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## Fiscal federalism, fiscal consolidations and cuts in central government grants : evidence from an event study

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# FISCAL FEDERALISM, FISCAL CONSOLIDATIONS AND CUTS IN CENTRAL GOVERNMENT GRANTS: EVIDENCE FROM AN EVENT STUDY

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# FISCAL FEDERALISM, FISCAL CONSOLIDATIONS AND CUTS IN CENTRAL GOVERNMENT GRANTS: EVIDENCE FROM AN EVENT STUDY

## Abstract

In this paper we examine financial interactions between tiers of government. Whilst most existing empirical evidence has focused on the US, it is difficult to generalize conclusions obtained to countries where the position and remit of lower tiers of government is evolving or is less clear constitutionally. Applying event study methodology to a dataset covering 15 countries we examine the timing, extent and composition of fiscal changes around consolidation attempts and central government grant cuts. Highlighting the participation of central and sub-central tiers of government, our analysis also sheds light on key outcomes, including decentralized service provision and macroeconomic adjustment.

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# 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 in 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 behavior, 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 from 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 emphasizes that the increasing tendency towards decentralization and fiscal federalism raises the issue of how to maintain sustainable public finances. A number of industrialized economies have adopted fiscal coordination mechanisms to address this problem, as surveyed in Journard and Kongsrud (2003). The mechanisms they discuss range from formal sub-national fiscal rules (e.g. expenditure and borrowing ceilings) 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 con-

siderable attention in some countries (e.g. Germany, Italy). 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, 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 dataset for the major OECD economies and assess how central and sub-central expenditures, taxation, and intergovernmental grants change in response to attempts to correct governments' fiscal positions. The episodes of fiscal consolidation are identified using a methodology which has become standard in the macroeconomics literature (see 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. Our analysis also distinguishes between successful consolidations (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 addressing some of the above issues regarding the interactions between central and sub-central tiers of government, we are also able to shed light on the extent to which sub-central tiers of government participate in fiscal consolidations, and hence to macroeconomic adjustment. Finally, we switch the focus to 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 grant cuts.

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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 do take steps to account for major shifts in fiscal responsibility that have occurred during our sample.

This allows us to assess the extent to which sub-central governments adjust expenditures and use their own fiscal powers (where these are significant) to offset the cuts in their grant allocations. Finally, 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, in the case of successful consolidation attempts, a pattern emerges for successful consolidations in which central governments cut intergovernmental transfers to lower tiers of government, who then make cuts in their expenditure since they have difficulty in raising sub-central tax revenues. Our results do not appear to offer strong support 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 own source revenues significantly.

Second, unsuccessful consolidations tend to be characterized by temporary increases in taxation at the central level, with no reduction in intergovernmental grants and no tendency for sub-central taxation to change. It also 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 make significant cuts in their capital expenditures. This suggests that the burden of adjustment to investment 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'<sup>2</sup>, 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. We confirm the robustness of this by looking at episodes in which central governments cut back grants to lower tiers of government, in addition to 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 that are more decentralized and apparently involve greater fiscal autonomy, tend to cut expenditures by a greater amount, 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 serves to limit any offsetting increase in local taxation. This does seem to contrast with the hypothesis that more decentralized fiscal arrangements lead to a lower degree of macroeconomic control (cf. Tanzi, 2001, Rodden, 2002, Rodden and Wibbels, 2002), or to excessive taxation (see Keen, 1997), with the qualification that central governments do retain a degree of effective control through their grant allocation decisions.

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. In particular, coalition governments tend to find it more difficult to cut grants to sub-central governments during fiscal consolidation attempts.

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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' with tests of the extent to which changes in government grants impact on local expenditures without reference to changes in private income.

## 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, 2002 Edition. GFS provides the best internationally comparable data on fiscal variables for fifteen OECD countries that is disaggregated by tier of government<sup>3</sup>, subdividing these between three levels (central, state and local categories). This allows us to construct an unbalanced panel dataset with 336 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, 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 dataset 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 to take into account the extent of independent taxing powers available to sub-central tiers using OECD (1999) for the majority of countries and information provided by Jonathan Rodden of MIT in the cases of Canada and the USA. In our empirical work we use this additional data<sup>4</sup> to distinguish between countries in terms of their differing degrees of fiscal autonomy.

Another potential 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. Nonetheless, the GFS data remain the best available for our purposes.

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

<sup>4</sup>Unfortunately, no such data appears to be readily available for Australia and France, so in the extensions to the basic analysis that involve fiscal autonomy data we have to drop some sample observations.



## 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 stabilizers and interest payments, and focusing on the structural primary balance as a proportion of GDP. There is no universally accepted way of decomposing the primary fiscal balance to GDP ratio into its cyclical and discretionary components<sup>5</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 using the constructed *fiscal impulses* to measure discretionary changes in fiscal policy from one year to the next.

For each country in our sample, we construct the Blanchard measure of the fiscal impulses by regressing each component of the primary balance on unemployment, a constant, and a linear and quadratic time trend. Predicted values for revenues and transfers are then 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>6</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 cross country panel dataset to examine common features which characterize shifts in general government 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

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<sup>5</sup>For a discussion, see Gramlich (1990), Bouthevillain and Quinet (1999), Bruni and Tujula (1999) and Chalk (2002).

<sup>6</sup>Bruni and Tujula (1999) compare the Blanchard measure of fiscal impulses with a cyclical adjustment of the primary balance that uses 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 somewhat arbitrary measures of potential output and base years.

that any statistical analysis based on this panel dataset 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>7</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.*

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 a consolidation attempt, in terms of the improvement of the general government fiscal position<sup>8</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 analyze 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<sup>9</sup>. 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. As might be expected, nearly all (59 out of 61) general government consolidation attempts are either led

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<sup>7</sup>For similar subjective criteria see Giavazzi *et al.* (2000), von Hagen *et al.* (2001).

<sup>8</sup>In practice, the results seem robust to different definitions of 'success', including the use of a success index. For an application using a particular four point success index, which makes a distinction between arresting the growth of debt, debt stabilization and debt reduction, see Darby *et al.* (2004).

<sup>9</sup>We find that the identification of consolidation attempts alters little if we adopt alternative methods to measure the discretionary fiscal impulse based on application of the Hodrick Prescott filter or the OECD's measure of the output gap.

by central government or involve both tiers of government. There are only 2 cases in which the sub-central tier consolidated when no consolidation effort could be identified at the central tier.

## 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>10</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 for each of the fiscal variables of interest both during the period of consolidation and periods immediately prior to and following the fiscal impulse.

In our analysis of fiscal consolidations all the variables employed are expressed in percentages of GDP. We define each event window to comprise five years, specifically two years prior the fiscal consolidation, the event period itself, and the two years following the consolidation attempt. The width of the event window can, as we shall see below, be altered if some of the time dummies are not statistically significant in the relevant regressions.

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<sup>11</sup>.

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<sup>10</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.

<sup>11</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 does not take a conventional 'difference in differences' approach, it is possible that the presence of serial correlation could result in inconsistently estimated standard errors. To explore this issue in our context we conducted two robustness checks: first, we added a lagged dependent variable to each regression; and second, we re-estimated our regressions using a

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 coefficients on 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  $\pm j$ -j periods from the consolidation period, and zero in all other periods.

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

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

where again  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ ,  $D_{i,P\pm j}^S$  are time dummies, equal to 1 in  $\pm j$ -j periods from the successful consolidation period (denoted  $t=P$ ) and zero in all other periods, and  $D_{i,Q\pm j}^U$  are time dummies, equal to 1 in  $\pm j$ -j periods from the unsuccessful consolidation period (denoted  $t=Q$ ) 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  $\beta_2$

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GLS (Cochrane-Orcutt) estimator. In both cases we found only minor changes in the size of the coefficients and no qualitative changes in the significance of the time dummies. 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, Thiess Buettner, for pointing this issue out to us.

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 behavior from the rest of the countries in the event sample. For instance, we might wish to consider whether those countries with different types of central government (e.g. coalition or single-party governments) display different behavior 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 to incorporate tests of these hypotheses by including an interactive dummy variable:

$$y_{it} = \alpha_i + \beta_1 D_{i,T-2} + \beta_2 D_{i,T-1} + \beta_3 D_{i,T} + \beta_4 D_{i,T+1} + \beta_5 D_{i,T+2} + \lambda_1 C_l D_{i,T-2} + \lambda_2 C_l D_{i,T-1} + \lambda_3 C_l D_{i,T} + \lambda_4 C_l D_{i,T+1} + \lambda_5 C_l D_{i,T+2} + \epsilon_{3i,t} \quad (3)$$

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 the current Eurozone countries, a significantly negative  $\lambda_3$  would indicate that in the year of a consolidation attempt, 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 for the fiscal variable of interest (e.g. fiscal impulse, change in expenditure etc.)

for respectively, all consolidations, successful consolidations, and unsuccessful consolidations. Alongside the coefficients we also plot the standard error bands which allow easy identification of the time periods in which the time profile implies a change which is significantly different from zero. The lower row of graphs in each panel shows the *cumulative* change in the fiscal variable of interest, obtained by summing the respective coefficients 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 involve sizeable central government fiscal impulses in 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 as can be seen from the cumulative graphs, the successful fiscal consolidations typically involve a larger cumulative positive fiscal impulse, as the improvements at time T are amplified in post-consolidation periods.

Panel B shows the discretionary fiscal impulse implemented by the sub-central tiers of government, and shows how they fared during these fiscal consolidation attempts. It is interesting that the consolidation effort is shared between tiers of government. All period T dummies attract positive and statistically significant coefficients, suggesting that the change in the discretionary fiscal balance is more favorable during consolidation years as opposed to non-consolidation years<sup>12</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) and Tanzi (2001), have argued that greater fiscal decentralization might result in a potential deterioration in macroeconomic control, since sub-central

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<sup>12</sup>Note that the movement in the sub-central impulse will also be affected by any change in grants from central government.

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 group of 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 groups of countries with 'high' and 'low' degrees of fiscal decentralization. To be precise, we divide our countries into these two categories on the basis of the percentage of expenditure and revenue assigned to the sub-central tier. Eight countries are allocated to the 'high' category<sup>13</sup>. Figure 1 (panel C) shows clearly that the average fiscal impulse is larger in the 'highly decentralized' countries at time T. The improvement, relative to non-consolidation years, is as much as 0.5% of GDP. Thus, a high degree of decentralization does not seem to be inconsistent with the 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 total expenditures and revenues and their key components during the event window. Note that, to avoid double counting, we examine total expenditure defined as total primary expenditure excluding intergovernmental 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 analyzed separately.

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

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<sup>13</sup>The eight countries in the 'high' category are Australia, Denmark, Canada, Germany, Finland, Norway, Sweden and the USA, while the seven countries in the 'low' category are Austria, Belgium, Spain, France, the UK, Ireland, and the Netherlands. In addition, we also differentiated our sample along a related characteristic, whether the countries are federal or unitary. In practice there is a substantial overlap between these two categorisations. The results for 'federal' countries were similar to those for 'highly decentralised' countries.

and E, the key difference between successful and unsuccessful consolidation attempts is that the successful consolidations involve consistently tightened expenditure over time, and not just in the period of the consolidation attempt (T). Sustained cuts are evident in the majority of the components of spending, with the exception of central government capital expenditure (see below), and is also evident at the sub-central level, confirming the important role of this tier. Second, it has been suggested by Alesina and Perotti (1997) that cuts in social welfare spending and wages tend to distinguish successful consolidation attempts; they stress the signalling effect of these types of cuts, through which central governments can demonstrate an important commitment to fiscal control<sup>14</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) that capital expenditure cuts tend to be unsustainable and hence are more of a feature of unsuccessful consolidations. The plots in panels L and M show that central governments tend to cut capital expenditure by more during unsuccessful consolidation attempts, but this picture is reversed at sub-central government. It appears that some of the financial 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 to the revenues, Panels N-S in Figure 1 show the evolution of central and sub-central government revenues and their components. Panel N demonstrates a point made in Alesina and Perotti (1995, 1997) that in the year of the consolidation unsuccessful attempts are characterized by increases in fiscal revenues rather than expenditure cuts. Note that central government revenues rise in both successful and failed consolidation attempts, but that the size of this increase is larger in the latter. However, the temporarily higher level of revenues is almost completely reversed in the following year, as indicated in the significant negative effect at T+1. Thus the cumulative change in the profile of revenues is not actually different for successful and

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<sup>14</sup>Alesina and Perotti (1997) also argue that outside of consolidation periods social transfers and wages have a strong tendency to automatically increase. This is supported by the average fixed effects in our estimated model, for both wages and social transfers they tend to be positive.



failed consolidation attempts. The temporary nature of the revenue hikes is not readily evident from the Alesina-Perotti studies because their analysis does not include the periods following the actual consolidation attempts. Panel O shows that unsuccessful attempts seem to be characterized more by an increase in sub-central governments' revenues. Breaking down revenues into taxation and other charges (including user charges), as shown in panels P-S, one can see that there is a tendency for sub-central governments to raise taxation<sup>15</sup> in the period of the consolidation. There is also a tendency for user charges and fees to be somewhat lower in the case of successful consolidations, although the difference is barely significant. We conclude that revenue adjustments appear to contribute little to the cumulative profile of fiscal consolidations at central or sub-central levels. Furthermore, where revenue adjustments are present, they appear to be more likely to be associated with unsuccessful consolidation attempts and/or to be temporary measures.

What seems to matter more, in terms of the success of fiscal consolidation attempts, 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>16</sup>. Any changes in grants will therefore impact heavily on sub-central governments.

The significant negative parameters on the T, T+1, and T+2 dummies in the upper row of panel T show that, relative to the reference category, substantial cuts are made to sub-central governments' grant allocations both during and after consolidation attempts. It is also apparent that this result is driven almost entirely by the experience of 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, the cumulative change is insignificantly different from the average fixed effect during unsuccessful consolidations. Clearly cuts in grants are central to fiscal consolidation efforts by central governments: by cutting the finance available in effect they force the hands of the decision makers within

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<sup>15</sup>Although it should be remembered that we do not distinguish at this point between taxation increases where the base and yield is under the control of sub-central government and increases in shared taxation revenues.

<sup>16</sup>See Figure 4.

the lower tiers of government. Below we will examine cuts in grants more 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 evidence of 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 types of government, we choose to aggregate up to three classes: 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>17</sup>. Panels U and V of Figure 1 show, respectively, the annual change in central government expenditures and cuts in grants made by single party and coalition central governments. As can be seen in panel U, there is only a slight difference in the expenditure-cutting behavior of these types of government. However, panel V demonstrates that coalition governments seem unable to cut sub-central grants, while the single-party dummies are significantly negative at the 10% level. Cutting sub-central grants, like any other category of current expenditure is likely to be politically difficult. Strong and less fragmented 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 often discussed in the literature<sup>18</sup>.

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<sup>17</sup>It is possible that changes in the type of government in power can take place within a particular event window. In practice this happens only rarely in our dataset and has little impact on our results.

<sup>18</sup>In addition, we have examined whether or not differences in central government ideology have an impact on the consolidation attempts by dividing our observations along partisan lines (i.e. Left, Right and Centre). We found no significant differences between the groups and our results are available on request.

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

We saw in the previous section that when central governments engage in fiscal consolidations they appear to use their grant allocation decisions as an important instrument for controlling public finances at the sub-central tier. We now broaden our focus to ask how these cuts in 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 to adjust financial flows between tiers of government. For instance, in the previous section we saw that cuts in grants during fiscal consolidations were not accompanied 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 decentralization. It is valid to ask whether this result holds more generally, in a wider range of circumstances not formally defined by an attempt to restore the public finances? Some researchers have suggested for instance that changes in grant allocations can 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 their grant allocations. 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 as a percentage of the previous period's total revenue, i.e.  $((G_t - G_{t-1})/TR_{t-1}) * 100$ . Here, unlike in our assessment of consolidation attempts, we focus on all real term cuts in grants, providing a total sample of 86 episodes. We excluded two episodes, those relating to the UK in 1990/91, and Spain in 1985/86. In both these cases the adjustments in grants were linked to major reforms in local government finance, and hence did not represent independent attempts 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:

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

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 the paths followed by a number of key variables: total expenditure, taxation, fees and user-charges, the wage bill, social transfers, expenditure of goods and services, and capital expenditure.

Since grant cuts appear in the sample regardless of size we also divide the events into two categories; 'large' and 'small' cuts in grants. These are defined below. We then perform the following event study regression:

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

where again  $y_{it}$  is the fiscal variable of interest in country  $i$  at period  $t$ ,  $D_{i,P\pm j}^L$  are time dummies, equal to 1 in  $+j/-j$  periods from the period when the large cut in grants took place (denoted  $t=P$ ) and zero in all other periods, and  $D_{i,Q\pm j}^S$  are time dummies, equal to 1 in  $+j/-j$  periods from the period in which the small cut in grants took place (denoted  $t=Q$ ) 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 behavior 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 instead 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'<sup>19</sup>. 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 increase 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.

Another key issue is potential endogeneity and the causal link implied by the event study. In this study we interpret cuts in grants by central government as exogenous and as causing reactions by sub-central governments. However, if central grants were to adjust in response to the expenditure or taxation decisions made by sub-central governments?<sup>20</sup> Gamkhar and Oates (1996) take account of potential endogeneity by instrumenting the cuts in grants in their regressions. Clearly IV regressions are not appropriate to event study regressions since the potentially endogenous variable, the cuts in grants, do not actually enter the regression. The question instead is whether

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<sup>19</sup>An alternative to dividing grant cuts into different categories is to scale the estimated effects of events by the magnitude of the events. Thus, one could run a regression of the form:

$$y_{it} = \alpha_i + (\beta_1 D_{i,T-2} + \dots \beta_5 D_{i,T+2}) \Psi_{iT} + \eta_{1i,t}$$

where  $\Psi_{iT}$  is the size of the impulse of the grant change. We have experimented with this approach, and have found that the predicted path for the fiscal variables following both an average 'large' and an average 'small' cut in grants is similar to those obtained using the methodology outlined above. Clearly, more general forms of non-linearity could also be investigated. However, one disadvantage of this approach is that it is difficult to provide a concise graphical analysis of the results. For the current paper, we simply note that these additional results support our initial conclusions in terms of a reaction of sub-central governments to cuts in grants. We are grateful to our discussant, Dennis Epplé, for suggesting this potential extension.

<sup>20</sup>For instance, excessive sub-central expenditure or reductions in sub-central taxation might lead to increases in intergovernmental grants.

one should take account of potential endogeneity when determining when exogenous cuts in grants have occurred. To check this, we have run auxiliary regressions using lagged grants and similar variables to the instruments employed by Gamkhar and Oates (1996), to generate estimated exogenous cuts in grants (using predicted rather than actual changes in grants). This approach does lead to some minor changes in the episodes identified. However, a check of a number of the subsequent event study regressions indicates little difference to the estimated signs and sizes of the time dummy coefficients and their standard errors suggesting there is very little change in the way sub-central fiscal variables react to *predicted* as opposed to *actual* cuts in grants<sup>21</sup>. In any event, even if one does not accept a strong causal link for all the cuts in grants events identified, the event study can still be seen as uncovering empirical regularities “stylized facts” that in some cases are likely to be picking up causal effects.

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. In contrast to the fiscal consolidation event regressions, we find that the T-2 dummies are always insignificant in the grant cut regressions, 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 the sub-central level, and there is even evidence that some of these cuts are anticipated since the T-1 dummy variable is significant. This might be the result of planned or signalled cuts by central governments. Second, as highlighted in panel B,

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<sup>21</sup>To be precise, our instrumenting regressions regressed cuts in grants on some political variables (political party in power, type of government using the data from Woldendorp *et al.*, 2000) as well as some conditioning economic variables (lagged unemployment, output). We then used these regressions to identify predicted cuts in grants episodes, and used these to re-run the event study regressions. The signs, sizes and standard errors of the time dummies were very similar and hence accounting for endogeneity would not seem to produce very different results.

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 it is notable that 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 on taxation 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 contrasts with 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). Following a large cut in grants, the cut to the wage bill is large and significant at time T and T+1, but the wage bill's response is barely significant at time T and never significantly below the starting point, even at T+2 in the case of a small cut in grants. This might reflect the fact that large cuts elicit major consolidations 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 the size of grant cut. Overall the major impact of the cuts in grants appears to fall on the sub-central government wage bill, and this ties in with the evidence from our fiscal consolidation study, which suggested that sub-central governments play an important part in stabilizations (see also Darby *et al.* 2004).

Fourth, as in the case of fiscal consolidations, sub-central governments appear to react to cuts in grants by cutting their capital expenditure. Panel G demonstrates 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 grants. Overall the graph shows a substantial tightening across the event window, and this is made even more significant by the fact that capital expenditure tends to constitute a small proportion of total expenditure 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. Our results also suggest that small grant cuts account for more significant and sustained changes in capital expenditure than do large grant cuts, a partial explanation for this is that in the latter case the cut in spending appear to be temporary.

### 3.2.2 Dependence on Central Government Grants

One question which arises in analyzing 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 that depend less on grants. In Table 4 we have divided the sample into a small group of five countries (the UK, Spain (post-1985)<sup>22</sup>, Belgium, Ireland and The Netherlands) which exhibit a high degree of dependence on central grants (above 50%) and the rest, 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>23</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 suggests that cuts in grants elicit different reactions in different institutional settings, although it is interesting to note that those countries

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<sup>22</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>23</sup>Although one has to recall that some of those who are less dependent on grants do benefit from tax-sharing arrangements (for example, Austria and Germany).



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 behavior 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 the profile of the fiscal variables for individual countries evolves along 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 the country dummies<sup>24</sup>. Some consistent results do 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>25</sup>.

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<sup>24</sup>These results are not tabulated for reasons of space. However, the results are available from the authors on request.

<sup>25</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. How-

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 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

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ever these effects are difficult to explain in terms of institutional features in the country groupings, and seem to be less important.

the argument that understanding sub-central government behavior is important in overall macroeconomic stabilization. However, this result is tempered by the observation that fiscal decentralization 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 (see Keen 1997). 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 and the level of effective central government control 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 large and persistent 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 - Data Descriptions

All variables unless otherwise stated are from the IMF GFS [2002] database and are in current prices.

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

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

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

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

7) Government Wage Bill = Expenditure on Wages and Salaries.

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

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

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

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

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

13) 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).

14) Ideological color 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)

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.

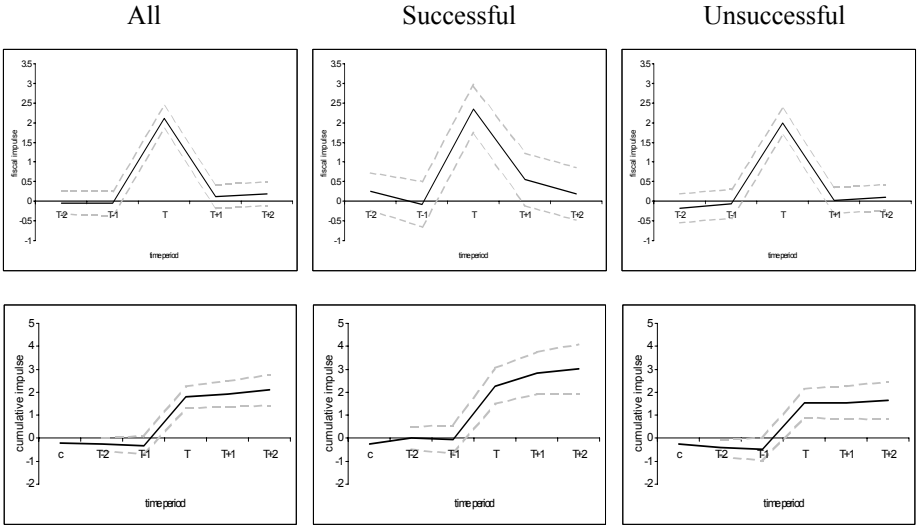
Table 8: Ranking by Borrowing Autonomy

<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

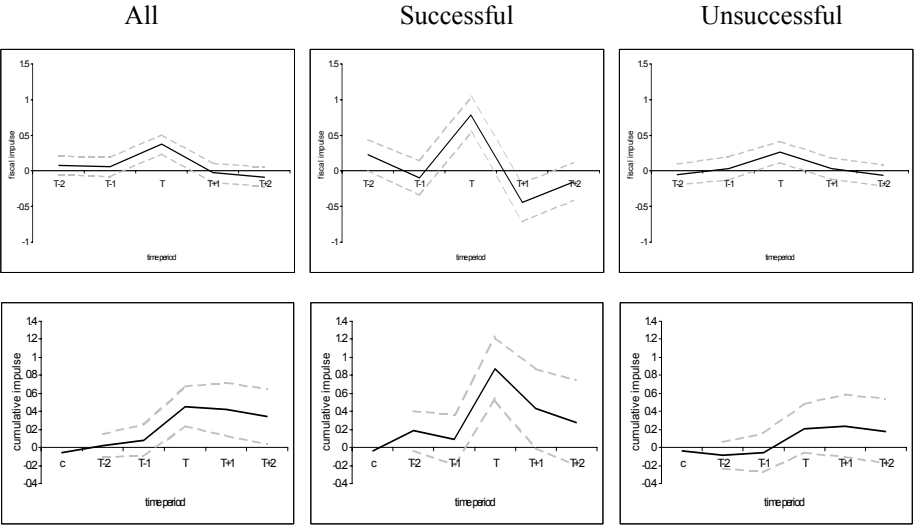
Source: Rodden (2003) as adapted in Darby et al., (2003).

**FIGURE 1:**

**A: Central Government Fiscal Impulse**



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



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

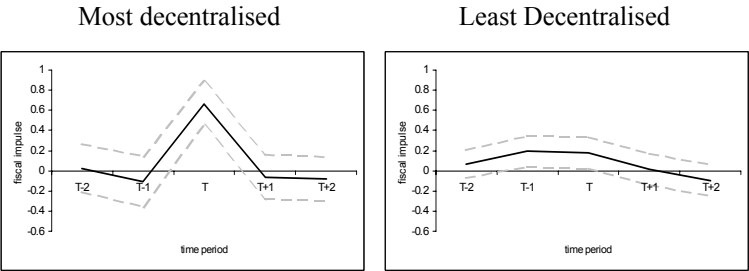
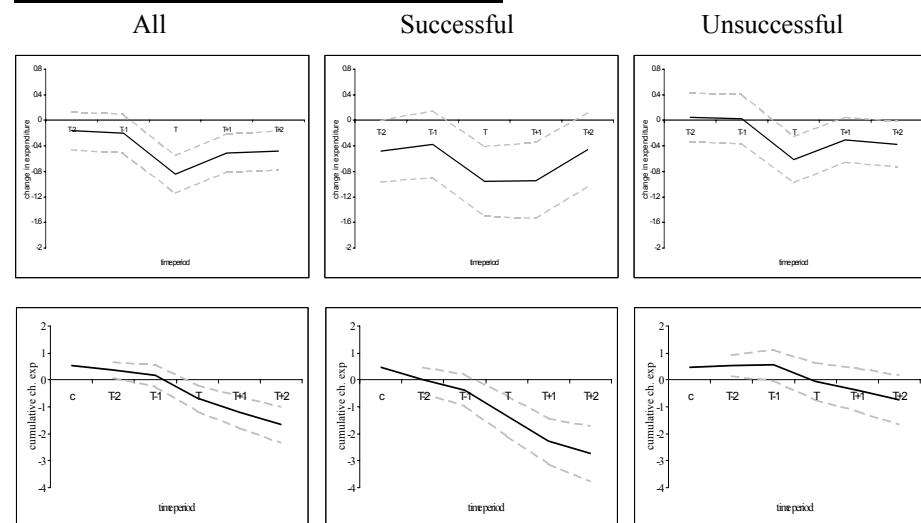
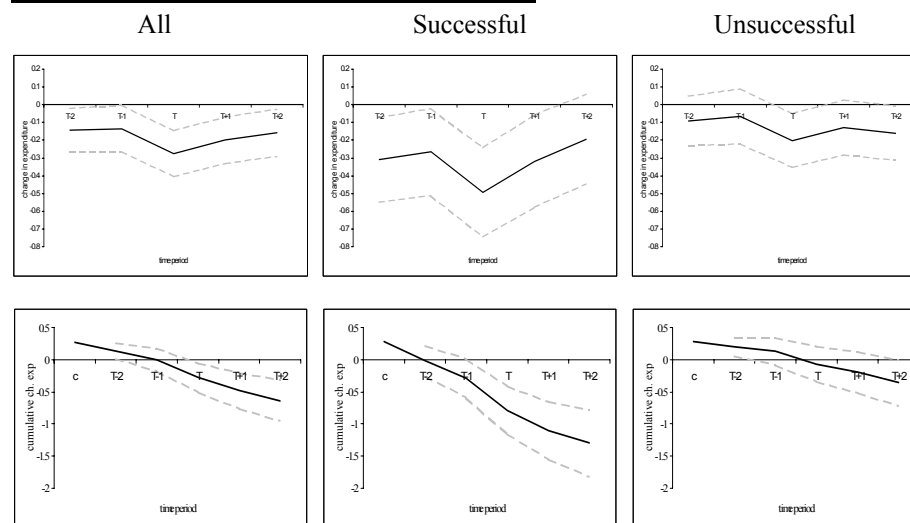


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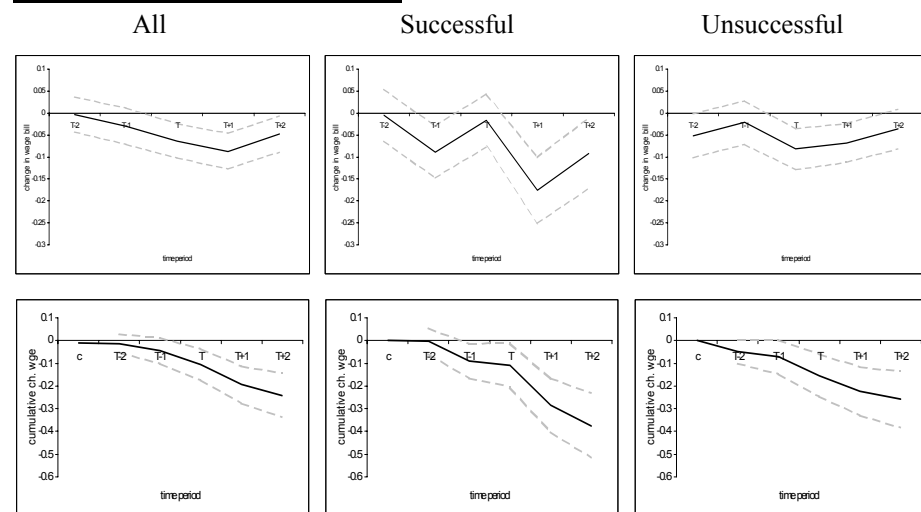
**D: Central Government Total Expenditure**



**E: Subcentral Government Total Expenditure**



**F: Central Government Wage Bill**



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

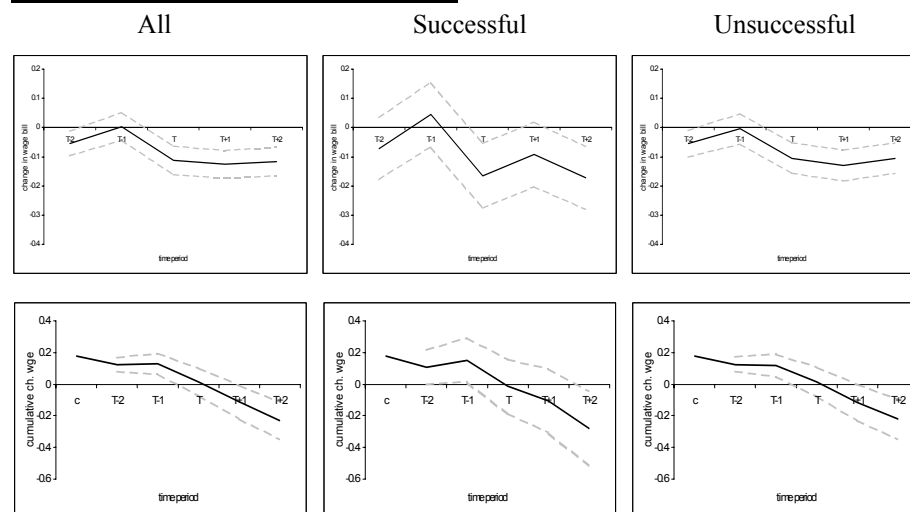
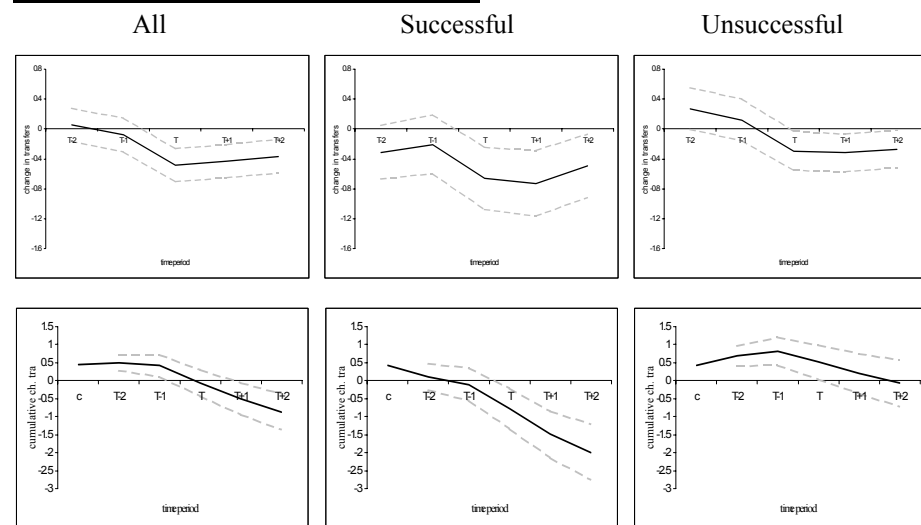
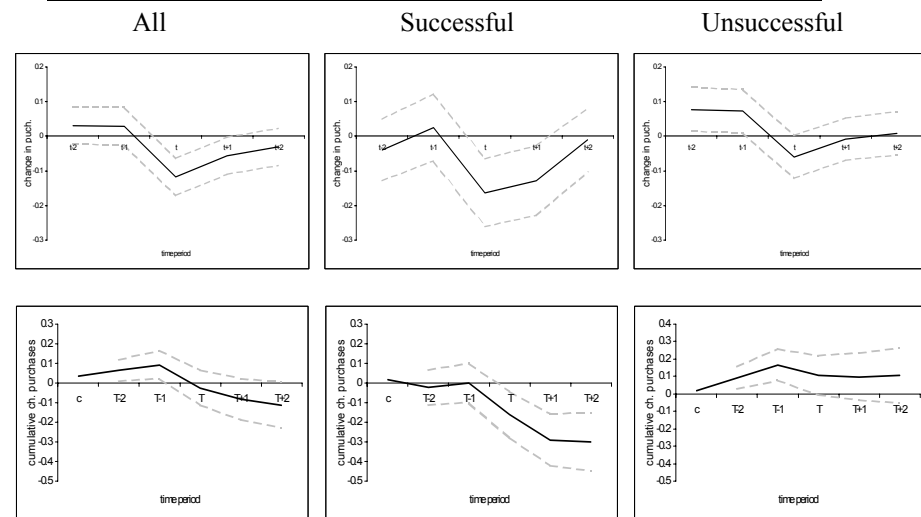


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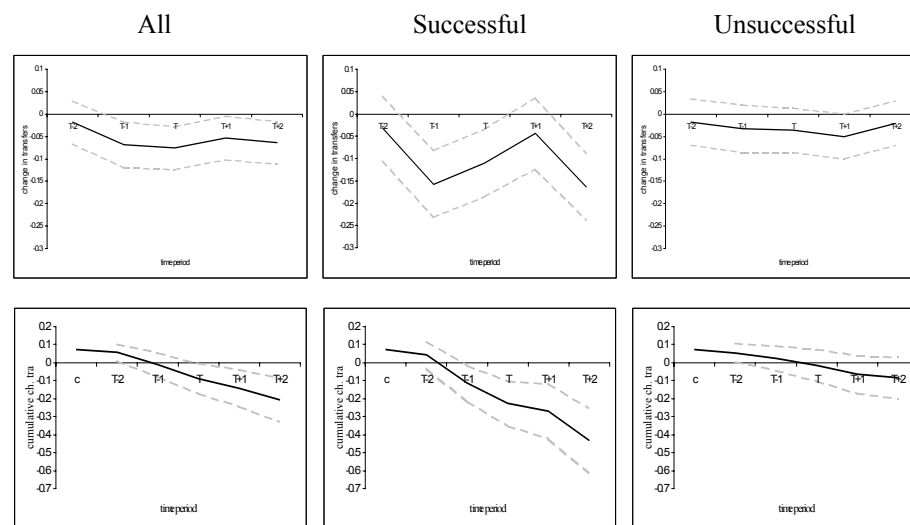
### H: Central Government Social Transfers



**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**

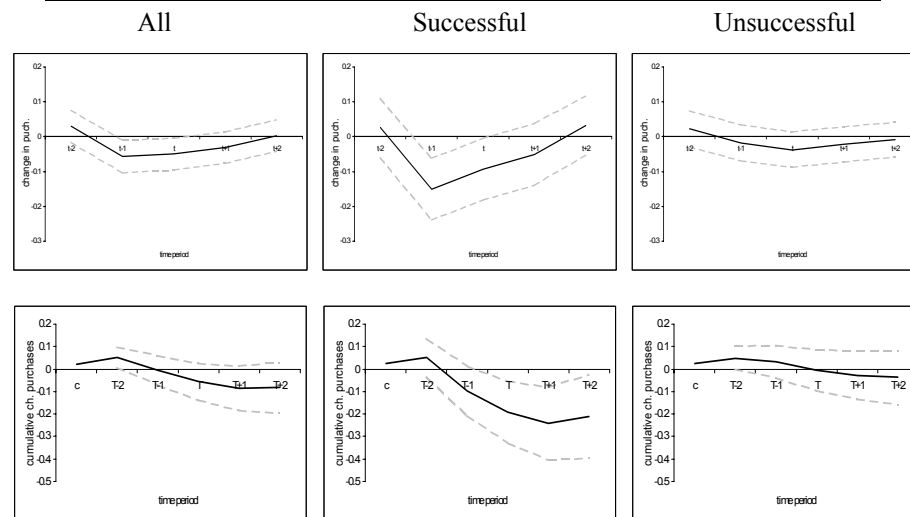
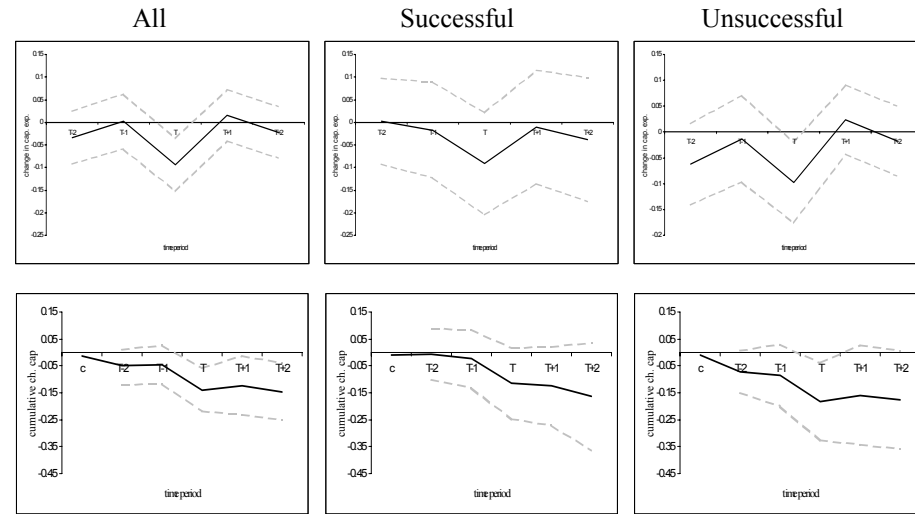
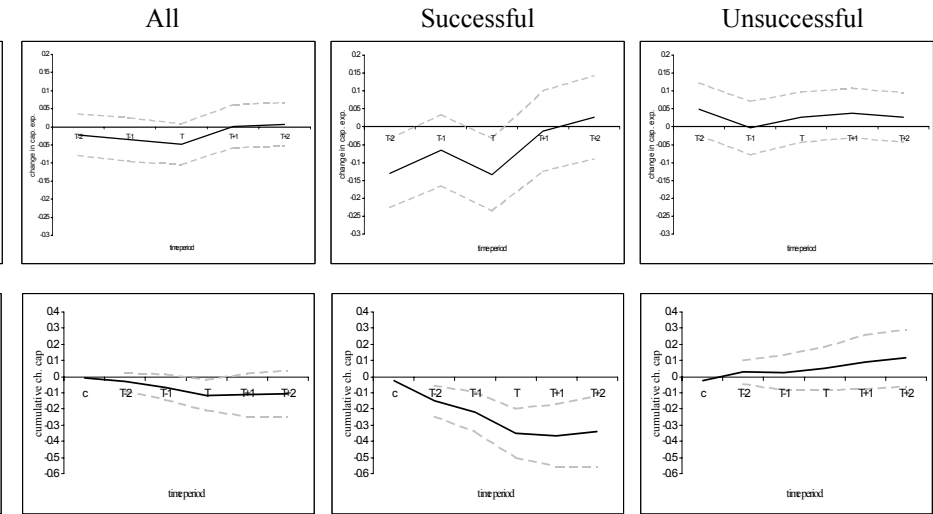


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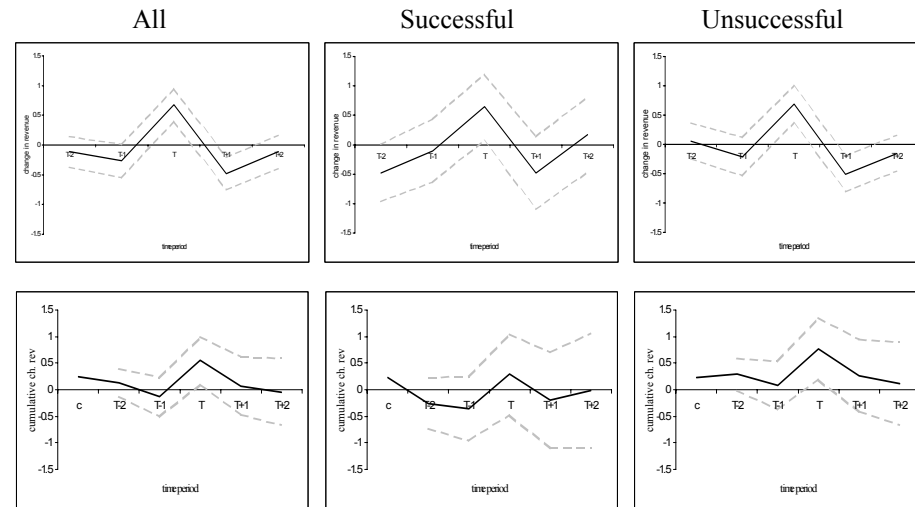
**L: Central Government Capital Expenditure**



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



**N: Central Government Total Revenue**



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

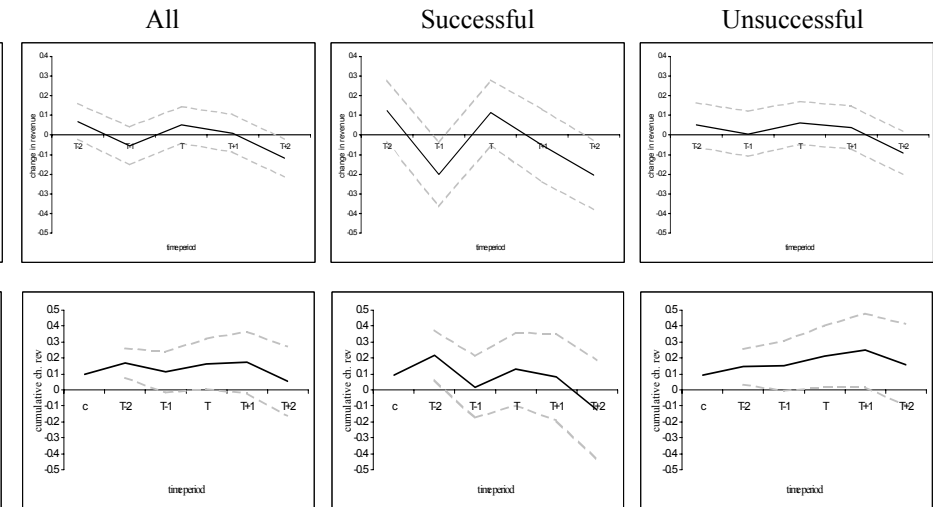
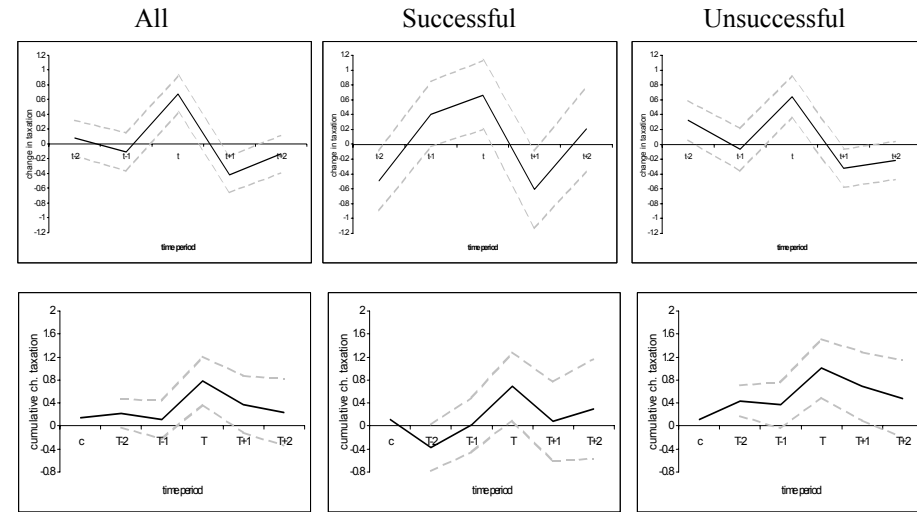
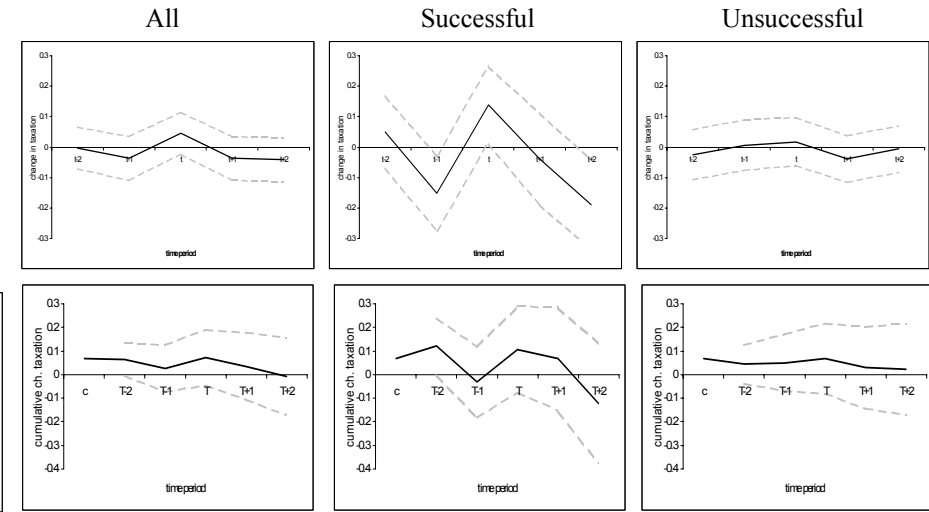


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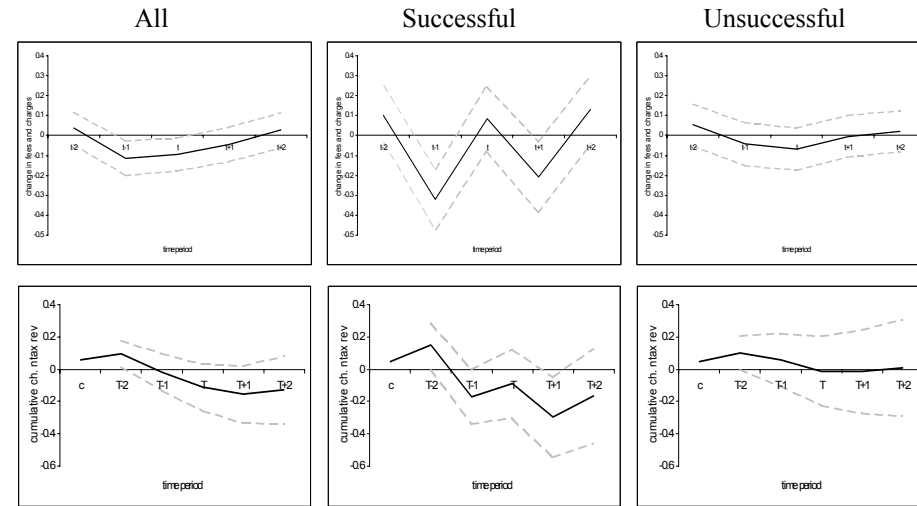
**P: Central Government Taxation Revenues**



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



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



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

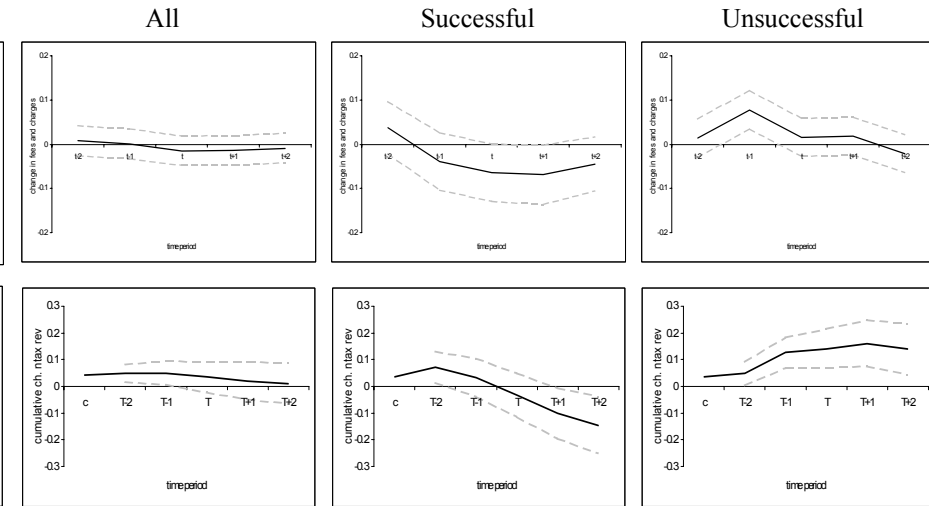
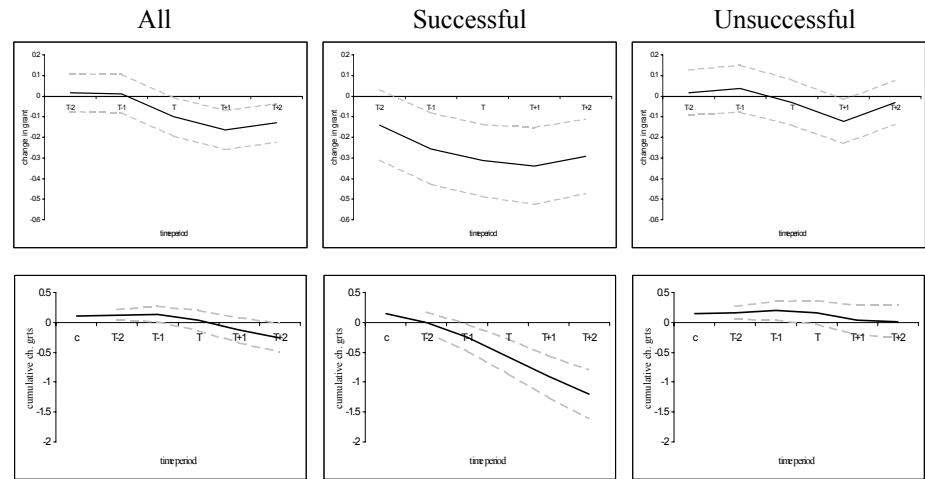




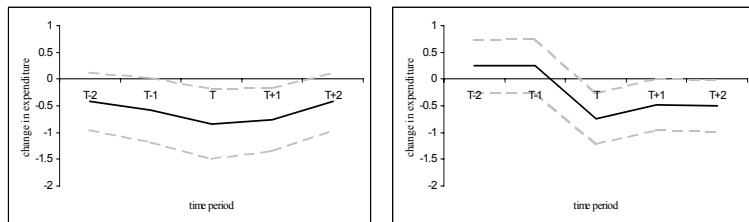
FIGURE 1 continued...

### T: Sub-Central Government Grants



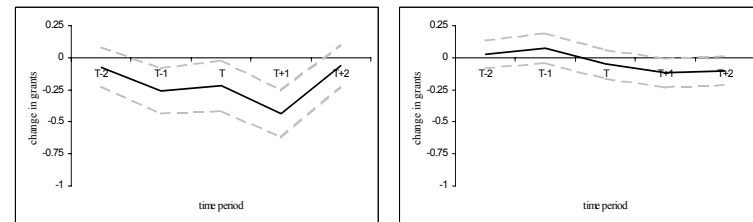
### U: Central Government Total Expenditure

Single Party Central Government      Central Government Coalition



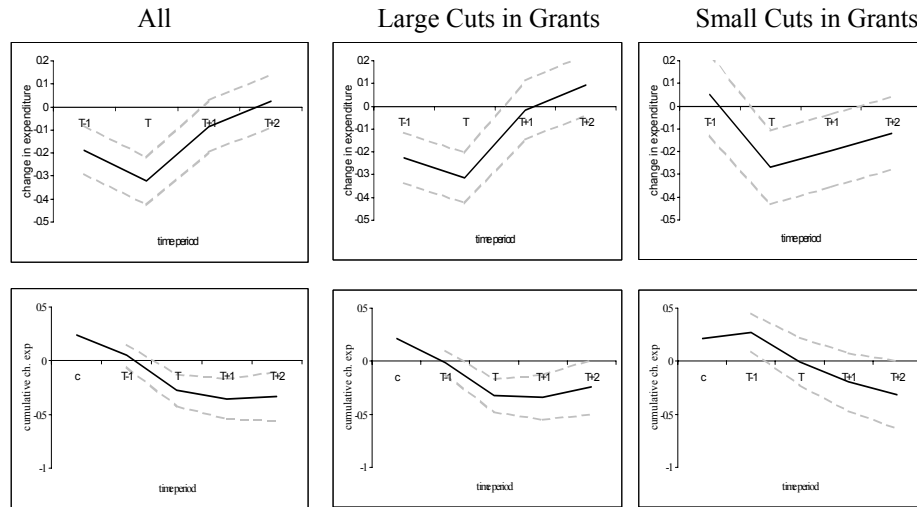
### V: Sub-Central Government Grants

Single Party Central Government      Central Government Coalition

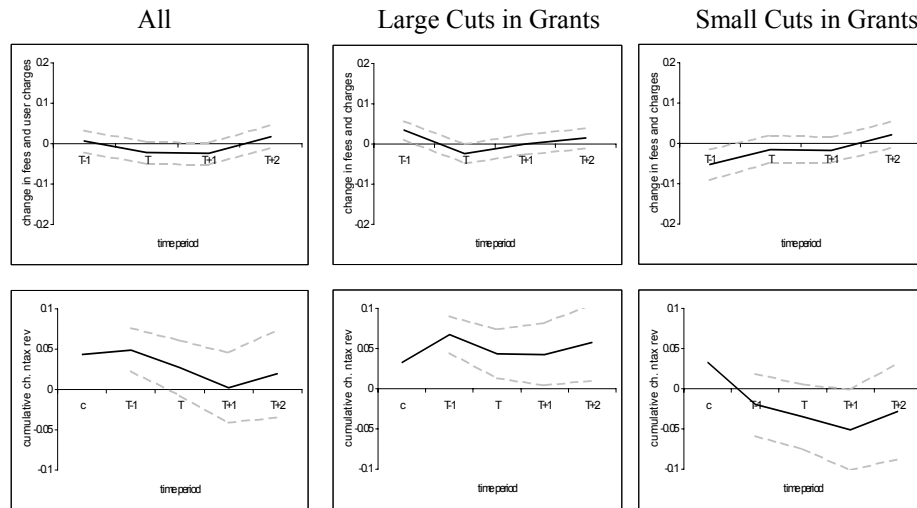


**FIGURE 2**

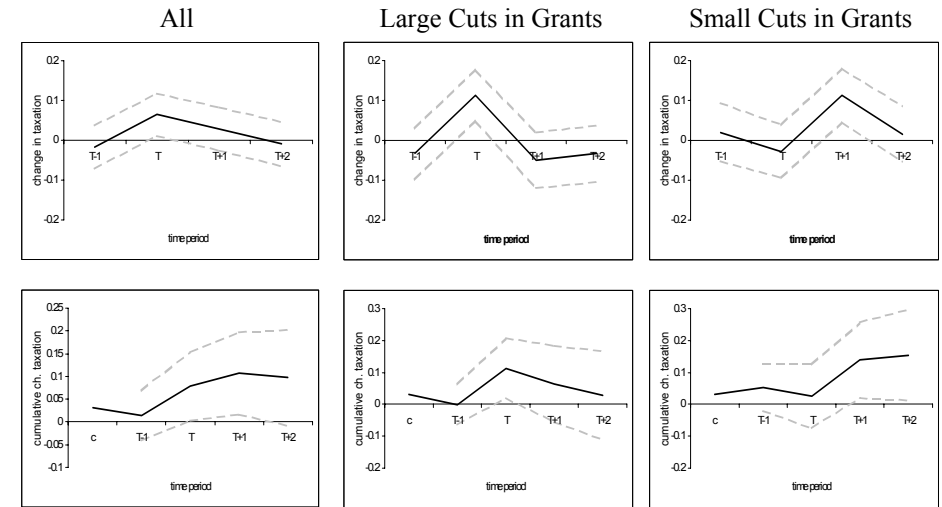
**A: Sub-Central Total Expenditure**



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



**B: Sub-Central Taxation Revenue**



**D: Sub-Central Wage Bill**

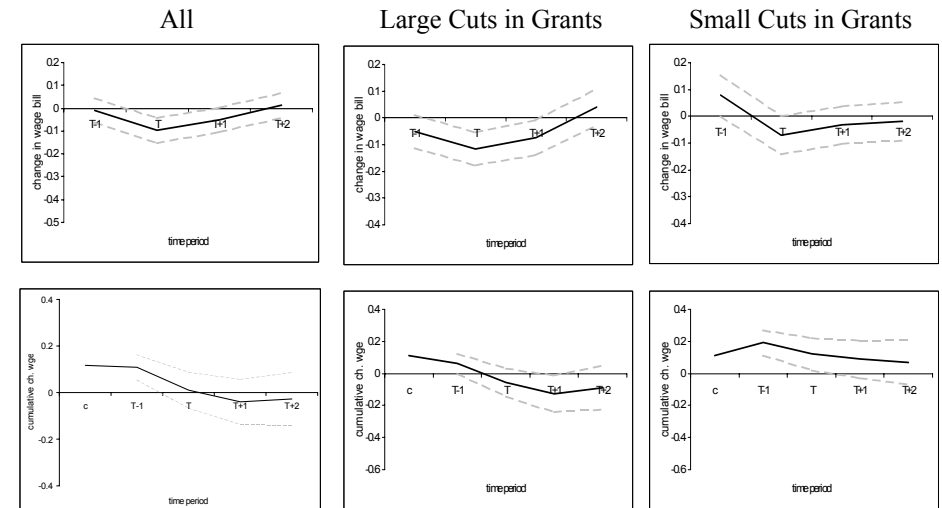
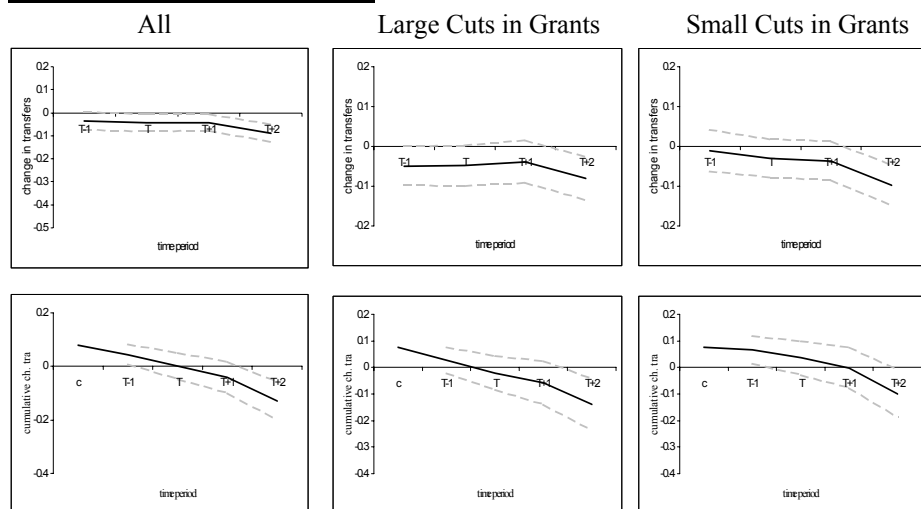
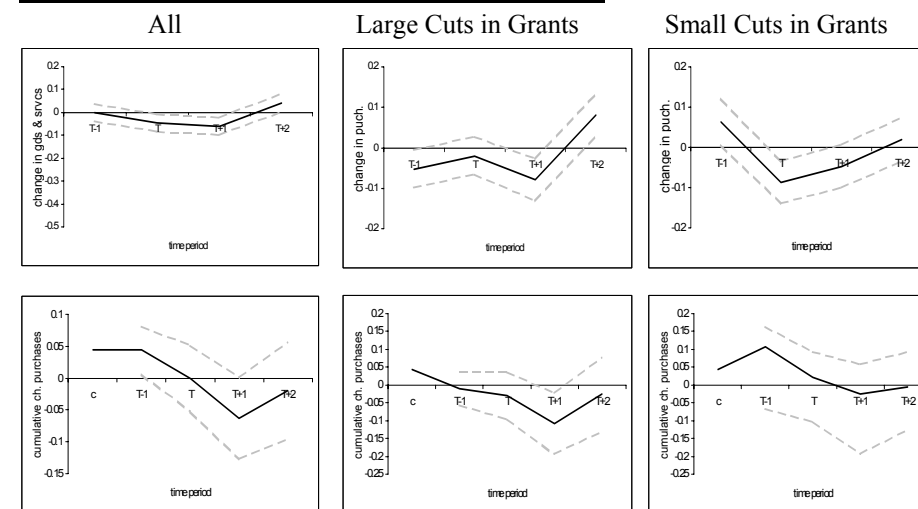


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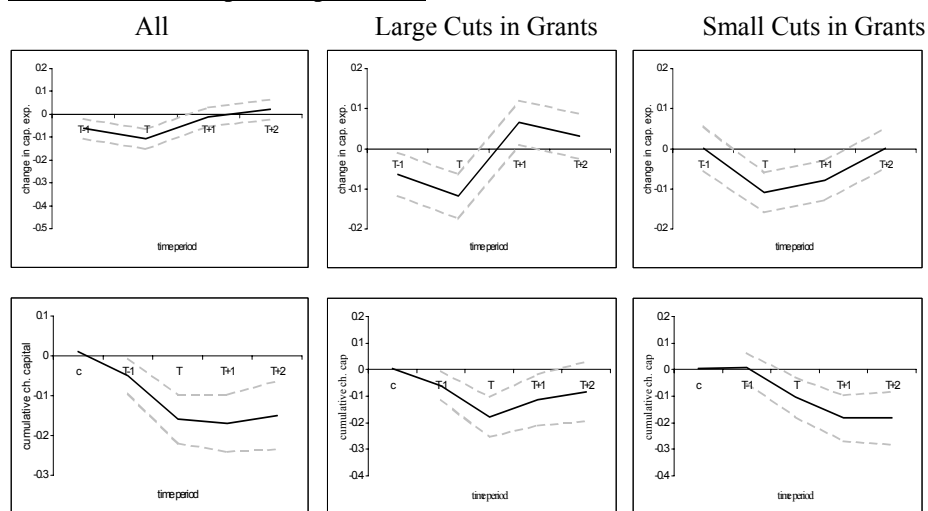
**E: Sub-Central Social Transfers**



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



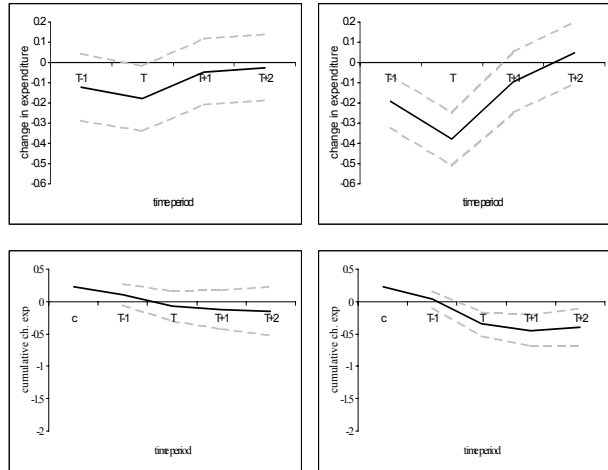
**G: Sub-Central Capital Expenditure**



**FIGURE 3**

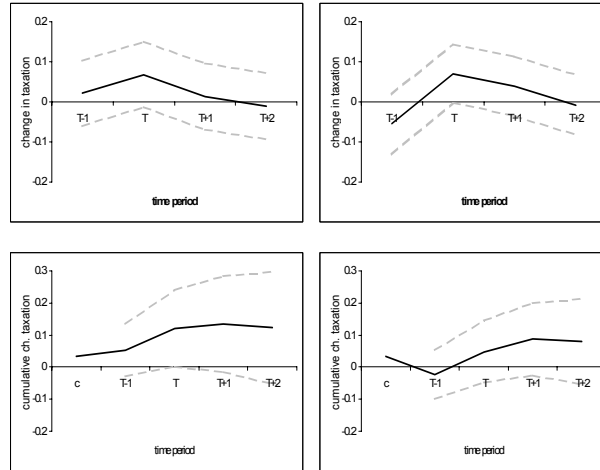
**A: Sub-Central Total Expenditure**

High Grant Dependence      Low Grant Dependence



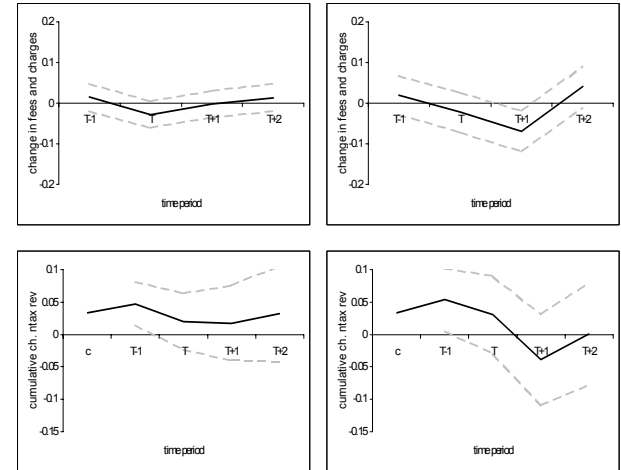
**B: Sub-Central Taxation Revenue**

High Grant Dependence      Low Grant Dependence



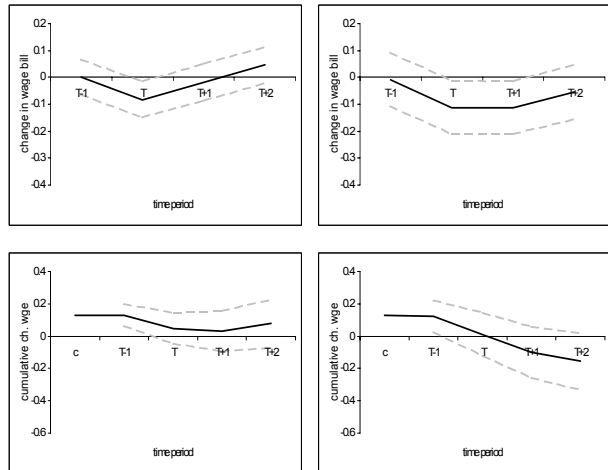
**C: Sub-Central Non-Tax Revenues**

High Grant Dependence      Low Grant Dependence



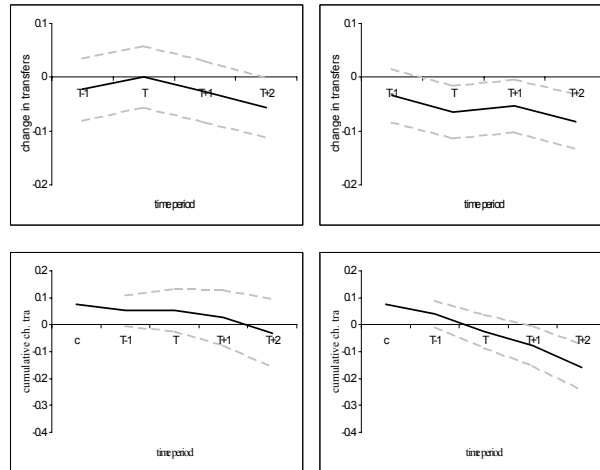
**D: Sub-Central Wage Bill**

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

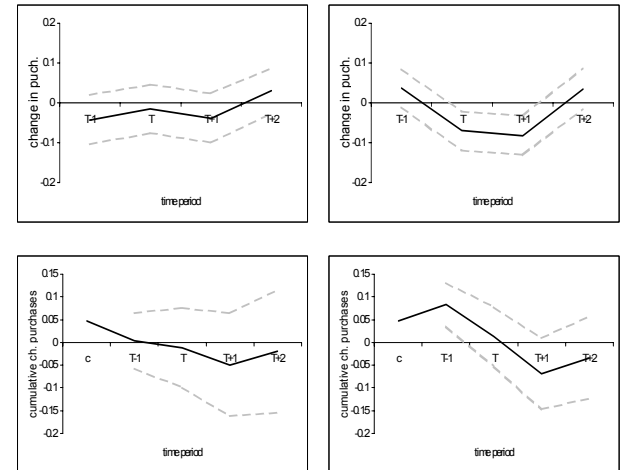
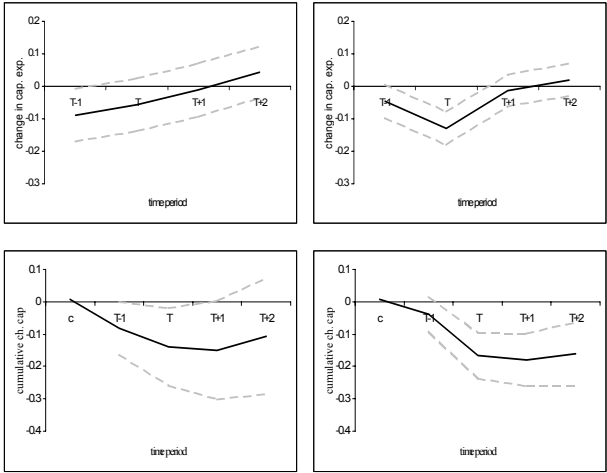


FIGURE 3 continued:

**G: Sub-Central Capital Expenditure**

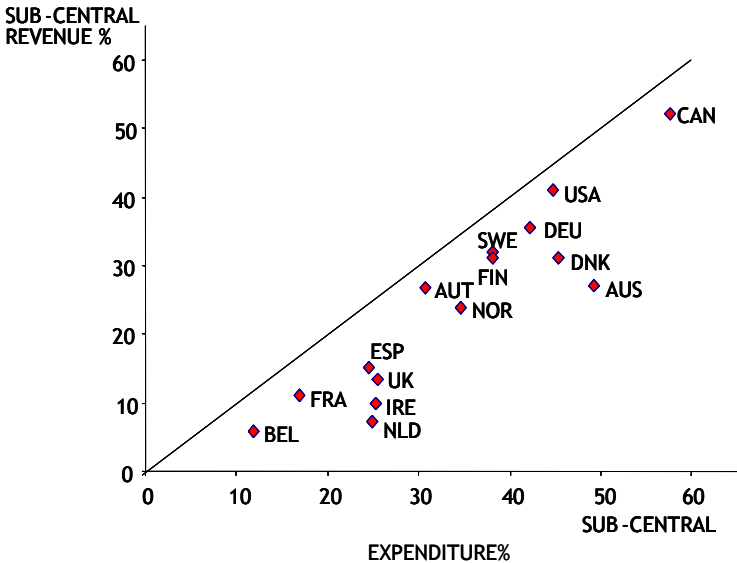
High Grant Dependence      Low Grant Dependence



**FIGURE 4**

**Vertical Imbalances:**

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



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

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