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**Conference Paper**

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44th Congress of the European Regional Science Association: "Regions and Fiscal Federalism",  
25th - 29th August 2004, Porto, Portugal

**Provided in Cooperation with:**

European Regional Science Association (ERSA)

*Suggested Citation:* Darby, Julia; Anton, Muscatelli; Roy, Graeme (2004) : Fiscal Federalism, Fiscal Consolidations and Cuts in Central Government Grants: Evidence from an Event Study, 44th Congress of the European Regional Science Association: "Regions and Fiscal Federalism", 25th - 29th August 2004, Porto, Portugal, European Regional Science Association (ERSA), Louvain-la-Neuve

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# Fiscal Federalism, Fiscal Consolidations and Cuts in Central Government Grants: Evidence from an Event Study<sup>1</sup>

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14 March 2004

<sup>1</sup>We are grateful to John Bradley, Jacques Melitz, Campbell Leith and to colleagues at the Universities of Glasgow and Strathclyde for useful comments on some of the material presented here. Julia Darby gratefully acknowledges ESRC funding under the Devolution and Constitutional Change Programme, Award n. L2192102. Graeme Roy acknowledges ESRC funding under the postgraduate scholarship scheme, ESRC award n. R42200134409.

# 1 Introduction

The relationship between different levels of government, and their interactions on the financial side, has 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 its financing between different levels of government; this is the classic literature on fiscal federalism. Oates (1999) provides a survey of this literature. The 'tax assignment problem', and the degree to which decentralized states use intergovernmental grants, tax sharing schemes, or sub-central taxes and user charges, has been an important area of debate. A number of interesting issues have been identified within this broad area, through 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 to intergovernmental grants than in response to increases in local income (see Gramlich, 1977, Oates, 1994, Hines and Thaler, 1995). This has been further developed by studies which examine whether lower levels of governments react differently to increases and decreases in intergovernmental grants. Gramlich (1987) suggests that such an asymmetry is present in US state and local government behaviour, but evidence to the contrary to this 'super-fly-paper effect' is presented in Gamkhar and Oates (1996).

A second broad strand relates to macroeconomic management in multi-tiered governments. This literature is rather less developed, although it has received recent attention in the OECD (see Journard and Kongsrud, 2003), and in academic studies (see Triesman, 2000, Rodden, 2002 and Rodden and Wibbels, 2002). This body of work emphasises that the increasing tendency towards decentralisation and fiscal federalism raises the issue of how to maintain sustainable public finances. A number of industrialised economies have adopted fiscal co-ordination mechanisms to address this problem, as surveyed in Journard and Kongsrud (2003), ranging from formal sub-national fiscal rules (e.g. expenditure and borrowing ceilings) to informal co-ordination mechanisms. The incentive issues which are raised by multi-tiered fiscal authorities are one key issue here. For instance, considerable attention has been given in some countries (e.g. Germany, Italy) to the problem of 'soft bud-

get constraints' in lower tiers of government. Rodden (2000) 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, especially 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 many OECD countries. In Darby *et al.* (2004) we show that quantitatively, sub-central tiers of government play a significant role in overall fiscal consolidation attempts.

In this paper we focus on a natural experiment which allows us to explore how sub-central tiers of government react to major discretionary policy shifts at the central level<sup>1</sup>. We construct a panel of data for the OECD economies to focus on how central and sub-central expenditures, taxation, and intergovernmental grants change in response to attempts to correct the government's fiscal position. These episodes of fiscal consolidations are identified using a methodology which has become standard in the macroeconomics literature (Alesina and Perotti, 1995, 1997, Alesina et al., 1998). We then conduct event analyses on the panel of data, which allow us to examine the timing of expenditure, taxation and intergovernmental grant shifts around the periods of fiscal consolidation, distinguishing between successful (i.e. ones that have a significant impact on a country's debt to GDP ratio) and unsuccessful consolidations, which do not and show signs of being temporary. In addition to some of the above issues regarding the interactions between central and sub-central tiers of government, our analysis also sheds light on the extent to which sub-central tiers of government participate in fiscal consolidations, and hence to macroeconomic adjustment. Finally, we focus on cuts in grants as a series of events, rather than fiscal consolidations, and conduct event analysis to examine how sub-central governments react to these cuts. This allows us to examine the extent to which sub-central governments adjust expenditures and use their own fiscal powers (where these are significant) to offset the

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<sup>1</sup>Whilst it is difficult to analyse these issues in countries where the relationship between tiers of government has changed over time, we take account of major shifts in fiscal responsibility.

cuts in grants. By grouping countries or country characteristics in our event analysis regressions we can examine whether particular patterns of reaction to fiscal consolidations, or cuts in central government grants are particularly applicable to certain individual, or groups of, countries.

Our paper highlights a number of points. First, successful fiscal consolidations at central government level bring with them similar, and sustained, cuts in expenditure at the sub-central level. Indeed a pattern emerges for successful consolidations in which central governments cut intergovernmental transfers to lower tiers of government, who then cut back expenditure since they have difficulty in raising sub-central taxation revenues. There appears to be little evidence for the effect identified by Gramlich (1987) in the USA: sub-central governments do not tend to react to cut-backs in grants by raising revenues significantly.

Second, unsuccessful consolidations tend to be characterized by increased taxation at the central level, with no fall back in intergovernmental grants and no tendency for sub-central taxation to change. It appears that there is a strong correlation between success in consolidating central fiscal deficits and similar actions from lower tiers of government.

Third, Alesina and Perotti (1995, 1997) identified cut-backs in capital expenditures at central government level as a sign of an unsuccessful fiscal consolidation. In contrast, we find that where consolidations are successful, sub-central tiers of government have to significantly cut back on their capital expenditures. This suggests that the burden of adjustment falls onto lower tiers of government and that central governments worry less about the long-term (i.e. public investment) consequences of consolidation if these decisions are taken at local level. In addition, there is evidence that when faced with cuts in intergovernmental grants during consolidations, sub-central governments tend to maintain expenditures on wages at the expense of capital expenditure: there seems to be a definite switch towards public consumption. This might be interpreted as a variant of the effect identified by Gramlich (1987): sub-central governments seek to defend current services as opposed to spending on infrastructure rather than raising taxation. This could be explained by the fact that in many of the OECD countries in our sample the states/regions and local authorities have much more limited powers to vary taxation than in the USA.

Fourth, our results shed some light on how sub-central governments react to cuts in grants and thus, at least indirectly, on the 'fly-paper effect', by

showing that it operates in reverse. It appears that successful fiscal consolidations are characterized by cut-backs in intergovernmental grants, which are more than matched by cut-backs in sub-central expenditures. In contrast, periods of unsuccessful consolidation, which are characterized by increases in central taxation and no change in intergovernmental grants show only a small temporary reduction in sub-central expenditures. By examining in more detail episodes where central governments cut back grants to lower tiers of government, rather than just periods of significant fiscal consolidation, we find that this result is robust. Not only do sub-central governments react to a cut in grants by cutting expenditures, but remarkably those countries with structures which are more decentralized and apparently involve greater fiscal autonomy tend to cut expenditures by more, and seem reluctant to raise sub-central taxes. This reverse 'fly-paper effect' might highlight either a low degree of effective fiscal autonomy, or a high effective degree of tax competition at sub-central level which prevents any offsetting increase in local taxation. This does seem to contrast with the hypothesis that more decentralised fiscal arrangements lead to a lower degree of macroeconomic control (cf. Tanzi, 2001, Rodden, 2002, Rodden and Wibbels, 2002), or to a greater degree of taxation (see Keen, 1997), with the qualification that central governments retain a degree of control through their grant allocations.

Finally, we find that the institutional arrangements in countries (the government type and the nature of the fiscal arrangements) do impact at the margin on the results, and in particular that coalition governments tend to find it more difficult to cut grants to sub-central governments during fiscal consolidations.

## **2 Fiscal Consolidations and Sub-Central Government**

### **2.1 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. GFS provides the only internationally comparable data on fiscal variables disaggregated by tier of gov-

ernment, and provides us with consistent data for fifteen OECD countries<sup>2</sup>, subdividing these between three levels (central, state and local categories) producing an unbalanced panel dataset with 336 observations over the period 1970-99. A full description of the data is provided in Appendix 1. The data set covers not only federal, but also unitary countries. In practice, as we show in Darby *et al.* (2003, 2004) 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.

The data set used does have some weaknesses. An obvious one is that little or no distinction is made between tax revenues from taxes where the sub-central tiers control both the tax rates and/or the tax base, and revenues from tax sharing arrangements. However, we have been able to supplement our data with information on the tax powers of sub-central tiers (see OECD, 1999) for the majority of countries and by Jonathan Rodden at MIT in the cases of Canada and the USA. In what follows below we use this additional data<sup>3</sup> in our empirical work in order to distinguish between different degrees of fiscal autonomy.

Another potential weakness is that, to the extent that central government 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. Nonetheless, the GFS data remain the best available for our purposes.

## 2.2 Identifying Fiscal Consolidation Attempts

Previous studies of fiscal consolidation attempts have tended to focus solely on the general government (see Alesina and Perotti, 1995, 1997, Alesina *et al.*, 1998). In common with the existing literature, we define a fiscal consolidation as a discretionary attempt to improve general government fiscal balances. This of course involves abstracting from the effects of automatic stabilisers and interest payments, and focusing on the structural primary balance as a proportion of GDP. There is no universally accepted way of decomposing

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<sup>2</sup>Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, the Netherlands, Norway, Spain, Sweden, the UK and the USA.

<sup>3</sup>However, we do not have this additional data for Australia and France, and so in the analysis involving the fiscal autonomy data we lose some sample observations.

the primary fiscal balance to GDP ratio into its cyclical and discretionary components<sup>4</sup>. In what follows, we adopt the methodology used in Alesina and Perotti (1995, 1997), and Alesina *et al.* (1998), who follow Blanchard (1993) in constructing *fiscal impulses* as a measure of discretionary changes in fiscal policy from one year to the next.

For each country in our sample, we construct the Blanchard measure of fiscal impulses by regressing each component of the primary balance on unemployment, a constant, and a quadratic trend. Predicted values for revenues and transfers are calculated conditional on the previous year's unemployment rate, and this allows one to calculate a predicted primary balance based on an unchanged unemployment rate. The Blanchard measure of the structural fiscal impulse is then calculated by subtracting the predicted cyclically adjusted primary balance from its actual value<sup>5</sup>.

Having constructed a measure of discretionary changes in fiscal policy for each country, there are two ways of proceeding. The first is simply to use this measure as part of a panel dataset across countries to examine common features which characterise shifts in general discretionary fiscal policy. However, the problem with this approach is that the measured discretionary fiscal impulse is unlikely to be zero even where there is no discretionary policy action enacted by governments, simply because there is no perfect way of decomposing automatic and discretionary fiscal changes. The risk is that any statistical analysis based on this panel data set will lack statistical power. A second way of proceeding is to focus on *significant* changes in discretionary fiscal policy. This will ensure that our results are not driven unduly by cyclical changes. An operational definition of a significant positive fiscal impulse, i.e. a period of *fiscal consolidation* is provided by Alesina and Perotti (1995)<sup>6</sup>:

*Definition 1: A period of fiscal consolidation is deemed to have occurred in a given year if the discretionary general government fiscal impulse is greater than or equal to 1.5% of GDP.*

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<sup>4</sup>For a discussion, see Gramlich (1990), Bouthevillain and Quinet (1999), Bruni and Tujula (1999) and Chalk (2002).

<sup>5</sup>Bruni and Tujula (1999) compare the Blanchard measure of fiscal impulses with a cyclical adjustment of the primary balance using the Hodrick-Prescott filter. They find that the Blanchard measure corresponds more closely to periods of expansionary or tight fiscal stance as identified by economic commentators. It also has the merit of not relying on problematic measures of potential output or base years.

<sup>6</sup>For similar subjective criteria see Giavazzi *et al.* (2000), von Hagen *et al.* (2001).



This definition allows us to identify a number of consolidation episodes from the panel data. These episodes can be classified further into successful or unsuccessful. To be more precise, we again follow previous studies on fiscal consolidation (see Alesina and Perotti, 1995) in defining a subjective criterion for the success or failure of consolidation attempt, in terms of the improvement of the general government fiscal position<sup>7</sup>:

*Definition 2: A fiscal consolidation is deemed to be successful if, three years after the consolidation attempt, the ratio of debt to GDP is at least 5 percentage points below the level observed immediately prior to the consolidation attempt.*

Having identified a number of periods of significant fiscal consolidation, we can analyse our data. As we shall see below, a useful approach is provided by the methodology of event studies. Using definition 1, we can identify 61 separate consolidation attempts. Of these, using definition 2, 22 seem to have been successful. Table 1 reports the countries and date for which we have identified fiscal consolidation attempts.

## 2.3 Event Studies of Fiscal Consolidations

### 2.3.1 Econometric Methodology

Event studies provide a method, based on regression analysis, to examine the collective time profile of key time series variables of interest around the time of defined events, in our case fiscal consolidations. These studies are less common in macroeconomics, but are more commonplace in finance<sup>8</sup>. Here we use event study analysis to compare and contrast changes in key fiscal variables before, during, and after a year of fiscal consolidation, which is the event of interest, with respect to 'normal' or reference conditions, i.e. non-consolidation years. By doing this, we can obtain a time profile of all the fiscal variables of interest during the period of consolidation and periods immediately prior and after the fiscal impulse.

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<sup>7</sup>In practice the results seem robust to different definitions of 'success', including the use of a more refined success index, as opposed to simply classifying attempts into 'successes' and 'failures'.

<sup>8</sup>See for instance MacKinlay (1997) and Campbell et al. (1997). For instance, in finance these methods are used to examine the impact of 'news' on share prices such as the announcement of profit figures, in the immediate and surrounding periods.

In our analysis of fiscal consolidations all the variables employed are expressed in percentages of GDP. We define an event window of five years, i.e. two years prior the fiscal consolidation, the event period itself, and the two years following the consolidation. The width of the event window can, as we shall see below, be altered if some of the time dummies used in the regression analysis are not significant.

The econometric methods used are similar to those employed by Tornell and Westermann (2002) in an analysis of business cycles around the time of financial crises. Panel data methods are applied, where the panel regressions include fixed effects to account for cross-country heterogeneity and use Weighted Least Squares (WLS) to account for the effects of heteroscedasticity. Each fiscal variable in our data set is regressed over the entire sample (for all countries,  $i$ , and all time periods,  $t$ ) on a series of time dummies designed to capture the time profile of the variables. More precisely, the time dummies capture the differences between each period in the event window and non-consolidation years. We carry out two sets of regressions.

First we examine all consolidation attempts collectively, where  $T$  denotes the actual year of consolidation:

$$y_{it} = \alpha_i + \beta_1 D_{i,T-2} + \beta_2 D_{i,T-1} + \beta_3 D_{i,T} + \beta_4 D_{i,T+1} + \beta_5 D_{i,T+2} + \epsilon_{1i,t} \quad (1)$$

where  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ , and  $D_{i,T\pm j}$  are time dummies, equal to 1 in  $+j/-j$  periods from the consolidation period, and zero in all other periods.

Second, we subdivide the identified fiscal consolidations into the 'successful' and 'unsuccessful' categories and perform the following regression:

$$y_{it} = \alpha_i + \delta_1 D_{i,T-2}^S + \delta_2 D_{i,T-1}^S + \delta_3 D_{i,T}^S + \delta_4 D_{i,T+1}^S + \delta_5 D_{i,T+2}^S + \varphi_1 D_{i,V-2}^U + \varphi_2 D_{i,V-1}^U + \varphi_3 D_{i,V}^U + \varphi_4 D_{i,V+1}^U + \varphi_5 D_{i,V+2}^U + \epsilon_{2i,t} \quad (2)$$

where again  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ ,  $D_{i,T\pm j}^S$  are time dummies, equal to 1 in  $+j/-j$  periods from the successful consolidation period (denoted  $t=T$ ) and zero in all other periods, and  $D_{i,T\pm j}^U$  are time dummies, equal to 1 in  $+j/-j$  periods from the unsuccessful consolidation period (denoted  $t=V$ ) and zero in all other periods.

Each estimated coefficient  $(\beta_k, \delta_k, \varphi_k)$  captures the estimated difference between period  $k$  in the event window and the average position in non-consolidation years. Thus, for instance, if the dependent variable is the annual change in central government expenditure, a significantly negative  $\beta_2$  implies that in the year prior to the consolidation the change in central government expenditure was significantly lower than in non-consolidation years (the 'normal', or reference period).

As we shall see below, having estimated the standard event study regression it may be useful to see if individual countries or groups of countries display significantly different behaviour from the rest of the countries in the event sample. For instance, we might wish to consider whether those countries with different types of government (e.g. coalition or single-party governments) display different behaviour in terms of fiscal adjustment at central and sub-central level. Or we might want to consider if countries with federal rather than unitary structures display a different adjustment pattern. Equation (1) can be modified as follows, to include an interactive dummy variable:

$$y_{it} = \alpha_i + \beta_1 D_{i,T-2} + \beta_2 D_{i,T-1} + \beta_3 D_{i,T} + \beta_4 D_{i,T+1} + \beta_5 D_{i,T+2} \quad (3)$$

$$\lambda_1 C_l D_{i,T-2} + \lambda_2 C_l D_{i,T-1} + \lambda_3 C_l D_{i,T} + \lambda_4 C_l D_{i,T+1} + \lambda_5 C_l D_{i,T+2} + \epsilon_{3i,t}$$

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 the standard dummies. For instance, taking the previous example, if  $C_l$  is a dummy representing the current Eurozone countries, a significantly negative  $\lambda_3$  would indicate that in the year of consolidation central government expenditure is significantly lower than in non-Eurozone countries during fiscal consolidations.

### 2.3.2 Results

The results of this consolidation event study are presented as a series of graphs, shown in Figure 1, panels A to V. As noted above, we consider all the consolidations which fall into definition 1, and then sub-divide them into the categories of successful and unsuccessful, using definition 2.

The upper row of graphs in each panel shows the time profile of the fiscal impulse for, respectively, all consolidations, successful consolidations, and unsuccessful consolidations. Alongside the fiscal impulse we also plot the standard error bands which show in which time periods the time profile implies a change in fiscal impulse which is significantly different from zero. The lower row of graphs in each panel shows the *cumulative* fiscal impulse, obtained by summing the fiscal impulses over all periods. Again, for the cumulative effect we show asymptotic standard error bands. Panel A shows the extent to which these consolidations involve an improvement in the fiscal position of the central government, as measured by the annual change in the Blanchard fiscal impulse. As can be seen from panel A, fiscal consolidations (as per their definition), involve a fiscal impulse which is at least 1.5% of GDP in time period T. It is also interesting to note that the time profile of the consolidations around period T is very similar regardless of whether the fiscal consolidation is ultimately successful or not, but that as can be seen from the cumulative graphs, the successful fiscal consolidations involve a larger cumulative positive fiscal impulse, as the improvements at time T are amplified in post-consolidation periods.

Panel B shows the fiscal impulse by the sub-central tiers of government, and shows how they fared during these fiscal consolidations. What is interesting is that the consolidation effort is a shared one between tiers of government. All period T dummies are positive and statistically significant, suggesting a more favourable annual change in the discretionary fiscal balance than in non-consolidation years both within and outwith the event window<sup>9</sup>. Interestingly, we see that there is a major difference between successful and unsuccessful consolidations: in the former, sub-central tiers of government share a considerable part of the burden of macroeconomic adjustment. The other point to note is that in the period following the discretionary fiscal tightening there is a partial reversal at sub-central level (the T+1 dummies are significantly negative). This may indicate some resistance to the consolidation effort.

Does a higher degree of fiscal decentralization imply less control over fiscal policy at sub-central level? Rodden (2002) and Rodden and Wibbels (2003) as well as Tanzi (2001), have argued that greater fiscal decentralization might

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<sup>9</sup>Note that the movement in the sub-central impulse will also be affected by any change in grants from central government.

result in a potential deterioration in macroeconomic control, as sub-central tiers of government have the incentive to myopically focus on local issues. Whilst we do not attempt to answer this question directly, we do examine the extent to which the most decentralized countries contribute to overall consolidation attempts, and gauge whether there is evidence of greater resistance to central government consolidation efforts within such countries. In Figure 1, panel C we have divided the sample into countries with 'high' and 'low' degrees of fiscal decentralisation. To be precise, we divide our set of countries into these two categories on the basis of the percentage of expenditure and revenue assignment at the sub-central level, with seven countries in the 'high' category<sup>10</sup>. Figure 1 (panel C) shows clearly that the fiscal impulse is larger in the 'highly decentralised' countries at time T, involving an improvement relative to non-consolidation years of 0.5% of GDP). Thus, a high degree of decentralisation does not seem to be inconsistent with sub-central tiers of government sharing the burden of adjustment. As we shall see below, concurrent cuts in central government grants appear to be an important element behind this shared adjustment.

Having looked at the time profile of the overall fiscal positions, we now examine the evolution of expenditures and revenues during the event window, both their total values and their individual components. Note that in the case of total expenditure we examine total primary expenditure excluding transfers, i.e. excluding interest payments and transfers to other levels of national government. Similarly total revenue includes all tax and non-tax revenues but excludes grants received from other tiers of national government. Intergovernmental grants and transfers are analysed separately.

Panels D and E in Figure 1 show the evolution of total expenditures in central and sub-central government. Panels F-M show the equivalent plots for the components of total expenditure (respectively wages, social transfer

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<sup>10</sup>The countries were split into two groups along expenditure decentralisation lines, with seven countries in the 'high' category (Australia, Canada, Germany, Finland, Norway, Sweden and the USA), and eight in the 'low' category (Austria, Belgium, Denmark, Spain, France, the UK, Ireland, and the Netherlands). The results seem reasonably robust to a classification along different lines, e.g. overall fiscal decentralisation based on both expenditure and revenue considerations. In addition, we also attempted to differentiate our sample along a related characteristic, i.e. whether the countries are federal or unitary. In practice there is a substantial overlap between these two categorisations, and the results for 'federal' countries were similar to those for 'highly decentralised' countries.

payments, goods and services and capital expenditure). A number of points can be noted from these results. First, as can be seen from panels D and E, the key difference between successful and unsuccessful consolidations is that expenditure is tightened consistently over time during successful consolidations, and not just in the period where the consolidation takes place (T). This sustained cut is evident in the majority of the components of spending, with the exception of central government capital expenditure which we discuss below. Furthermore, this progressive tightening is also evident at the sub-central level, confirming the important role of the sub-central tier. Second, it has been suggested by Alesina and Perotti (1997) that cuts in social welfare spending and wages tend to distinguish successful consolidation, and that this is linked to an important signalling effect: by cutting these types of expenditures central governments can indicate an important commitment to fiscal control<sup>11</sup>. Panels F and H confirm this: while significant and sustained cuts are made in the central government wage bill across both successful and failed consolidations, the size of the cut is clearly larger, and the demonstration effect stronger, in the successful case. Third, it is usually argued (Alesina and Perotti 1995, 1997, and McDermott and Wescott, 1996) capital expenditure cuts tend to be unsustainable and hence are more of a feature of unsuccessful consolidations. Panels L and M show that capital expenditure cuts by central governments do tend to be larger during unsuccessful consolidations, but that the picture is reversed at sub-central government. It does appear that some of the pressure on sub-central governments is translated into lower levels of public investment, and the difference between successful and unsuccessful consolidations is particularly marked.

Turning now to the revenues side, Panels N-S in Figure 1 show the evolution of central and sub-central government revenues and their components. Panel N shows the point made in Alesina and Perotti (1995, 1997) that in the year of the consolidation unsuccessful attempts are characterised by increases in fiscal revenues rather than expenditure cuts in period T. Note that central government revenues rise in both successful and failed consolidation attempts, but that the new higher level of revenues is almost completely reversed in the next year, with a significant negative effect at T+1. Thus the

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<sup>11</sup>Alesina and Perotti (1997) argue that outside of consolidation periods social transfers and wages have the strongest tendency to automatically increase. This is supported by the average fixed effects in our estimated model, where for both wages and social transfers they tend to be positive.

cumulative change in revenues profile is not actually different for successful and failed consolidation attempts. This is something which is not evident from the Alesina-Perotti studies because they do not analyse the periods subsequent to the consolidation attempts. Panel O shows that unsuccessful attempts seem to be characterised more by an increase in sub-central governments' revenues. Breaking down revenues into taxation and other charges (including user charges), shown in panels P-S, one can see that although there is a tendency for sub-central governments to raise taxation<sup>12</sup> in the period of the consolidation. There is also a tendency for user charges and fees to be lower in the case of successful consolidations, although these effects are barely significant. We conclude that revenue adjustments appear to contribute little to the cumulative profile of fiscal consolidations at central or sub-central levels, and where present they appear to be more connected with unsuccessful consolidations or to be temporary measures.

What seems to matter more, in terms of fiscal consolidations, is the role played by intergovernmental grants and transfers. Panel T shows the extent to which central governments adjust sub-central grants around the time of fiscal consolidations. It is important to note that all the countries in our sample exhibit some degree of vertical imbalance in that expenditures at the sub-central tier exceed own-source revenues with the difference being financed by central government grants<sup>13</sup>. Any changes in grants will therefore impact heavily on sub-central governments.

The significant negative dummies in periods T, T+1, and T+2 in the upper row of panel T shows that, relative to the reference category, grants to sub-central governments are cut substantially both during and after years of consolidation. It is also apparent that this result is driven almost entirely by successful consolidations. The cumulative change in grants during successful consolidations is about -1.3% of GDP, while the average change outside the event window is 0.2%. In contrast during unsuccessful consolidations the cumulative coefficient is insignificantly different from the average fixed effect. Clearly cuts in grants are central to fiscal consolidation efforts by central governments: by cutting the finance available to lower tiers of government they in effect force their hand. Below we will examine cuts in grants more

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<sup>12</sup>Although it should be remembered that we do not distinguish here between taxation increases where the base and yield is under the control of sub-central government and increases in shared taxation revenues.

<sup>13</sup>See Figure 4.

closely, to see whether, and when, sub-central governments respond to such pressures by cutting expenditures, and when instead they choose to raise taxes. For the moment, at least when we focus on fiscal consolidations, there would appear to be a reverse 'fly-paper effect', in that cuts in grants lead to cuts in sub-central expenditure. Again, we will return to this theme below to see whether it applies more generally to all cases where central governments cut grants to lower tiers of government.

Finally, we examine the extent to which the nature and stability of the central government impacts on these fiscal decisions. Using the data provided in Woldendorp et al. (2000), we differentiate the identified consolidation episodes along 'type of government' lines. Although Woldendorp et al. define six alternative forms of government, we group these into three types: single party parliamentary majority, coalition parliamentary majority and parliamentary minority with a single party or a coalition). The form of government in the actual period of consolidation is used as the discriminating factor<sup>14</sup>. Panels U and V in Figure 1 show, respectively, the annual change in government expenditures by single party and coalition central governments, and the cuts in grants by these two categories of government. As can be seen in panel U, there is only a slight difference in the expenditure-cutting behaviour of single-party and coalition governments. However, panel V demonstrates that coalition governments are not able to cut sub-central grants. All single-party dummies are significantly negative at the 10% level. Cutting sub-central grants, like any other current expenditures is likely to be politically difficult and strong governments may find it easier to deal with the potential backlash from local government. The reluctance to address sub-central finances may partially explain the lower probability of success in fiscal consolidations of coalition governments.

### **3 Cuts in Grants: How do Sub-Central Governments React?**

We saw in the previous section that central governments engaged in fiscal consolidations use grants to sub-central tiers of government as an important

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<sup>14</sup>Potentially different types of government can be in power across our event window. We find, however, that this happens rarely and does little to alter our results.



instrument for controlling public finances. We now broaden the horizon to ask how these moves to cut grants impact on the adjustment decisions made by lower tiers of governments. The reason for doing this is that fiscal consolidations may not be typical of a more general tendency for different tiers of governments to adjust financial flows between them. For instance, in the previous section we saw that cuts in grants during fiscal consolidations were not characterised by increases in taxation, but instead led to cuts in sub-central expenditures (including capital spending). In other words, fiscal consolidation seems to diminish fiscal decentralisation. Is this a result which holds more generally in a wider range of circumstances not formally defined by an attempt to restore the public finances? Some writers have suggested for instance that changes in grants between tiers of government may be used to affect the relationship between federal governments and states (see Quigley and Rubinfeld, 1996).

### 3.1 A Cuts in Grants Event Study

In what follows we again employ an event study methodology in order to study how sub-central governments react to cuts in grants. Changes in grants as a percentage of total sub-central revenues now represent the 'event', rather than consolidation attempts. The variable in question is the change in grants (at constant prices) as a percentage of the previous period's total revenue (at constant prices), i.e.  $((G_t - G_{t-1})/TR_{t-1}) * 100$ . Here, unlike consolidations, we focus on all cuts in grants in real terms, which provides us with a total sample of 86 episodes. From these we exclude two, the UK in 1990/91, and Spain in 1985/86, where the adjustments in grants were linked to a major reform in local government finance, and hence did not represent an attempt to change the fiscal balance between tiers of government without an associated reform in local/state government finance. A list of all the episodes which are part of our sample is provided in Table 2.

As before, the basic event study regression is given as follows, where  $T$  now denotes the actual year of the cut in grant:

$$y_{it} = \alpha_i + \beta_1 D_{i,T-2} + \beta_2 D_{i,T-1} + \beta_3 D_{i,T} + \beta_4 D_{i,T+1} + \beta_5 D_{i,T+2} + \epsilon_{1i,t} \quad (4)$$

where  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ , and

$D_{i,T\pm j}$  are time dummies, equal to 1 in  $+j/-j$  periods from the period where the cut takes place, and zero in all other periods. As before, we focus on a variety of different variables: total expenditure, taxation, fees and user-charges, the wage bill, social transfers, expenditure of goods and services, and capital expenditure.

It is also informative to divide the events into two categories, defined by 'large' and 'small' cuts in grants. These are defined below. We then perform the following event study regression:

$$y_{it} = \alpha_i + \delta_1 D_{i,T-2}^S + \delta_2 D_{i,T-1}^S + \delta_3 D_{i,T}^S + \delta_4 D_{i,T+1}^S + \delta_5 D_{i,T+2}^S + \varphi_1 D_{i,V-2}^L + \varphi_2 D_{i,V-1}^L + \varphi_3 D_{i,V}^L + \varphi_4 D_{i,V+1}^L + \varphi_5 D_{i,V+2}^L + \epsilon_{2i,t} \quad (5)$$

where again  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ ,  $D_{i,T\pm j}^S$  are time dummies, equal to 1 in  $+j/-j$  periods from the period when the small cut in grants took place (denoted  $t=T$ ) and zero in all other periods, and  $D_{i,T\pm j}^L$  are time dummies, equal to 1 in  $+j/-j$  periods from the period in which the large cut in grants took place (denoted  $t=V$ ) and zero in all other periods.

As shown in (3), we can modify this regression to take account of particular individual or groups of countries to see if their behaviour deviates from that of other countries in the sample.

## 3.2 Results from Cuts in Grants Study

### 3.2.1 Results

One issue is whether there is some non-linear effect present which cannot be captured by focusing on all real cuts in grants. 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 grants by raising taxation, whilst a large cut could not be accommodated in this way and might require a significant cutback in spending. In order to check whether the results are affected by the size of the grant cut we divided our sample as shown in (5). We ranked our sample of 86 observations by size and then divided them into two equal sub-samples of 'large cuts' and 'small cuts'. The largest cuts averaged 2.77% of total sub-central government revenues, whilst the smallest cuts averaged 0.59%

of total revenues. Note that both of these categories of cuts are generally sustained. On average, the grants in period  $T+1$  increased by only 0.1% of total revenues for the large grants cut, and by 0.27% for small cuts. In other words, large cuts are substantial and hardly reversed in the following period, whilst small cuts on average tend to be partially, but not wholly, reversed.

As before, we plot the results from the event study regressions to show how the fiscal variables for the sub-central governments behave in proximity of the cuts in grants event. These are shown in Figure 2, panels A-G. In each row of the panels in Figure 2 we again plot both the annual change and the cumulative change in each fiscal variable. Panels A-G show the reaction of each of the seven fiscal variables to the cuts in grants during the event window, and for each variables the results are divided into all cuts in grants, small cuts in grants, and large cuts in grants. Unlike the fiscal consolidations, we find that for the cuts in grants regressions the  $T-2$  dummies are always insignificant, and hence they have been dropped from our regressions.

A number of points emerge from Figure 2. First, it is apparent from panel A that there is a sustained cut in total expenditures at sub-central level, and there is even evidence that some of these cuts are anticipated as the  $T-1$  dummy variable is significant. This might be the result of planned or signalled cuts by central governments. Second, as is apparent from panel B, sub-central governments do tend to react significantly in period  $T$  to a cut in grants, by raising taxation. Notice that, unlike the fiscal consolidation study, the estimated increase in sub-central tax revenue is significant at time  $T$  for all grant cut episodes. The response of sub-central taxation revenues tends to be immediate for large cuts in grants, and delayed (at  $T+1$ ) for small cuts, although the cumulative change is more sustained in response to small grant cuts. This is a richer picture than emerged from our fiscal consolidation study, where there seemed to be little impact on revenues: although the cumulative effect here is not significant by  $T+2$ , there does appear to be a shift towards sub-central taxation as a result of cuts in grants, with a delayed effect in the case of small cuts in grants. However, the impact is less than that on expenditures, and 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. This is generally supportive of the results in Gamkhar and Oates (1996), and in contrast to Gramlich (1987). Similarly, there is little evidence that non-taxation revenues from fees and user charges are used to offset the

cuts in grants (panel C). Third, the impact of cuts in grants on the sub-central government wage bill is significant at time T for all cuts, and there is a significant (though small) reduction in social transfers and purchases of goods and services (see panels D-F). In the case of the wage bill, the cut in this following a large cut in grants is large and significant at time T and T+1, but is very different in the case of small cuts, where the response of the wage bill is barely significant at time T and never significantly below the starting point, even at T+2. This might be due to the fact that large cuts elicit major adjustments in sub-central governments such as adjustments in the wage bill of local governments. Clearly in the case of social transfers any effect is small because the majority of social welfare expenditures are likely to be the responsibility of central governments for most of the countries in our sample, and this is similar across size of grant cut. Overall the major impact of the cuts in grants appears to fall on the wage bill of sub-central government, and this ties in with the evidence from our fiscal consolidation study, which suggested that sub-central governments play an important part in stabilisations (see also Darby et al. 2004). Fourth, as in the case of fiscal consolidations, cutting capital spending by sub-central governments is a standard reaction. Panel G shows clearly that cuts in capital spending constitute a large proportion of the overall adjustment, and that indeed the T-1 dummy is significant, so that some cuts are brought forward ahead of the cuts in grant. Overall the graph shows a substantial tightening across the event window, and this is made even more significant by the fact that capital expenditures tend to be only a small proportion of total expenditures at the sub-central level. Table 3 shows that capital spending ranges from as little as 6.24% of total spending on average in Canada, to 28.7% in France. Small grant cuts account for more significant and sustained changes in capital expenditure than large grant cuts, as in the latter case the cut in spending appears temporary.

### 3.2.2 Dependence on Central Government Grants

One question which arises in analysing these responses to central government grant cuts is whether there is a significant difference in the responses of sub-central governments which are highly dependent on grants and those depend less on grants. In Table 4 we have divided the sample into a small group

of five countries (the UK, Spain<sup>15</sup> (post-1985), Belgium, Ireland and The Netherlands) which exhibit a high degree of dependence on central grants (above 50%) and those where the dependence is less (below 50%).

Figure 3 shows the annual change in the fiscal variables following a cut in central grants, in each of panels A-G. What is striking about these results is that those countries that are least dependent on central grants seem to cut expenditure more (i.e. there is a stronger reverse 'flypaper effect'). From the results in Figure 3, panel B, it appears that fiscal autonomy<sup>16</sup> does not necessarily imply a willingness to offset grant cuts through increases in taxes. Similarly, those countries that are less dependent on grants are more responsive in cutting all the components of spending (goods and services, social transfers, wages, and capital expenditure).

This result does suggest that cuts in grants elicit different reactions in different institutional settings, although it is interesting to note that those countries that are least dependent on central government grants are more likely to adjust. To check the robustness of this result, we conducted some further analysis to check which countries and what institutional features were driving this result.

### 3.2.3 Fiscal autonomy and Reaction to Grant Cuts

One way to examine how individual countries react during the events is by introducing interactive dummies in our event study regressions (see 3). These show whether individual countries display a behaviour which is significantly different from that of other countries in terms of the coefficient on the time dummies in the regression. To put this another way, it shows whether for individual countries the profile of the fiscal variables evolves in a significantly higher or lower path. In general, these results were not very informative, and for some countries (Spain and Finland) there were too few observations to allow us to introduce country dummies<sup>17</sup>. Some consistent results do

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<sup>15</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.

<sup>16</sup>Although one has to recall that many of those who are less dependent on grants do benefit from tax-sharing arrangements.

<sup>17</sup>These results are not tabulated for reasons of space. However, the results are available from the authors on demand.

emerge: for instance, Belgium shows a lesser cut in expenditure relative to the reference value, 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 a significantly larger cuts in capital spending, but Austria displayed significantly smaller cuts, following cuts in grants. In the UK sub-central governments seem to anticipate cuts in grants with bigger cuts in expenditure at T-1.

In order to obtain more informative results, which use up less degrees of freedom, we tried grouping the countries into different categories, depending on the institutional features of their fiscal arrangements.

Table 5 shows the ranking of the countries in our samples by expenditure decentralization. A greater degree of decentralization in spending should presumably allow sub-central governments greater scope to adjust to a cut in grants. The first row of Table 6 shows that this does seem to be the case, with taxation, total expenditures, and expenditures on goods and services lower than the reference value<sup>18</sup>.

We next attempted to see whether by grouping the countries by the degree of taxation autonomy this might explain some of the reactions to the cuts in grants. In order to do this, we use the measures of taxation autonomy published in OECD (1999) and Rodden (2002). There are, however, two caveats with this. The first is that it results in the loss of observations for two countries (France and Australia). The second is that the reference date for these measures of tax autonomy (see Table 7) is fixed at 1995 levels. The second row of Table 6 show that in fact few significant effects could be found at time T, so that tax autonomy does not appear to be a significant feature explaining how sub-central governments react to cuts in grants. It is interesting to know that a higher degree of taxation autonomy still involves a reverse 'flypaper effect' and that there is no attempt by sub-central governments to offset the consequences of lower grants on sub-central spending.

Finally, we group the countries according to a measure of borrowing autonomy (see Table 8). The final row of Table 6 shows that the countries with the greatest borrowing autonomy react to cuts in grants through lower

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<sup>18</sup>In tabulating these effects we focus on the interactive dummies at time T. In some cases, we found that the interactive dummies were significant in other time periods. However these effects are difficult to explain in terms of institutional features in the country groupings, and seem to be less important.

total expenditure and lower capital spending, relative to the reference value. It appears that, even for countries with high levels of autonomy, sub-central expenditures and grants are strategic complements.

## 4 Conclusions

Our paper has established an important role for sub-central government in fiscal adjustment. Using comparative data on sub-central government variables and on inter-governmental grants, we have provided a picture of how sub-central tiers of government play a role during periods of fiscal consolidation, and how grants play a key role in forcing sub-central governments to adjust. We use event study analysis to examine not only how governments react to these adjustment episodes, but also the time profile of the adjustment.

The results which emerge are varied and are set out in detail in the body of the paper. However, it is worth highlighting three general points which emerge from our empirical analysis. The first is that sub-central governments play a key role in successful fiscal consolidations. This provides support for the argument that understanding sub-central government behaviour is important in overall macroeconomic stabilisation. However, this result is tempered by the observation that fiscal decentralisation does not seem to necessarily imply loss of control, as suggested by some observers (cf Rodden, 2002, Rodden and Wibbels, 2002), or to a higher degree of taxation. Sub-central governments do not appear to react to fiscal consolidation attempts by increasing own taxes. Furthermore, the largest cuts in sub-central expenditure in response to a cut in grants from central government seem to have occurred in countries with greater expenditure decentralization. This implies that, even within countries which have high degrees of decentralization, grant allocations provide a mechanism whereby central governments retain considerable effective control over aggregate sub-central expenditures. In future work, we hope to focus more closely on the implications of alternative forms of fiscal decentralization on the nature and success of consolidation attempts.

The second general theme is that we present some evidence that cuts in grants play an important role in fiscal consolidations. We also demonstrate that cuts in grants are not generally offset by increases in sub-central taxation revenues. Overall, the increase in sub-central taxation following episodes of

cuts in grants tend to be weak, and this is generally supportive of the presence of a reverse 'fly-paper' effect, but without evidence for an asymmetric fly-paper effect as suggested by Gramlich (1987).

The third general point is that capital spending is an important adjustment mechanism for sub-central governments following fiscal consolidations or cuts in grants. Although the nature of the adjustment does depend on the degree of success of the consolidation or the size of the cut in inter-governmental grant, what is striking is that capital spending does tend to suffer at sub-central level following a fiscal adjustment. This is despite the relatively small size of capital expenditure compared to total sub-central budgets, and possibly highlights a degree of short-termism on the part of local governments in adjusting their fiscal position.

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## 6 Appendix 1 - Data Descriptions

All variables unless stated are from the IMF GFS [2002] database.

1) 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.]

2) Total revenue = Tax revenue + non-tax revenue + capital revenue + grants (total grants less grants received from other tiers of national government).

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

4) Social Transfers = Transfers to households and non-profit organisations plus subsidies to firms.

5) Government wage bill = Expenditure on wages and salaries.

6) Debt to GDP ratio = Gross national debt as a percentage of GDP; source OECD Statistical Compendium 2002.

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

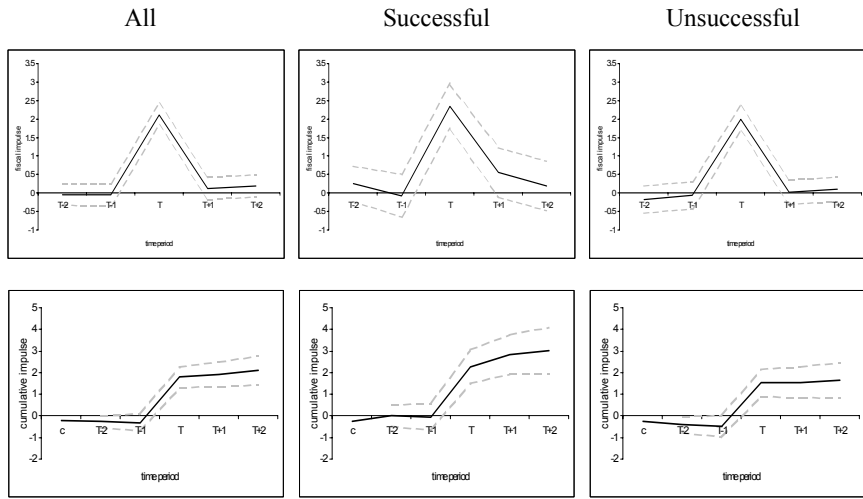
8) Blanchard Fiscal Impulse = (Blanchard Adjusted cyclical balance)<sub>t</sub> - Unadjusted Primary Balance)<sub>t-1</sub>.

9) Type of government = Based on 'Type of Government' variable in Woldendorp et al. (2000). For each year, central government classified either as single party majority (i.e. one party in government with a majority in the legislature), coalition majority (i.e. two or more parties in government where between the two they have a majority in the legislature), or minority (i.e. single or multi-party government without a majority in the legislature).

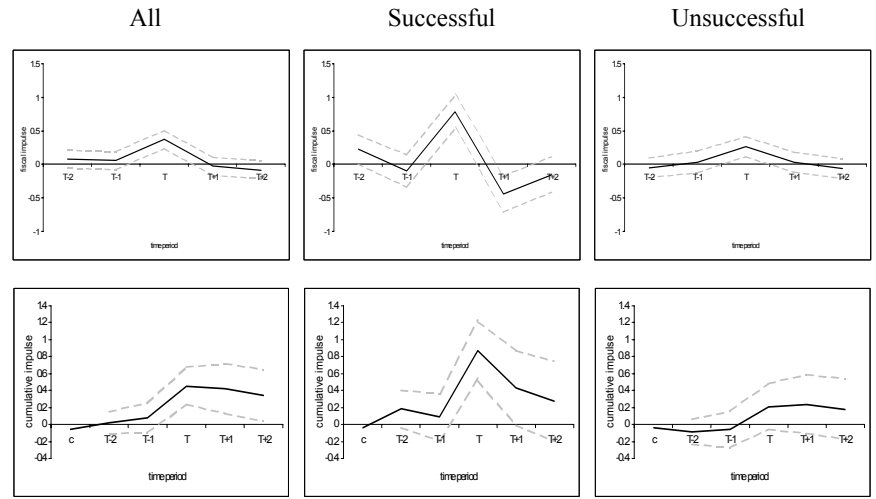
10) Ideological colour of the government = Based on "Ideological Complexion of Government and Parliament" in Woldendorp et al. (2000). For each year, central government classified as Right-wing dominance (share of seats in Government and supporting parties in Parliament larger than 66.6%), Left-wing dominance (share of seats in Government and supporting parties in Parliament larger than 66.6%), Centre dominance (all other cases)

**FIGURE 1:**

**A: Central Government Fiscal Impulse**



**B: Sub-Central Government Fiscal Impulse**



**C: Sub-Central Fiscal Impulse split by level of decentralisation**

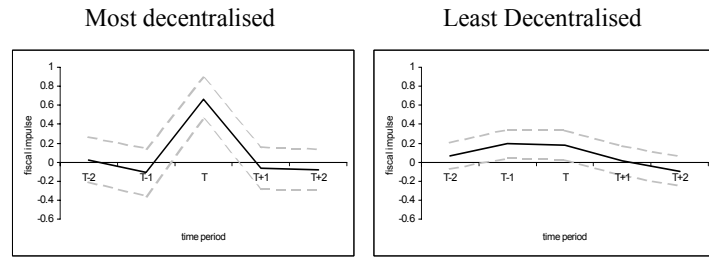
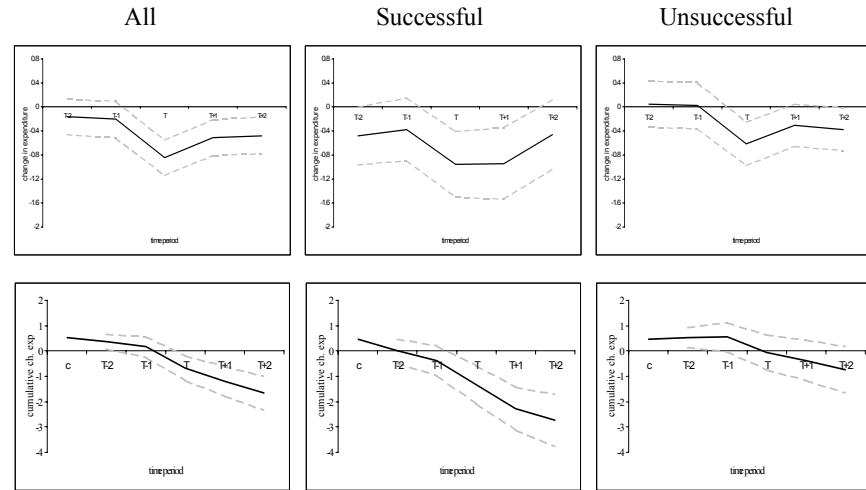
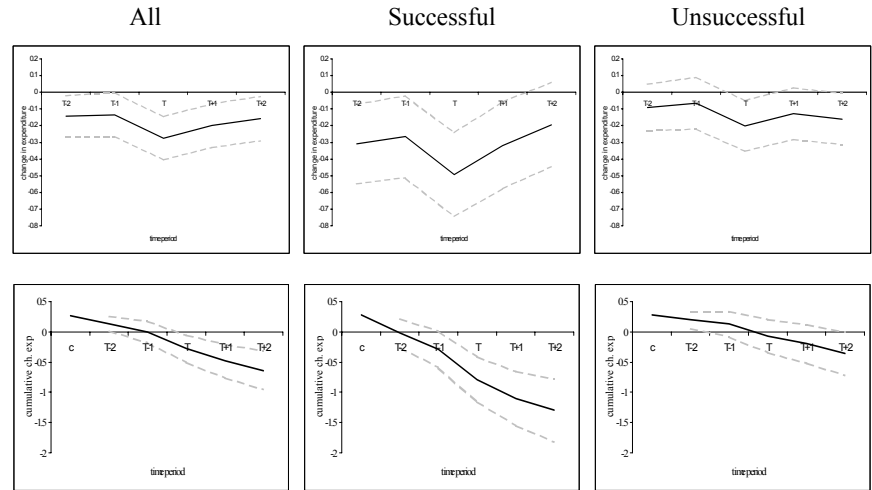


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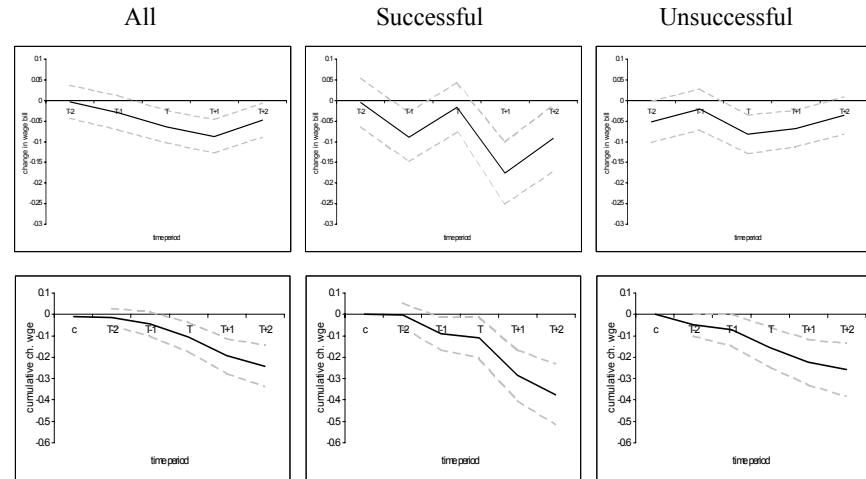
**D: Central Government Total Expenditure**



**E: Subcentral Government Total Expenditure**



**F: Central Government Wage Bill**



**G: Sub-Central Government Wage Bill**

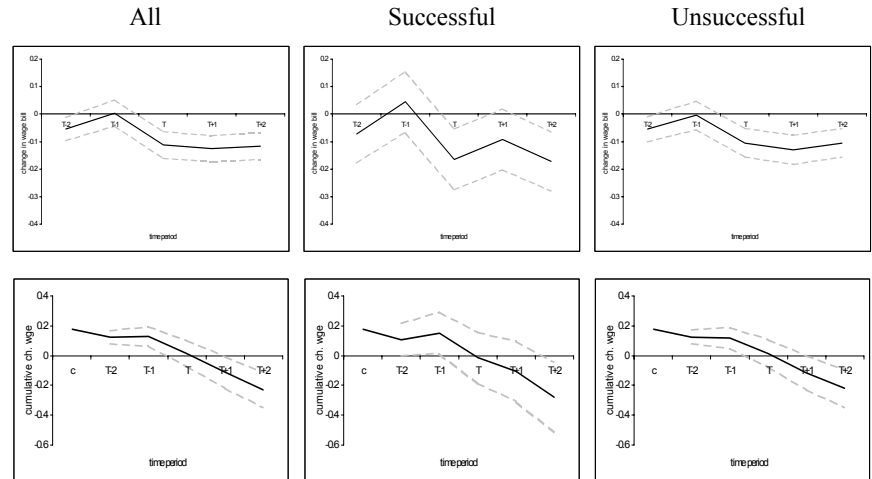
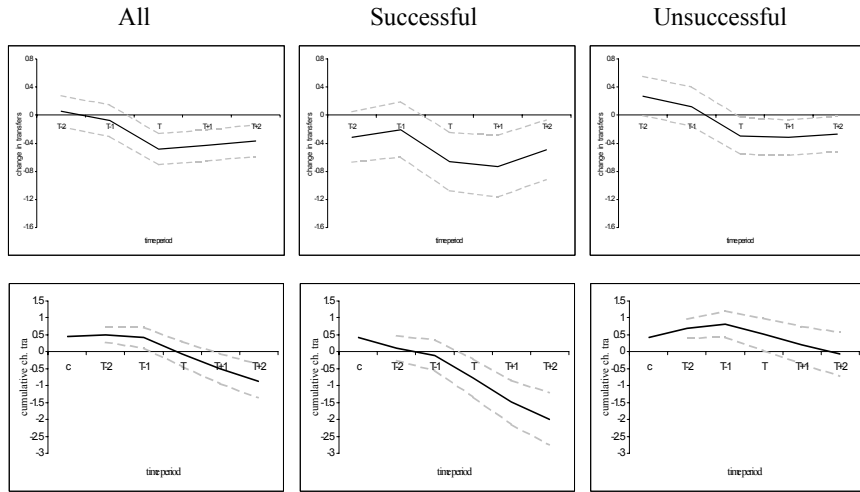
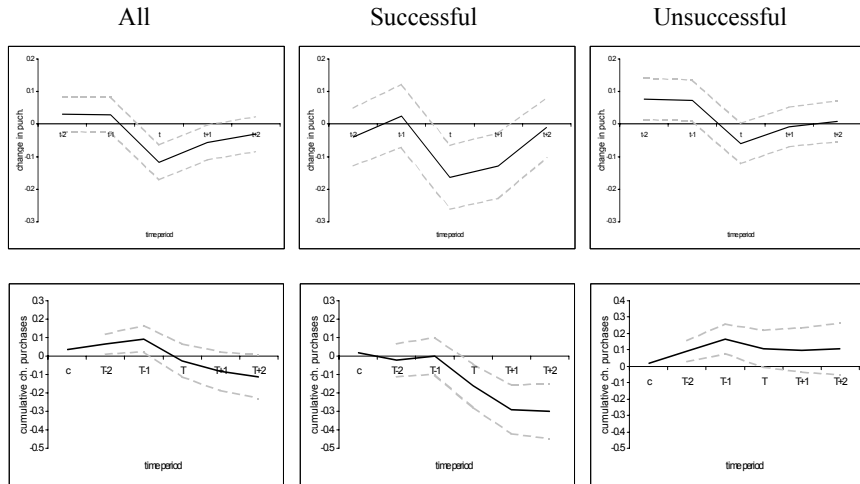


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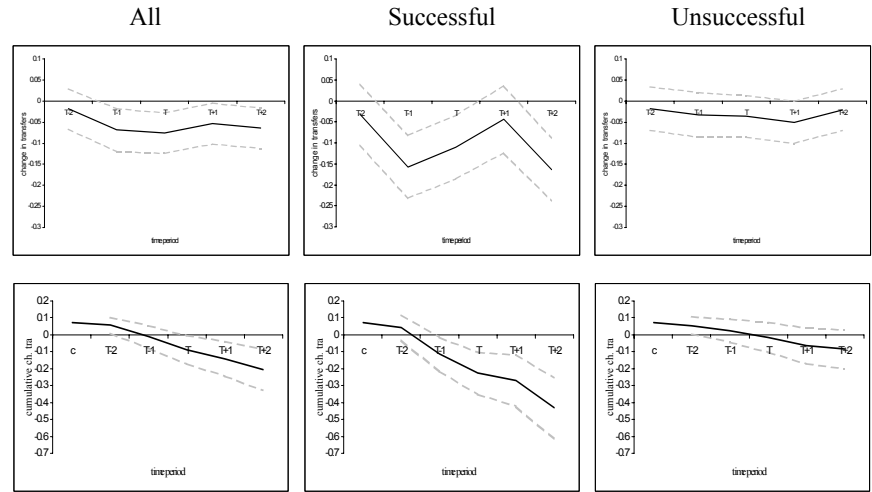
**H: Central Government Social Transfers**



**Figure 1J: Central Government Expenditure on Goods and Services**



**I: Sub-Central Government Social Transfers**



**Figure 1K: Sub-Central Government Expenditure on Goods and Services**

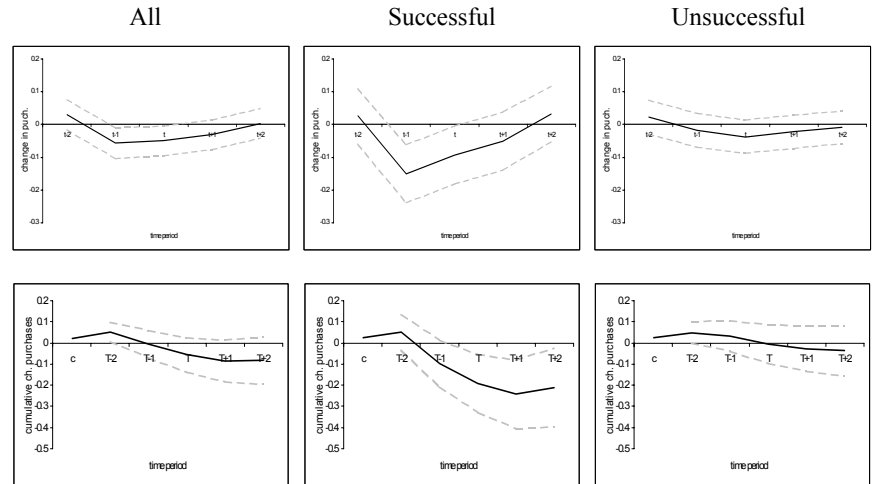
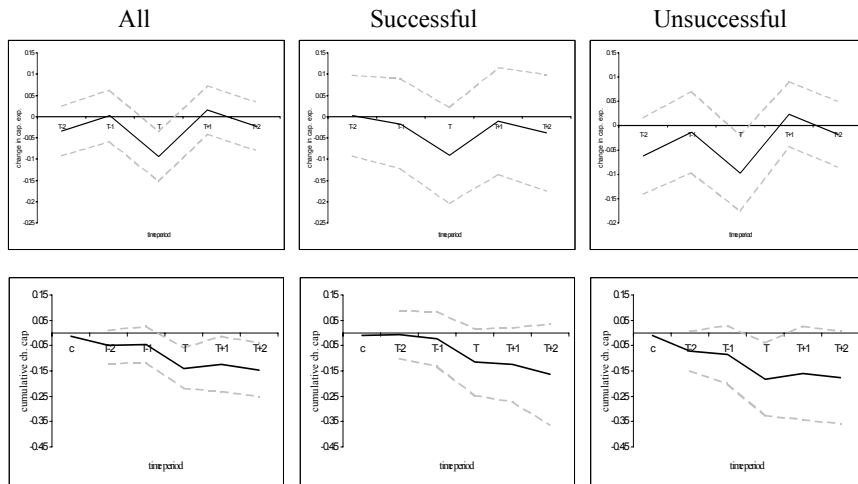
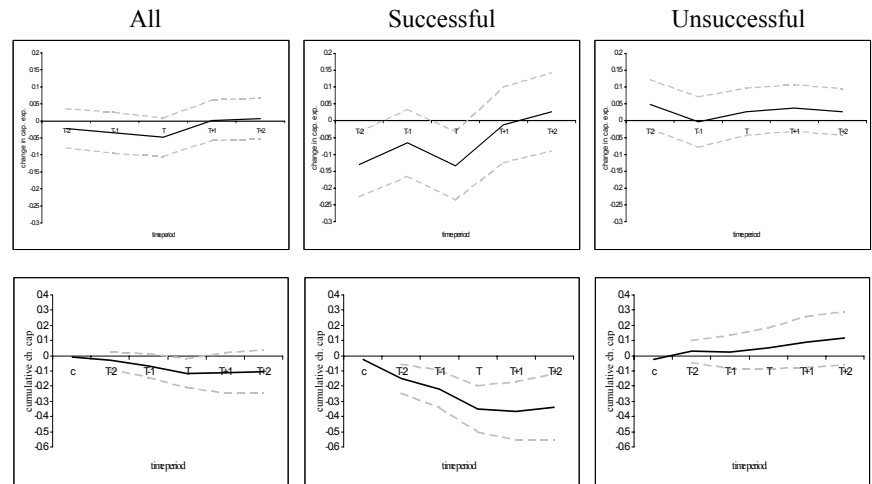


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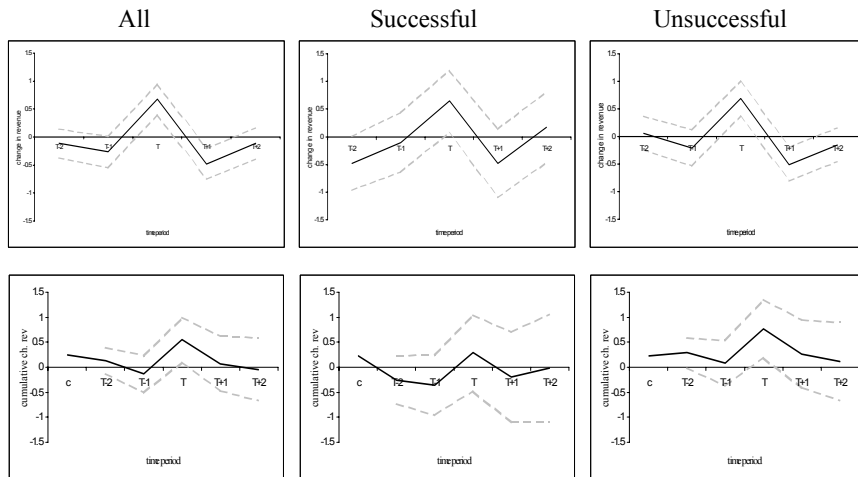
**L: Central Government Capital Expenditure**



**M: Sub-Central Government Capital Expenditure**



**N: Central Government Total Revenue**



**O: Sub-Central Government Total Revenue**

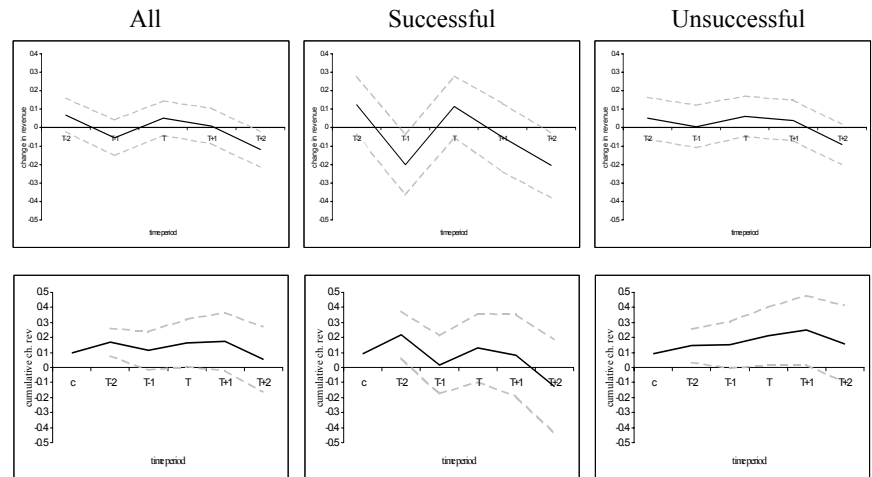
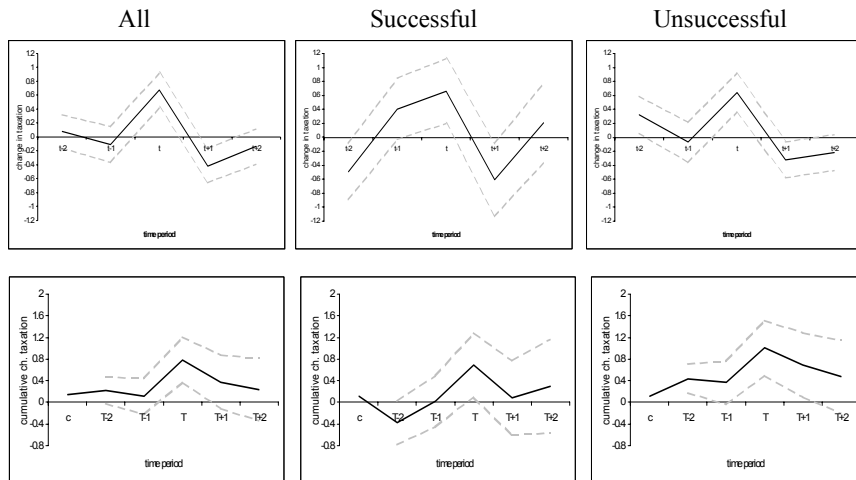
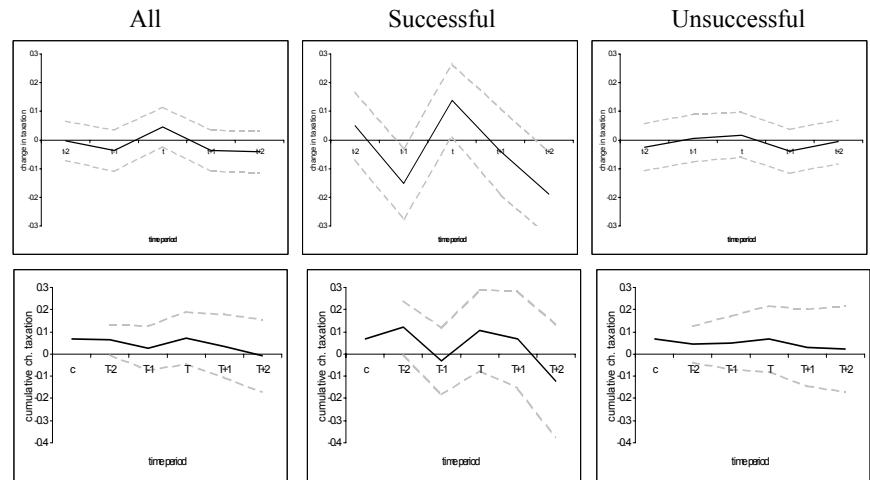


FIGURE 1 continued...

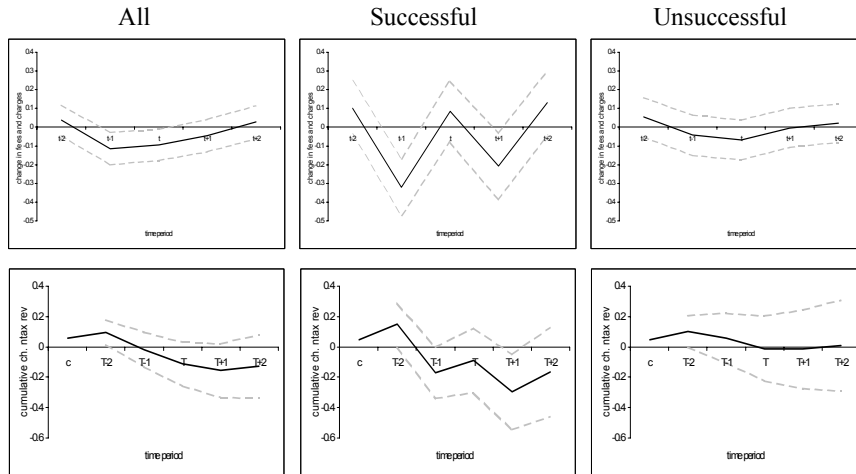
**P: Central Government Taxation Revenues**



**Q: Sub-Central Government Taxation Revenues**



**R: Central Government Non-Tax Revenues**



**S: Sub-Central Government Non-Tax Revenues**

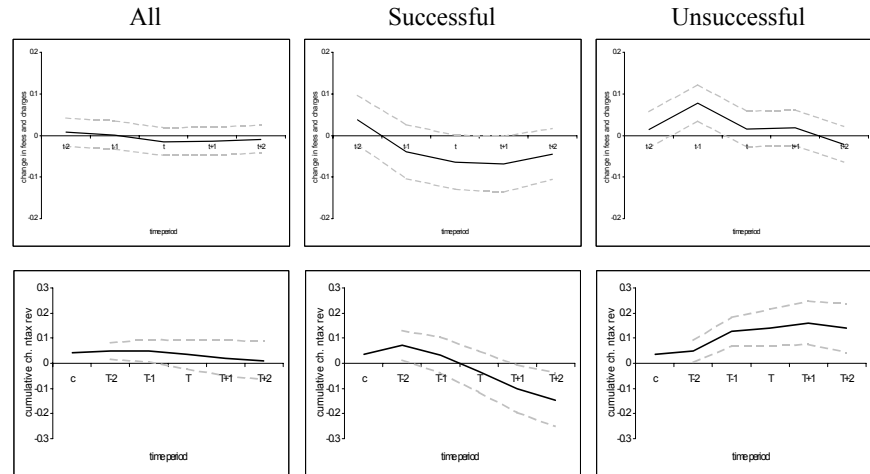
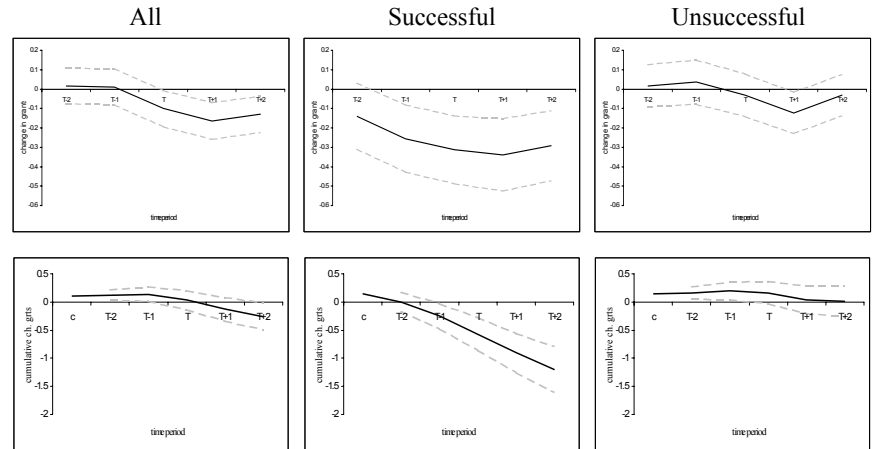


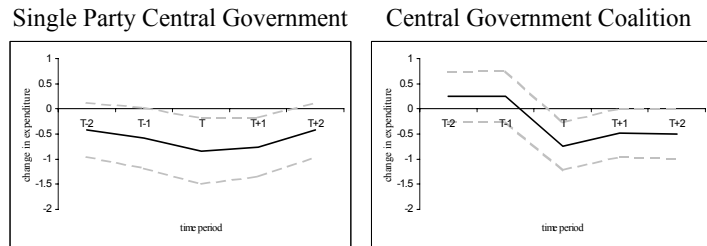


FIGURE 1 continued...

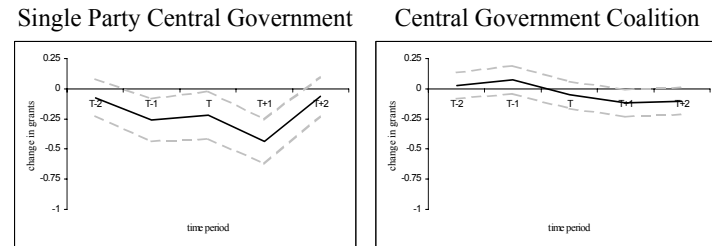
**T: Sub-Central Government Grants**



**U: Central Government Total Expenditure**

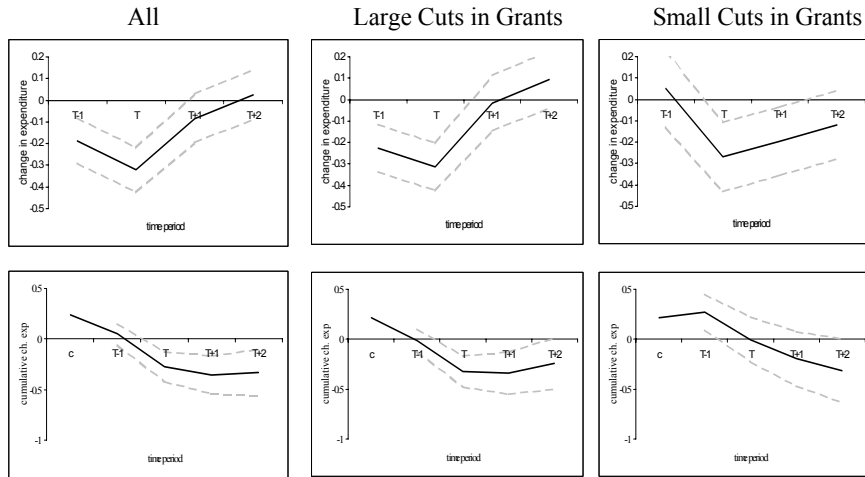


**V: Sub-Central Government Non-Tax Revenues**

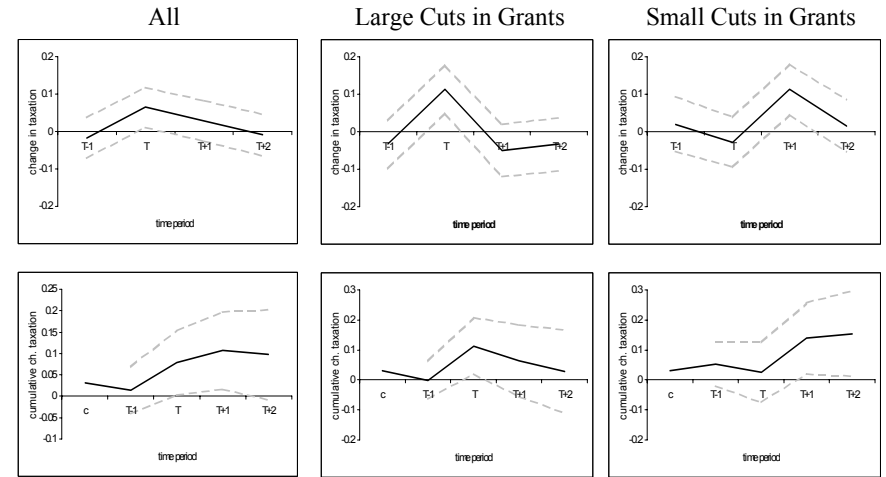


**FIGURE 2**

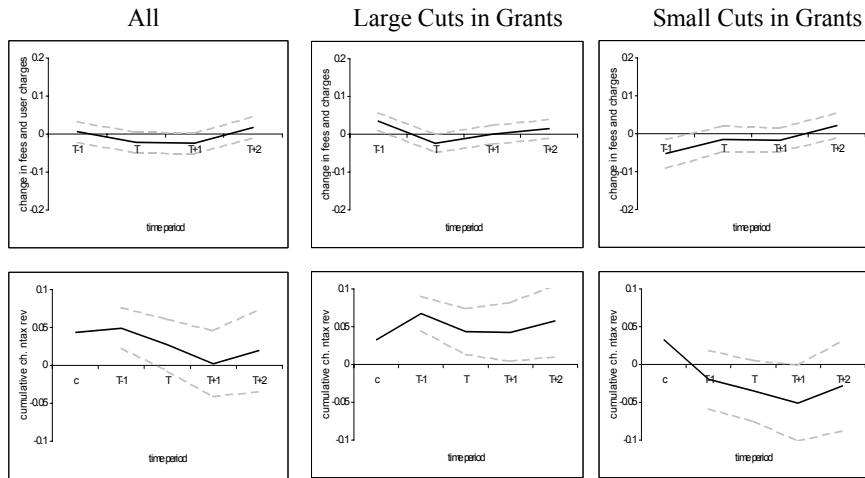
**A: Sub-Central Total Expenditure**



**B: Sub-Central Taxation Revenue**



**C: Sub-Central Non-Tax Revenues**



**D: Sub-Central Wage Bill**

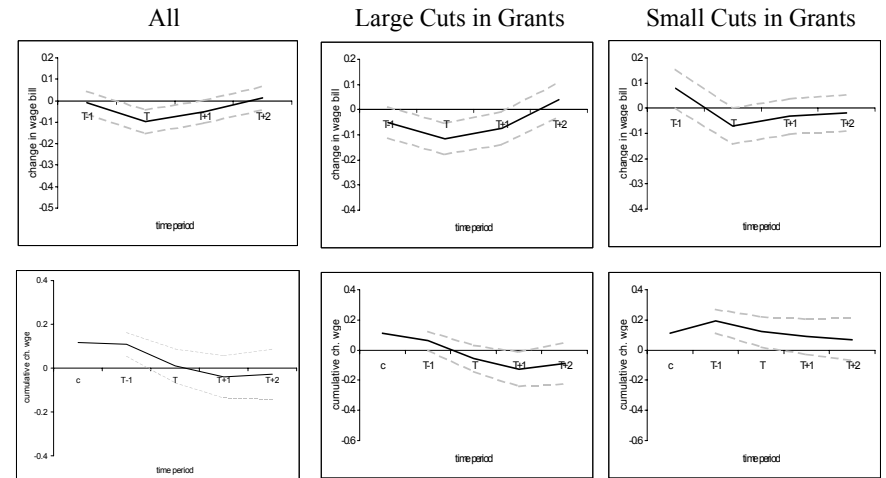
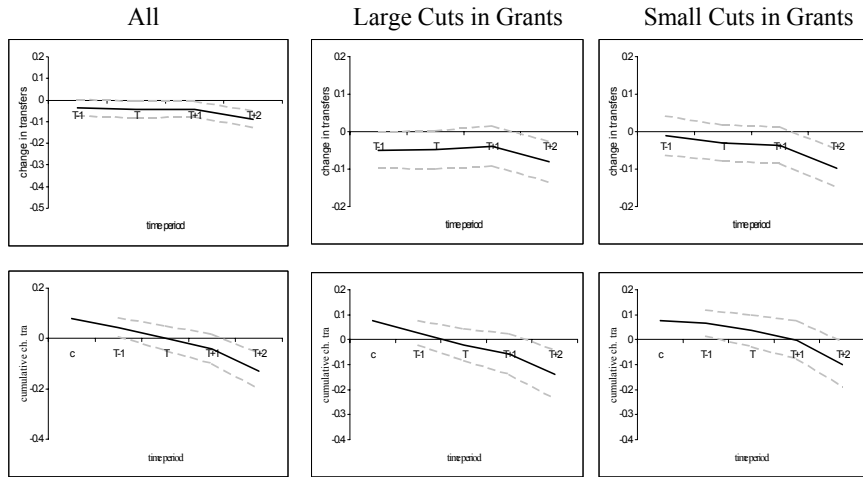
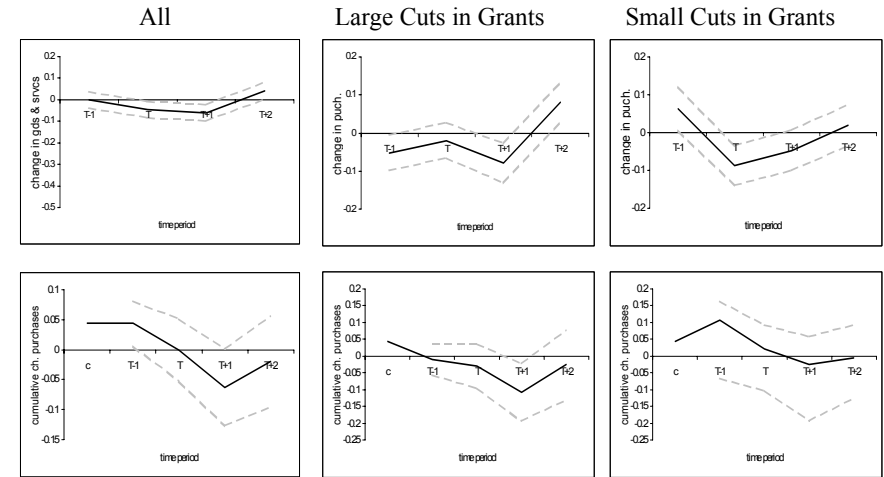


FIGURE 2 continued:

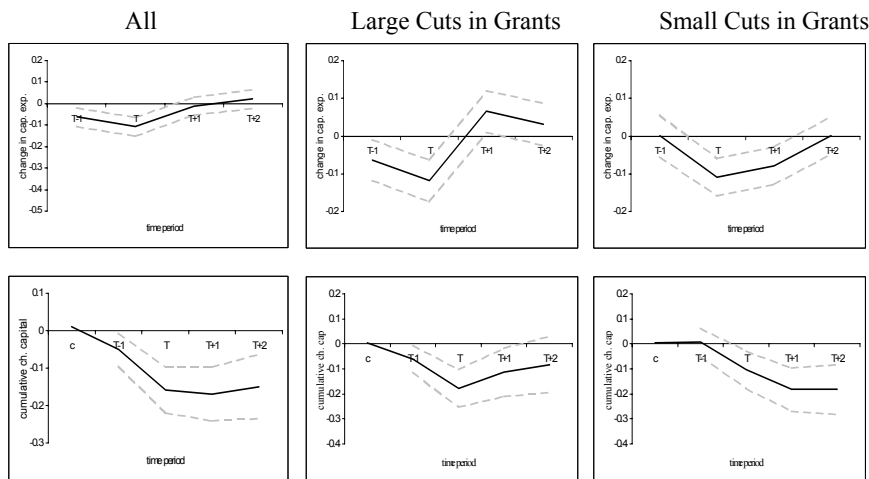
**E: Sub-Central Social Transfers**



**F: Sub-Central Expenditure on Goods and Services**



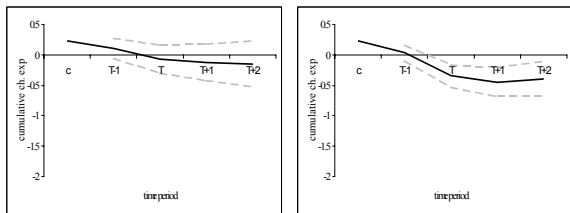
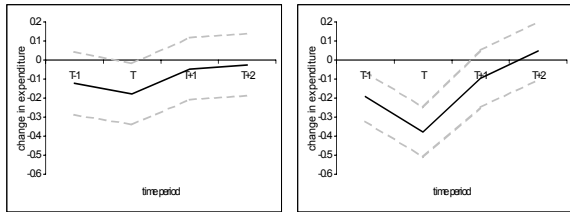
**G: Sub-Central Capital Expenditure**



**FIGURE 3**

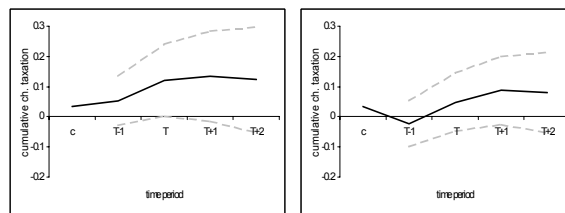
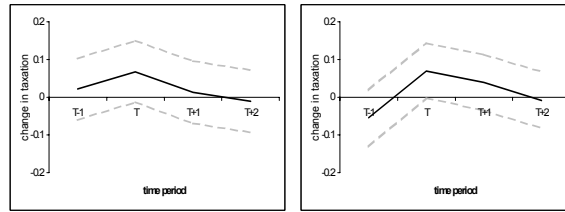
**A: Sub-Central Total Expenditure**

High Grant Dependence      Low Grant Dependence



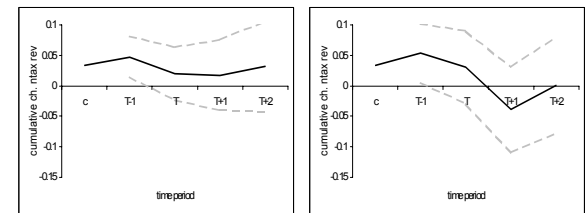
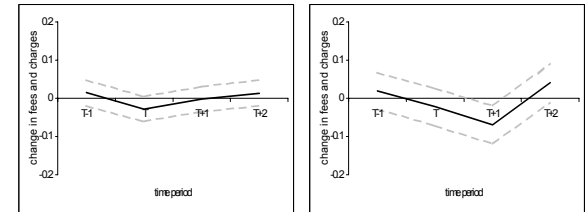
**B: Sub-Central Taxation Revenue**

High Grant Dependence      Low Grant Dependence



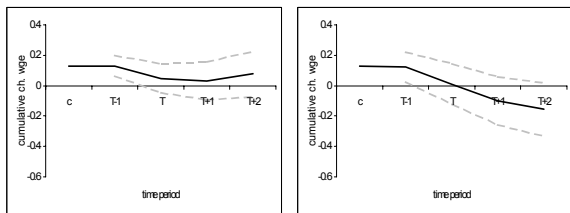
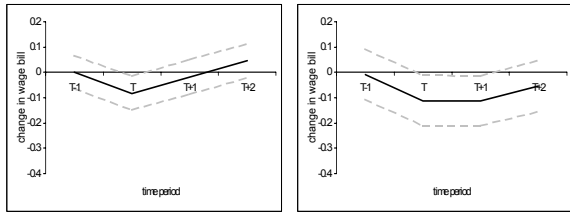
**C: Sub-Central Non-Tax Revenues**

High Grant Dependence      Low Grant Dependence



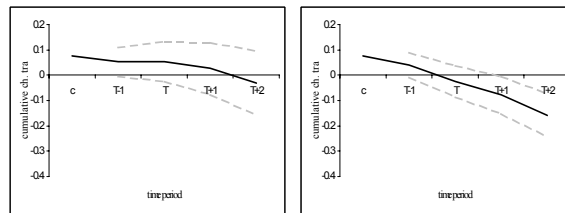
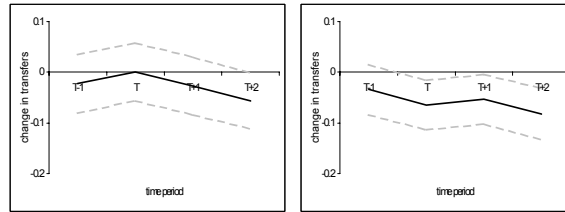
**D: Sub-Central Wage Bill**

High Grant Dependence      Low Grant Dependence



**E: Sub-Central Social Transfers**

High Grant Dependence      Low Grant Dependence



**F: Sub-Central Expenditure on Gds & Svs**

High Grant Dependence      Low Grant Dependence

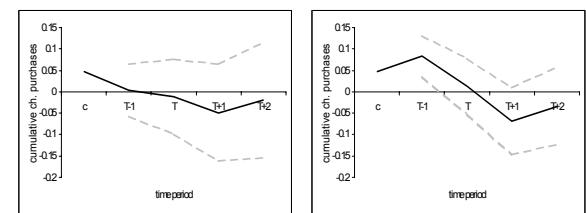
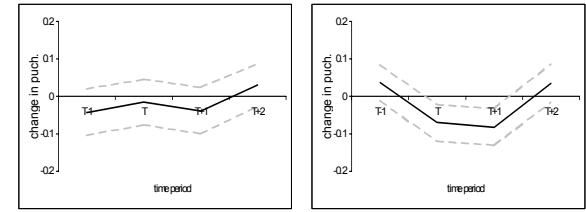
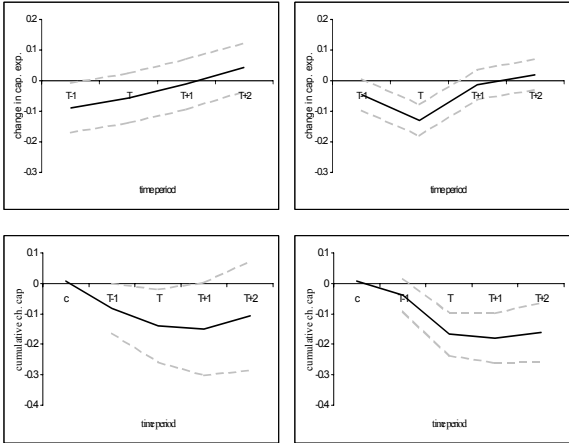


FIGURE 3 continued:

**G: Sub-Central Capital Expenditure**

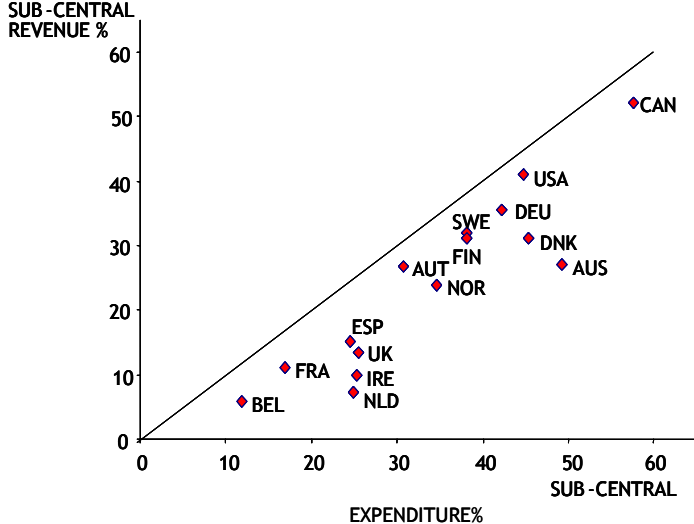
High Grant Dependence      Low Grant Dependence



**FIGURE 4**

**Vertical Imbalances:**

(sub-central expenditure and revenues as % of general government totals)



Source: IMF Government Financial Statistics. Figures are sample averages.

Table 1: Chronology of Fiscal Consolidation Attempts

	<i>Year of Attempted Consolidation</i>	<i>Successful Consolidations</i>
Australia	1982, 96 & 98	1996 & 98
Austria	1984	None
Belgium	1982, 85, 86 & 94	1994
Canada	1982, 87, 95, 96 & 97	1996 & 97
Denmark	1983, 84 & 86	1983 & 84
Finland	1976, 81, 84, 88 & 93	None
France	1987 & 97	None
Germany	1976, 77 & 82	None
Ireland	1976, 83, 84, 87, 88 & 89	1987, 88 & 89
Netherlands	1983, 85, 88, 91 & 93	None
Norway	1981, 83, 89, 90 & 94	1981 & 94
Spain	1985, 86 & 97	1997
Sweden	1981, 82, 83, 84, 87, 92, 94, 95 & 96	1984, 87 & 96
UK	1976, 77, 87, 88, 96, 97 & 98	1976, 77, 87, 88, 97 & 98
USA	None	None
Total	61	22

Table 2: Chronology of Grant Cuts

	<i>Year of cut in grants</i>
USA	1983
UK	1977, 78, 79, 80, 82, 85, 88, 93, 95, 97 & 98
Austria	1985 & 89
Belgium	1981, 82, 87, 88, 89, 92, 96 & 97
Denmark	1981, 83, 84, 85, 86, 87, 95, 96 & 97
France	1984 & 96
Germany	1976, 77, 81, 82, 83, 93, 94, 95, 97 & 98
Netherlands	1980, 84, 86, 87, 89, 93, 94 & 96
Norway	1977, 93, 95 & 96
Sweden	1978, 82, 83, 85, 86, 88, 91, 94, 95, 96 & 99
Canada	1980, 84, 86, 88, 93, 95, 96 & 97
Finland	1993
Ireland	1984, 86, 88, 89
Spain	1997
Australia	1982, 86, 87, 88, 89, 94
Total	88

Table 3: Sub-Central Capital Expenditure  
as a % of total sub-central expenditure

Canada	6.24
Denmark	7.87
Sweden	8.47
USA	10.17
Norway	12.28
Finland	12.47
Netherlands	13.78
Belgium	14.22
UK	15.86
Ireland	17.40
Germany	19.09
Australia	19.33
Spain	22.67
Austria	23.08
France	28.72

Table 4: Ranking by Dependence of Grants:  
(grants as % of total sub-central revenues)

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

Table 5: Ranking by Expenditure Decentralization  
(s-c expenditure as % of total govt. expenditure)

<i>Least Decentralized Countries</i>	
Belgium	11.82
Spain (pre-1985)	15.74
France	16.93
Netherlands	24.99
Ireland	25.27
UK	25.37
Spain (post-1985)	27.83
Austria	30.73
<i>Most Decentralized Countries</i>	
Norway	33.63
Sweden	36.19
Finland	38.86
Australia	41.43
Germany	41.77
USA	44.51
Denmark	45.01
Canada	57.34

Source for Tables 3-5: calculated as sample averages from IMF Government Financial Statistics.

Table 6: Summary of results using country groupings

Criteria used for grouping countries	Significant NEGATIVE effects
Highest expenditure decentralization	Total Expenditure Expenditure on Goods and Services Taxation Revenue
Highest tax autonomy	Total Expenditure Taxation Revenue
Highest borrowing autonomy	Total Expenditure Capital Expenditure

Table 7: Ranking by Tax Autonomy

	s-c tax revenues as % of total s-c revenues (A)	% of s-c taxation for which s-c controls tax rate and/or tax base (B)	Tax Autonomy: 'own taxes' as % of total s-c revenues (C) = (A) x (B) /100
<i>Countries with greatest tax autonomy</i>			
Sweden	61.47	100	61.47
Canada	56.41	86	48.51
Finland	49.53	89	44.08
Denmark	43.75	95	41.56
USA	47.46	76	36.07
<i>Countries with least tax autonomy</i>			
Belgium	34.25	97	33.22
Spain	40.71	67	27.28
UK	24.15	100	24.15
Ireland	10.25	100	10.25
Netherlands	7.12	100	7.12
Germany	54.45	13	7.08
Austria	51.21	11	5.63
Norway	45.74	3	1.37
Australia	32.88	N.A.	N.A.
France	43.06	N.A.	N.A.

Sources: Column (A) - IMF Government Financial Statistics, calculated as sample averages.  
Column (B) - Estimates for Canada and USA were provided by Jonathan Rodden and are based on control of *both* the tax rate and base, the remaining data are OECD (1999). All figures are for 1995.



Table 8: Ranking by Borrowing Autonomy

<i>Lowest levels of sub-central borrowing autonomy</i>	
Belgium	1.45
Denmark	1.45
UK	1.5
Austria	1.6
Norway	1.6
Ireland	1.75
<i>Highest levels of sub-central borrowing autonomy</i>	
Netherlands	2.3
Germany	2.3
Australia	2.5
Spain	2.6
Canada	2.7
France	3
Finland	3
Sweden	3
USA	3

Source: Rodden (2003) as adapted in Darby et al., (2003).