actual change in grants (logged) is regressed on lagged changes in grants (logged) and a set of variables identified as potential instruments by Gamkhar and Oates (1996)<sup>12</sup>. The residuals from this regression can be interpreted as exogenous, or more correctly, ‘non-predicted’/‘unanticipated’ changes in grants.

By construction these residuals will have a mean of 0. Therefore, we focus on ‘large’ residuals where ‘large’ is defined as greater than 1 standard deviation from the mean. The identified periods of grant cuts from this methodology are shown in Table 2. As we can see from Table 2, the identified episodes of grant cuts closely mirrors those listed in Table 1.

*Table 2: Chronology of Grant Cuts (Un-anticipated)*

	<i>Year of cut in grants</i>
USA	1982 & 83
UK	1977, 80, 88, 93 & 97
Austria	1983 & 85
Denmark	1985, 87, 96 & 97
France	1985
Germany	1981, 82 & 95
Netherlands	1987, 89 & 96
Norway	1983, 93 & 96
Sweden	1991 & 1996
Canada	1980, 93, 96 & 97
Finland	None

<sup>11</sup> For instance, excessive sub-central expenditure or reductions in sub-central taxation might lead to increases in intergovernmental grants.

<sup>12</sup> Our instruments include lagged unemployment (logged), two measures of ‘type of government’, i) Gov<sub>dummy</sub> (lagged) = 1 if Single Party Majority, 2 if Single Party Minority or Coalition Majority or 3 if Coalition Minority, ii) Col<sub>dummy</sub> (lagged) = 1 if Right Wing, 2 if Centre or 3 if Left Wing and a time trend. The unemployment data is taken from the OECD Statistical Compendium while the political data is from Woldendorp et al. (2000).

Ireland	1976 & 88
Spain	1982 & 84
Australia	1988, 89 & 94
Total	<b>36</b>

One interesting extension that we have undertaken, which fits in well with this alternative approach, is to re-conduct the above analysis of large unanticipated cuts, but this time focus upon large unanticipated *increases*<sup>13</sup>. In doing so, we can compare and contrast the behavior of sub-central fiscal policy during periods of substantial grant increases and substantial grant decreases. Our event study regressions now take the form:

$$y_{i,t} = \alpha_i + \delta_1 D_{i,P-1}^C + \delta_2 D_{i,P}^C + \delta_3 D_{i,P+1}^C + \delta_4 D_{i,P+2}^C + \varphi_1 D_{i,Q-1}^I + \varphi_2 D_{i,Q}^I + \varphi_3 D_{i,Q+1}^I + \varphi_4 D_{i,Q+2}^I + \varepsilon_{6i,t} \quad (6)$$

where again  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ ,  $D_{i,P\pm j}^C$  and  $D_{i,Q\pm j}^I$  are time dummies such that:

$$D_{i,P\pm j}^C = 1, j \text{ periods from 'unanticipated' cut in grants (Period } P) \\ = 0 \text{ otherwise}$$

$$D_{i,Q\pm j}^I = 1, j \text{ periods from 'unanticipated' increase in grants (Period } Q) \\ = 0 \text{ otherwise}$$

We can then compare via the use of F-tests whether or not the estimated coefficients for grant increases and decreases are statistically the same as each other. If not, this would suggest that they behave asymmetrically; reacting in one particular manner to grant cuts and in another manner for grant increases.

#### IV. RESULTS

We present our key results in the form of a series of charts and tables to demonstrate how the fiscal variables for the sub-central governments behave in proximity to the cuts in

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<sup>13</sup> To identify such increases we return to the residuals from our auxiliary regressions (i.e. the 'unanticipated' changes in grants) and focus on large positive values of the residuals where large is again defined as greater than 1 standard deviation from the mean (i.e. zero).

centrally allocated grants. For the main sub-central fiscal aggregates (total expenditure and total revenue) we present our results in graphical form to clearly highlight the behavior of sub-central governments during such periods. For succinctness, for our disaggregated data (the wage bill, social transfers and subsidies, goods and services, capital expenditure, taxation and non-taxation revenues) we summarize our findings in a series of tables. Each table shows the sign of the respective dummy variable coefficient and its level of significance. We also display the cumulative change in the fiscal variable across the entire event window and test whether or not this change is significantly different from a) zero and/or b) the constant (i.e. the average change across the entire sample).

With respect to the Figures, the upper row of graphs in each panel shows the time profile for the fiscal variable of interest (e.g. change in total expenditure, total revenue etc.) for all grant cuts, large grant cuts and small grant cuts respectively. In addition to plotting the coefficients we also show the relevant 95% standard error bands which allow easy identification of the time periods in which a given estimated change is significantly different from zero. The lower row of graphs in each panel shows the cumulative change in the fiscal variable of interest which is obtained by chronologically summing the respective coefficients over the entire event window. Once more, in order to highlight the significant effects alongside these cumulative changes we show the relevant asymptotic 95% standard error bands.

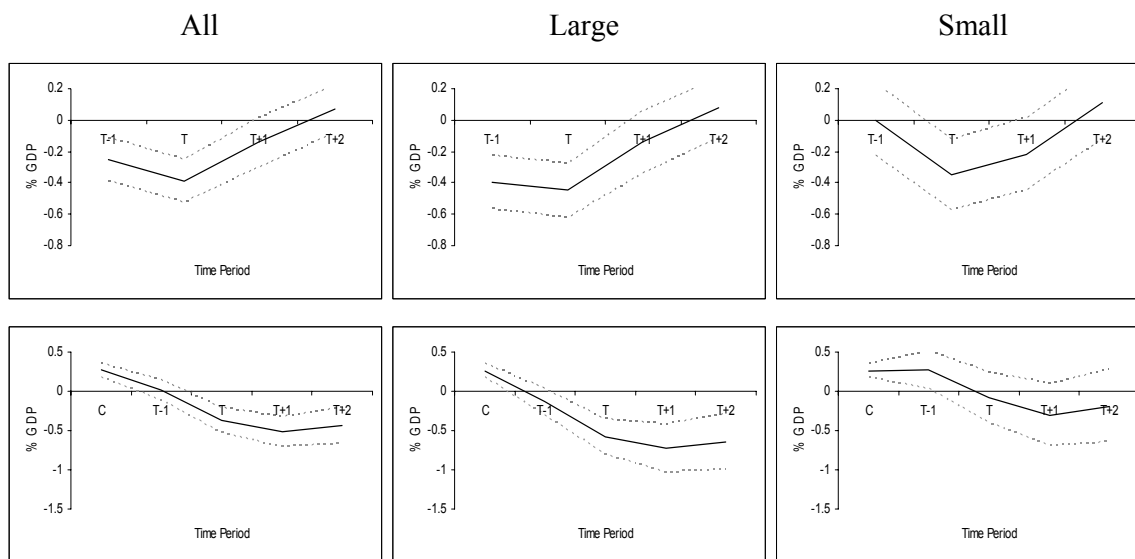
It is apparent from Figure 1 that cuts in grants are followed by significant and sustained cuts in total sub-central expenditures. As one might expect, the cuts following the largest cuts in grants tend to be larger and more sustained than the smaller cuts. Interestingly, there is also evidence that some of these cuts are anticipated since the T-1 dummy variable is significant. This adjustment may be the result of grant allocations for future years (especially when they are likely to involve substantial cuts) being pre-announced by the central government and sub-central governments adjusting their current budgets in order to smooth the effects of adjustment<sup>14</sup>.

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<sup>14</sup> We were aware that this result may have been driven by the number of grant cuts identified in our sample which occurred immediately before or after a similar period of cuts. To check the robustness of our results we focussed on grant cuts which occurred on their own and were not part of a more sustained period of grant tightening. While the ‘anticipation’ effect did lessen it remained significant at the 10% level.

Overall, there would appear to be a clear correlation between cuts in grants from the centre and expenditure tightening at the sub-central tier.

**Figure 1: Total Expenditure**



Second, as highlighted in Figure 2, sub-central governments also tend to raise their total revenues significantly in the period of a cut in their grant allocation<sup>15</sup>. As we will observe when we focus upon the disaggregated data, this result is driven by increases in sub-central taxation and not non-tax revenues. However, the increase in total revenues appears only to be temporary as by the end of our event window, the total cumulative effect is not statistically significantly different from either zero or the constant (i.e. the average change in total revenue across the sample)<sup>16</sup>. Our results are consistent with the findings of Gramlich (1987) but conflict with the findings of a ‘super-flypaper effect’ of Stine (1994). Stine found in a study of the budgetary responses of county governments in Pennsylvania that in response to grant cuts, taxation revenues fell.

Overall, it would appear that following cuts in grants, the dominant response of sub-central governments is to cut expenditures rather than increase their ‘own-source’

<sup>15</sup> Note that our analysis of total revenue includes all tax and non-tax revenues but excludes grants received from other tiers of national government.

<sup>16</sup> This can be observed with reference to the confidence bands on the T+2 coefficients in the lower panel of Figure 2.

revenues. This may be due to either an inability to increase their revenues (i.e. limited de facto fiscal autonomy) or a more discretionary unwillingness on their part (perhaps because of intense inter-regional tax competition) to adopt such a policy.

**Figure 2: Total Revenue**

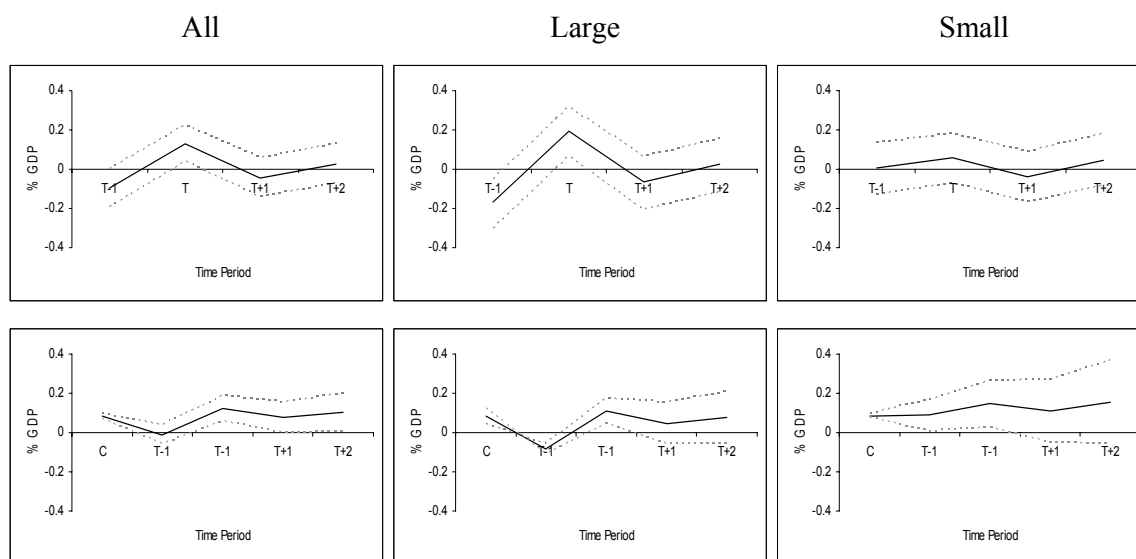


Table 3 summarizes some of the key elements of our results for the various components of expenditure. For each element of expenditure we show the coefficients of the respective dummies, their standard errors and their level of significance<sup>17</sup>. We also include the total cumulative effect (denoted by  $\Sigma$ ) and its level of significance. In the final column (denoted by  $\Lambda$ ) we show whether or not the cumulative effect reached in Period T+2 is statistically different from the constant (i.e. the average change in years when grants were not cut).

**TABLE 3a**  
*Event Study: Components of Expenditure (Wage Expenditure)*

	C	Coefficients on Dummies				$\Sigma$	$\Lambda$
		T-1	T	T+1	T+2		
All	0.121*** (0.025)	-0.02 (0.039)	-0.078** (0.039)	-0.098** (0.041)	0.015 (0.041)	-0.063 (0.059)	**
Large	0.126*** (0.024)	-0.068 (0.048)	-0.118** (0.054)	-0.103** (0.050)	-0.001 (0.053)	-0.164 (0.101)	**

<sup>17</sup> Significance is shown at the 10%, 5% and 1% levels by \*, \*\*, \*\*\* respectively.



Small	0.126*** (0.024)	0.038 (0.053)	-0.059 (0.055)	-0.082 (0.054)	0.027 (0.055)	0.049 (0.099)	/
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Notes:

$\Sigma$  = cumulative effect (i.e. summation of constant and coefficients on dummies  $D_{T-2}$ ,  $D_{T-1}$ ,  $D_T$ ,  $D_{T+1}$ , and  $D_{T+2}$ ). Significantly different from 0 at 10% (\*), 5% (\*\*) and 1% (\*\*\*).

$\Lambda$  = Test of whether or not cumulative effect in T+2 is statistically significantly different from constant. Test carried out by comparing confidence bands of the cumulative coefficient in T+2 and constant.

TABLE 3b  
*Event Study: Components of Expenditure (Goods and Services)*

	Coefficients on Dummies						$\Sigma$	$\Lambda$
	C	T-1	T	T+1	T+2			
All	0.055*** (0.016)	-0.012 (0.026)	-0.050** (0.026)	-0.078*** (0.027)	0.036 (0.027)	-0.049 (0.038)	*	
Large	0.043*** (0.015)	-0.080*** (0.029)	-0.038 (0.030)	-0.051 (0.034)	0.129*** (0.034)	0.002 (0.062)	/	
Small	0.043*** (0.015)	0.061* (0.036)	-0.081** (0.037)	-0.079** (0.037)	0.020 (0.038)	-0.035 (0.070)	/	

TABLE 3c  
*Event Study: Components of Expenditure (Social Transfers & Subsidies)*

	Coefficients on Dummies						$\Sigma$	$\Lambda$
	C	T-1	T	T+1	T+2			
All	0.097*** (0.016)	-0.034 (0.027)	-0.087*** (0.027)	-0.048* (0.027)	-0.089*** (0.028)	-0.161*** (0.037)	***	
Large	0.103*** (0.016)	-0.060 (0.038)	-0.115*** (0.039)	-0.059 (0.041)	-0.101*** (0.041)	-0.233*** (0.069)	***	
Small	0.103*** (0.016)	-0.011 (0.033)	-0.074** (0.034)	-0.047 (0.034)	-0.077** (0.035)	-0.106* (0.058)	***	

TABLE 3d  
*Event Study: Components of Expenditure (Capital Expenditure)*

	Coefficients on Dummies						$\Sigma$	$\Lambda$
	C	T-1	T	T+1	T+2			
All	0.008 (0.018)	-0.064** (0.028)	-0.111*** (0.027)	-0.017 (0.027)	0.024 (0.027)	-0.158*** (0.041)	***	
Large	0.004	-0.109***	-0.153***	0.027	0.028	-0.203***	***	

	(0.016)	(0.033)	(0.035)	(0.035)	(0.035)	(0.066)	
Small	0.004 (0.016)	0.016 (0.035)	-0.100*** (0.034)	-0.065* (0.034)	0.047 (0.034)	-0.097 (0.067)	/

Table 3a shows that the impact of cuts in grants on the sub-central government wage bill is significantly negative at time T and T+1. When separating the cuts by size we discover that this is driven by the behavior during the largest cuts in grants. For the smallest cuts in grants, while the government wage bill appears to undergo sustained cuts the effects are not significant. So it would appear that large grant cuts are required to induce significant reductions in the sub-central government wage bill<sup>18</sup>. As Table 3b highlights the impact on purchases of goods and services during periods of grant cuts is far less pronounced than the impact on the wage bill. While there is some evidence of cuts during the smallest cuts in grants, the cumulative effect across the event window reveals that such expenditures appear to be insulated from any long-term adjustment.

Social Transfers and Subsidies however, bear a significant burden of adjustment. Our event study reveals that during periods of grant tightening, social transfers are cut significantly both in the period of grant cut (T) but also in surrounding periods. In contrast to the government wage bill, the total cumulative effect is for a significant fall in such payments irrespective of whether the initial cut in grants is large or small.

An interesting finding is the behavior of capital expenditure during periods of grant tightening. Table 3d reveals that overall cuts to capital spending constitute a large proportion of the overall expenditure adjustment. This result is dominated by the behavior during large grant cuts where the cumulative cut in expenditure is only slightly smaller than the overall change in social transfers and larger than both the cut in the wage bill and purchases of goods and services put together. Given that capital expenditure constitutes a relatively small proportion of the overall expenditure budget for sub-central governments this suggests that during periods of grant tightening, capital expenditures bear a proportionately severe burden of adjustment<sup>19</sup>.

<sup>18</sup> Of course, given that our analysis is data descriptive and we have yet to address any issues of endogeneity, it is possible (though unlikely) that large and sustained attempts by sub-central tiers to reduce their wage bills leads to an immediate and large reduction in the grant they receive from the centre.

<sup>19</sup> Our data reveals that across our sample, on average, the value of current expenditure is roughly 10 times greater than the value of capital expenditure.

There are two possible explanations for this result. It may be the case that sub-central government capital investment programs rely heavily upon central grants for funding. Therefore, any decision by the central government to cut this source of revenue necessarily has an immediate and substantial impact on such expenditures. Alternatively, to the extent that sub-central governments have autonomy over local capital investment programs, following periods of grant tightening they may seek to defend current services by cutting back on capital investment. This is consistent with the hypothesis proposed by Gramlich (1987) who argued that in response to grant cuts, sub-central governments are likely to seek to help defend the provision of public goods and services at pre-cut levels by shifting a proportion of the burden of adjustment on to capital expenditure rather than current expenditure. This possibly highlights a degree of short-termism on the part of local governments in adjusting their fiscal position as such sustained cuts can be expected to have significant adverse consequences for local service provision in the long run. This high correlation between grant tightening and capital expenditure cuts is also consistent with our findings during episodes of national fiscal consolidation (Darby et al. 2005a, and b) where we observed a similar heavy burden of adjustment being borne by sub-central capital expenditure. Overall our analysis highlights a clear and apparently pivotal negative relationship between central government grant allocations and local and regional public investment spending.

In Table 4 we disaggregate our Total Revenue data outlined in Figure 2 into Taxation and Non-Taxation revenues.

TABLE 4a  
*Event Study: Components of Revenue (Taxation)*

	Coefficients on Dummies					$\Sigma$	$\Lambda$
	C	T-1	T	T+1	T+2		
All	0.023 (0.022)	-0.027 (0.035)	0.101*** (0.034)	0.020 (0.035)	-0.014 (0.035)	0.103** (0.050)	/
Large	0.027 (0.021)	-0.045 (0.039)	0.182*** (0.040)	-0.021 (0.043)	-0.043 (0.043)	0.101 (0.079)	/
Small	0.027 (0.021)	0.009 (0.046)	0.009 (0.045)	0.076* (0.045)	0.008 (0.047)	0.098 (0.092)	/

*Event Study: Tax Autonomy*

	Coefficients on Dummies					$\Sigma$	$\Lambda$
	C	T-1	T	T+1	T+2		
All	0.029*** (0.009)	-0.014 (0.019)	0.047** (0.022)	0.008 (0.016)	-0.005 (0.015)	0.065** (0.025)	/
Large	0.034*** (0.009)	-0.020 (0.024)	0.093*** (0.028)	-0.014 (0.018)	-0.019 (0.021)	0.074 (0.039)	/
Small	0.034*** (0.009)	-0.015 (0.027)	0.002 (0.019)	0.027 (0.023)	0.003 (0.015)	0.050 (0.037)	/

TABLE 4b

*Event Study: Components of Revenue (Non-Tax Revenues)*

	Coefficients on Dummies					$\Sigma$	$\Lambda$
	C	T-1	T	T+1	T+2		
All	0.052*** (0.014)	-0.014 (0.024)	0.041* (0.024)	-0.067*** (0.025)	0.018 (0.025)	0.030 (0.031)	/
Large	0.051*** (0.015)	-0.046 (0.034)	0.058* (0.035)	-0.085** (0.036)	-0.024 (0.036)	-0.057 (0.052)	/
Small	0.051*** (0.015)	0.030 (0.035)	0.031 (0.037)	-0.051 (0.037)	0.023 (0.040)	0.084 (0.063)	/

Table 4a reveals that during periods of grant cuts there is a shift toward a greater contribution to the overall sub-central budget made by taxation. For our entire sample, this effect is immediate and sustained. The total cumulative effect is significantly positive at the 5% level. In breaking up these grant cuts according to their size we find that during the largest grant cuts the response appears immediate (i.e. the period T dummy coefficient is significant), while in contrast the response is delayed (to T+1) for small cuts. While the overall cumulative effect is insignificant (as highlighted by the results contained in the final two columns), our analysis does tentatively suggest that there is evidence of switching toward taxation revenues in response to grant cuts.

The lower panel in Table 4a demonstrates that this result is robust if we make use of the additional data on sub-central fiscal autonomy supplied in Stegarescu (2005) discussed above. While the coefficient on the dummy in period T is smaller, it remains statistically significantly positive. There appears to be no evidence of cuts in grants being replaced by increases in revenues from tax-sharing. Table 4b shows that there is little evidence that

non-taxation revenues (from fees and user charges) are used to offset the cuts in grants. In fact, after an initial increase in non-tax revenues during the period of grant cut, non-tax revenues tend to fall.

In summary, there appears to be some evidence of a shift towards revenue from sub-central taxation in response to grant cuts, although this is delayed in the case of small cuts and appears to be at least partially reversed in response to large cuts in grants. In terms of overall size, the impact on taxation is less than that on expenditure. In general this supports the notion that the 'fly-paper effect' operates in both directions, in that local governments choose not to fund certain expenditures if they have to provide funds from their own taxes.

## V. Unanticipated Grant Cuts

As discussed above, we are aware of issues of potential endogeneity in our analysis of grant cuts. It does seem reasonable to suggest that the dominant nature of central governments and the relative subservience of sub-central governments in many of the countries in our sample (see Darby et al. (2003)) implies a causal link in central and sub-central fiscal relations. Nevertheless, to address this issue, in the following table we summarize the key results from our application of the approach taken by Gamkhar and Oates (1996) to distinguish between endogenous and exogenous grant cuts. Strictly speaking however, their methodology differentiates between anticipated and unanticipated grant cuts. In the analysis that follows we refer to unanticipated changes as oppose to exogenous changes. In the spirit of Gamkhar and Oates (1996) we therefore re-conduct our event study, focusing this time only on the unanticipated grant cuts. Our results are summarized in Table 5.

TABLE 5  
*Event Study: Unanticipated Grant Cuts*

Expenditure							
		Coefficients on Dummies					
	C	T-1	T	T+1	T+2	$\Sigma$	$\Lambda$
Wage	0.095 (0.017)	0.001 (0.043)	-0.124*** (0.042)	-0.043 (0.043)	-0.029 (0.042)	-0.099 (0.081)	**
Transfers	0.059***	-0.017	-0.087***	-0.066**	-0.058***	-0.169***	***

	(0.012)	(0.030)	(0.030)	(0.030)	(0.030)	(0.056)	
Goods & Services	0.029** (0.013)	-0.027 (0.033)	-0.065** (0.031)	-0.022 (0.032)	0.080** (0.031)	-0.005 (0.061)	/
Capital	-0.021 (0.015)	-0.016 (0.027)	-0.072** (0.032)	-0.004 (0.030)	-0.036 (0.037)	-0.150** (0.075)	*
Revenue							
		Coefficients on Dummies					
	C	T-1	T	T+1	T+2	$\Sigma$	$\Lambda$
Tax	0.031* (0.019)	0.048 (0.044)	0.125*** (0.044)	-0.036 (0.043)	-0.070* (0.042)	0.098 (0.084)	/
Non-Tax	0.032** (0.015)	-0.028 (0.025)	0.069** (0.033)	-0.024 (0.020)	-0.016 (0.028)	0.033 (0.054)	/

The results in Table 5 confirm our earlier findings. While there are differences in the size of the effects, qualitatively our earlier observations are confirmed. Social transfers and capital expenditures continue to bear a large burden of the overall expenditure adjustment however, we do observe a relatively more dominant impact on the government wage bill than before. Furthermore, there is again evidence that sub-central taxation increases during periods of grant cuts though this time the effects do not appear to be sustained.

As mentioned above, it is convenient when adopting this approach to examine the extent to which sub-central government fiscal policy displays evidence of either symmetrical or asymmetrical behavior during periods of grant cuts vis-à-vis grant increases. To do this we conducted event analysis adopting the specification outlined in equation 5 and tested via means of F-tests whether the coefficients were similar to each other<sup>20</sup>. For the most part our results for cuts in grants and increases in grants were similar however, as Table 6 highlights we found interesting differences with respect to taxation and capital expenditure.

In contrast to the case of grant cuts where there was a significant increase in taxation revenues, we observe no change in sub-central taxation during grant increases. Use of an F-test reveals that this difference is statistically significant at the 10% level. Instead, there was an overall pattern of increased expenditures (though the differences for the individual

<sup>20</sup> More correctly, we test whether the coefficients are the exact negative of one another, i.e.  $\delta_i = -\phi_i$  etc

current expenditure components were not statistically significant). The exception however appears to be capital expenditure which is shown in the lower panel of Table 6. While capital expenditures are cut significantly during grant decreases they are not increased significantly during grant increases. However, they are increased significantly (at least at the 10% level in the year preceding the grant increase. While we cannot fail to reject the null hypothesis that the coefficients on increases and decreases are identical to one another, it would appear that the overall response of capital expenditure to grant cuts across the event window is more pronounced than under grant increases (as demonstrated by contrasting the significance of the cumulative effects in period T+2). Again this result further highlights our previous analysis of the close relationship between grant cuts and reductions in sub-central public investment.

TABLE 6  
*Event Study: Unanticipated Grant Cuts vs. Unanticipated Increases*

<i>Taxation</i>							
	C	Coefficients on Dummies				$\Sigma$	$\Lambda$
		T-1	T	T+1	T+2		
Cuts	0.034 (0.021)	0.053 (0.046)	0.120*** (0.045)	-0.032 (0.043)	-0.076* (0.042)	0.097 (0.085)	/
Increases	0.034 (0.021)	0.009 (0.041)	-0.030 (0.042)	0.026 (0.043)	-0.016 (0.044)	0.022 (0.085)	/
<i>Capital Expenditure</i>							
	C	Coefficients on Dummies				$\Sigma$	$\Lambda$
		T-1	T	T+1	T+2		
Cuts	-0.041** (0.018)	-0.038 (0.044)	-0.076** (0.032)	-0.011 (0.041)	-0.045 (0.034)	-0.211*** (0.075)	*
Increases	-0.041** (0.018)	0.064* (0.043)	0.047 (0.041)	0.034 (0.036)	0.011 (0.037)	0.115 (0.073)	*

In the final part of the paper, we investigate whether there are significant differences in the responses in either individual countries or groups of countries.

## VI. Institutional Arrangements and Responses to Grant Cuts

One way to examine how individual countries react is to introduce interactive dummies in the event study regressions (see equation 3). The significance of these individual country interactive dummies allows us to judge whether individual countries display a behavior

which is significantly different from the others. Two countries, Finland and Spain, had to be dropped from this analysis since there were too few observations of grant cuts in the sample to allow discrimination. For the remaining countries we were able to use these additional regressions to check whether the profile of the fiscal variables evolves along a significantly higher or lower path than for the remaining group. In general there were few significant differences among the countries to report, however some consistent results do emerge<sup>21</sup>. In particular, Canada and the US display a smaller increase in taxation, and Austria and France showed a larger increase in taxation and higher expenditure, following cuts in grants episodes. Germany and France also displayed significantly larger cuts in capital spending, but Austria significantly less. In the UK, sub-central governments seem to anticipate cuts in grants and enact bigger cuts in expenditure at T-1.

In order to obtain more informative results, which use up less degrees of freedom, we next tried grouping the countries into different categories, depending on the institutional features of their fiscal arrangements. We used a number of possible alternatives, such as degree of expenditure decentralization, revenue decentralization and borrowing autonomy<sup>22</sup>. However, our most interesting results arise when we differentiate according to the extent of dependence upon grant finance and consequently we only present these results here.

In Table 7 we have divided the sample into a small group of five countries (the UK, Spain (post-1985)<sup>23</sup>, Ireland, The Netherlands, Denmark and Spain) that exhibit a ‘high’ degree of dependence on central government grants, specifically those with grants representing more than 40% of total revenues, and the rest, with grant dependence below 40%.

*Table 7: Ranking by Grant Dependence:  
(grants as % of total sub-central revenues)*

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<sup>21</sup> These results are not tabulated for reasons of space. However, the results are available from the authors on request.

<sup>22</sup> More specifically, we divided our countries according to a) the proportion of total general government expenditure spent by sub-central tiers of government, b) the degree of tax autonomy using data provided in Stegarescu (2005) and discussed above and c) a measure of sub-central borrowing autonomy provided in Rodden (2002) and discussed in Darby et al. (2005a).

<sup>23</sup> Given that Spain underwent major reforms in the financing of sub-central governments in the 1980s, we have divided the observations for Spain into two groups, those relating to the pre-1985 reforms period, where Spanish sub-central governments depended less on central grants, and the post-1985 period.



<i>Countries with Low Grant Dependence</i>		<i>Countries with High Grant Dependence</i>	
Spain (pre-1985)	18.56	Australia	44.82
Sweden	21.59	Denmark	45.64
Germany	23.25	UK	55.74
Canada	26.00	Spain (post 1985)	56.42
Austria	26.11	Belgium	57.87
USA	29.53	Ireland	69.77
Finland	32.19	Netherlands	77.41
France	37.14		
Norway	37.41		

Source: Sample averages of data from IMF Government Financial Statistics

In Table 8 we show the changes in current expenditure, capital expenditure, taxation and non-tax revenues following a cut in central government grants with the results separately identified for the counties with ‘high’ and ‘low’ grant dependence respectively.

TABLE 8  
*Event Study: High vs. Low Grant Dependency*

Current Expenditure							
	C	Coefficients on Dummies				$\Sigma$	$\Lambda$
		T-1	T	T+1	T+2		
High	0.317*** (0.043)	-0.269** (0.101)	-0.40*** (0.102)	-0.141 (0.102)	0.099 (0.103)	-0.393** (0.164)	***
Low	0.317*** (0.043)	-0.060 (0.091)	-0.207** (0.089)	-0.276*** (0.101)	-0.061 (0.102)	-0.288* (0.151)	***
Capital Expenditure							
	C	Coefficients on Dummies				$\Sigma$	$\Lambda$
		T-1	T	T+1	T+2		
High	0.008 (0.018)	-0.071* (0.044)	-0.122*** (0.043)	-0.002 (0.044)	0.069 (0.044)	-0.117 (0.072)	/
Low	0.008 (0.018)	-0.065* (0.037)	-0.105*** (0.034)	-0.032 (0.035)	-0.009 (0.035)	-0.203*** (0.063)	***
Taxation							
	C	Coefficients on Dummies				$\Sigma$	$\Lambda$
		T-1	T	T+1	T+2		
High	0.033 (0.023)	-0.030 (0.044)	0.097** (0.043)	0.034 (0.044)	0.021 (0.044)	0.152** (0.073)	*

Low	0.033 (0.023)	-0.049 (0.059)	0.085 (0.056)	0.002 (0.061)	-0.079 (0.062)	0.024 (0.099)	/
Non-Tax Revenues							
		Coefficients on Dummies					
	C	T-1	T	T+1	T+2	$\sum$	$\Lambda$
High	0.045*** (0.015)	0.006 (0.033)	0.007 (0.034)	-0.051 (0.034)	-0.003 (0.035)	0.006 (0.046)	/
Low	0.045*** (0.015)	-0.016 (0.038)	0.026 (0.038)	-0.092** (0.041)	0.039 (0.042)	-0.034 (0.067)	/

A striking feature of these results is that those least dependent on grants seem to cut expenditure just as much (i.e. there is a similar reverse fly paper effect) as those sub-central governments who depend to a relatively greater extent on grant finance. Furthermore, it would appear that greater fiscal autonomy does not result in a willingness to offset grant cuts through an increase in sub-central tax revenues. In fact, only in the high dependence countries is the dummy coefficient for period T significant for taxation. As discussed above, our individual country interactive results showed that the USA and Canada were less likely than the other countries in the sample to increase revenues and these two countries have some of the most autonomous sub-central governments in the industrialized world. This may reflect a high degree of inter-regional tax competition or that such governments depend less on grants to finance their overall fiscal strategy and feel less pressure to increase their ‘own-source’ revenues.

## VII. CONCLUSIONS

In this paper we have examined the behavior of sub-central governments during episodes when their grant finance from central government has been cut. We have used event analysis to examine not only how sub-central governments respond to these adjustment episodes, but also to gain information on the time profile of the adjustment. Previous studies of grant cuts have tended to focus only on the actual period of grant cut. In undertaking this analysis we have been able to implement the first comprehensive cross-national study of how sub-central governments’ react to a financial squeeze enacted by central government. We believe that this is itself a major contribution to the literature on local and regional public finance.

The results which emerge are set out in detail in the body of the paper. However, it is worth highlighting some general points from our empirical investigation. Our first observation is that the burden of adjustment in response to a cut in grants is met by a tightening of sub-central expenditure. We observe that across our event window, during episodes of grant cuts, expenditures are cut by significant amounts and furthermore, such cuts appear to be sustained.

The second general theme is that cuts in grants appear to only be partially offset by increases in sub-central taxation revenues. The greater burden of adjustment appears to fall on sub-central expenditures. We do however, observe that the increase in sub-central taxation is demonstrably larger than the cut during equivalent grant increases. This suggests that sub-central governments display an asymmetrical response to grant changes.

The third general point is that social transfers, subsidies, wages and capital spending are important areas of adjustment for sub-central governments following cuts in grants. Although the nature of the adjustment does depend to some degree upon the size of the cut in inter-governmental grant, it is striking that capital spending whilst being a small component of sub-central expenditure suffers disproportionately following the centrally imposed squeeze. This possibly highlights a degree of short-termism on the part of local governments in adjusting their fiscal position.

Finally, we find that where countries have greater flexibility to offset the centrally imposed cuts, by being less dependent on grants to finance their expenditures, they appear less willing to exercise these powers. Indeed our evidence suggests that the most decentralized and autonomous sub-central governments exercise the greatest expenditure restraint. We can speculate that the even stronger links between grant cuts and spending squeeze in these cases reflect the ease with which the sub-central governments can convince their electorate to attribute the blame for the cuts to the centre.

## VIII. DATA APPENDIX

All variables unless otherwise stated are from the IMF GFS (2002) database and are expressed as a % of GDP.

**General Government** = Central + Sub-Central

**Sub-Central** = Local + State (where applicable)

**Total Expenditure** = [All Current Expenditure (including Wages and Salaries, Employer Contributions, other Purchases of Goods and Services, Subsidies, Transfers to households and Transfers abroad) less Interest Repayments less Transfers to other tiers of national government] + [All Capital Expenditure (including acquisition of Fixed Capital Assets, Purchases of Stocks, Purchases of Land and Intangible Assets and Capital Transfers) less Capital Transfers to other tiers of national government.]

**Total revenue** = Tax revenue + Non-Tax revenue + Capital Revenue + Grants (total grants less grants received from other tiers of national government).

**Tax revenue** = Income, Corporate and Capital Gains taxation + Social Security Contributions + Payroll taxation + Property taxation + Domestic and International Indirect taxation.

**Non-tax revenue** = Entrepreneurial and Property Income + Administrative Fees and Charges + Fines and Forfeits + Other Non-tax revenue.

**Grants** = Grants received from other tiers of national government. Grants received from super-national authorities such as the EU are excluded.

**Social Transfers** = Transfers to households and non-profit organizations + Subsidies to firms.

**Government Wage Bill** = Expenditure on Wages and Salaries.

**Purchases of Goods and Services** = Non-Wage Expenditure on Goods and Services.

**Capital Expenditure** = Acquisition of Fixed Capital assets, Purchases of Stocks, Land and Intangible Assets + Capital Transfers.

**Debt to GDP ratio** = Gross National Debt as a percentage of GDP; source OECD Statistical Compendium 2002.

**GDP** = Gross Domestic Product (Expenditure approach) at current prices; source OECD Statistical Compendium 2002.

## IX. REFERENCES

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