Decentralization and the duration of fiscal consolidation: shifting the burden across layers of government

Dirk Foremny[±]   Agnese Sacchi[≡]   Simone Salotti[∓]

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Abstract

We study the relationship between fiscal decentralization and the duration of the fiscal consolidation episodes occurred in 17 OECD countries between 1978 and 2009. It appears that consolidation lasts longer when expenditure decentralization is higher. We also find that transfers from higher levels of government are reduced during consolidation episodes. This suggests that, given a certain institutional structure within the country, central governments are able to shift the burden of consolidation towards lower tiers of government by reducing intergovernmental transfers. This is particularly the case when sub-national governments have little legal autonomy to raise tax revenues and cannot affect executive decisions taken at the central level.

[±] Institut d'Economia de Barcelona (IEB), University of Barcelona, email: foremny@ub.edu

[≡] Universitas Mercatorum (Rome, Italy) and GEN (Vigo, Spain), email: a.sacchi@unimercatorum.it

[∓] Oxford Brookes University, Oxford (UK), email: ssalotti@brookes.ac.uk

1. Introduction

The recent financial crisis and the ensuing recession have forced many OECD countries to consolidate their general government balances. Severe austerity packages have been implemented in many countries across the globe to achieve this goal, with hotly debated results (Blyth, 2013). While general aspects of fiscal consolidation, such as political economy and macroeconomic conditions have been studied extensively in the literature (Price, 2010; Grüner, 2013), the question of whether fiscal decentralization supports the ability of a country to implement fiscal adjustment measures has not been answered yet.

The hypothesis that decentralization may play a role in how, and to what extent, countries implement consolidation measures (and with which results) is an appealing research question which we address in this paper. According to Neyapti (2013), decentralization can be considered an appropriate institutional mechanism able to sustain fiscal adjustment and to promote fiscal discipline over time. Escolano et al. (2012) claim that the latter is particularly true when sub-central governments have the power to raise adequate resources and revenues to cover their expenditures. According to the IMF (2013), medium-term adjustment plans should be supported by reforms to strengthen fiscal institutions such as better fiscal rules, better budgetary processes, better fiscal monitoring and transparency (including through independent fiscal agencies and fiscal councils), and better coordination of policy across the various levels of government.

From a theoretical viewpoint fiscal decentralization may either favour or impede the governmental consolidation efforts. On the one hand, in a more decentralized system the number of veto players increases, making the adoption of corrective packages more difficult and potentially running into a typical common pool problem. Some studies point out that in times of crisis, a combination of deficit bias and coordination failures due to fiscal decentralization has resulted in over-spending (and/or under-taxation) tendencies at the sub-national level as well as conflicting fiscal stances between the central and the sub-central levels (see, e.g., Jonas, 2012; Eyraud and Moreno Badia, 2013).[1]

On the other hand, central governments may consolidate their balances via lower spending by simply cutting their inter-governmental transfers to sub-national units in order not to face the direct political costs of such unpopular measures.[2] The more expenditures are in the hands of sub-central tiers of government without corresponding revenue powers (as indeed it tends to happen in most decentralized countries, see Sacchi and Salotti 2014), the more of the burden can be shifted to sub-national levels. Also, some forms of cooperative arrangements between central and sub-national governments like internal stability pacts and sub-national fiscal rules are now in place in some

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[1] For example, overspending by regions in Spain resulted in larger than expected primary deficits during the recent recession, particularly in 2011.

[2] Indeed, this seems to be what is happening in Italy with the latest government budget containing spending cuts for 15 million euro, see the article by Bordignon (2014) titled *La manovrona*.

countries (e.g., Austria, Germany, Italy) making sub-national constraints more binding and coordination over fiscal adjustment targets easier to achieve.

However, all those scenarios depend crucially on the financing structure of the different levels of government: what is the real level of autonomy of local governments over their budgets? Foremny and von Hagen (2013) suggest that the real degree of sub-central autonomy and the reliance on transfers may crucially affect the relationship between decentralization and consolidation efforts. They find that sub-national governments in unitary countries in particular saw a significant increase in transfers from the central government during the Great Recession which did not occur in federal states. This suggests that the composition of transfers and its change during consolidation periods depend on the degree of decentralization, but also on the true assignment of power to different levels of government.

Related to this, the presence of sub-national fiscal rules, usually limiting certain budgetary items, may also influence the duration of adjustment episodes as well as their intensity. Indeed, such rules can favour a more coordinated behaviour between central and local policy-makers if not increasing their fiscal discipline and accountability. However, the evidence on the disciplinary effects of sub-national rules is not too strong (Escolano et al. 2012, Foremny 2014). In fact, such rules may not be effective if they represent only *de jure* instruments with the possibility of a bailout intervention from an upper level of government. It appears that the sub-national governments of many countries had accumulated significant fiscal risks over the years up to 2007 (IMF 2013[3]), something that played unfavourably during the subsequent turbulent times. In general terms, sub-national governments had accumulated significant fiscal risks over the years during the crisis, especially in countries both without and, to a lesser extent, with sub-national fiscal rules (Escolano et al., 2012).

Our aim is to combine the literature on fiscal consolidation with that on fiscal federalism and decentralization. The question we raise in this paper is whether or not more decentralized countries consolidate their budget for longer periods than more centralized countries. Furthermore, we investigate the possible mechanisms behind the resulting findings. In particular, we look at how transfers from central governments change during consolidation periods in order to understand whether transfers are used by central governments as an instrument to achieve their consolidation objectives.

Our main results are the following: fiscal consolidation spells are longer in countries characterised by larger proportions of public spending in the hands of sub-central government tiers. This is particularly true when such governments do not enjoy real autonomy over the revenues which appear to be in their hands. We also document a decrease of intergovernmental transfers from the central level during consolidation episodes which suggests that central governments shift the burden

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[3] One significant example is constituted by Iceland. Before the crisis there were no formal constraints on local government finances, and local government debt surged to 37% of GDP at end-2009, with debt-to-revenue ratios exceeding 150% in two-fifths of municipalities owing to a lack of proper oversight.

of consolidation towards lower levels of government when they can do so, at the expenses of prolonging the length of the consolidation processes themselves. Our findings carry interesting implications in light of the widespread concerns over the fiscal imbalances currently characterising most developed countries.

The paper is organized as follows. Section 2 offers a brief literature review on fiscal consolidation, focusing on aspects such as duration, determinants, and successfulness. Section 3 illustrates the empirical strategy we have adopted to investigate the research question introduced above. Section 4 contains the results of the analysis, and Section 5 concludes.

2. Related literature

The literature on fiscal consolidation has dealt with aspects such as the factors leading to consolidation efforts, the determinants of their success, and the duration of the episodes. Existing empirical studies mainly focus on OECD countries and the interest on this topic has been revived by the economic and financial crisis calling for fiscal adjustments in most industrialized countries. There is no unique definition of a successful consolidation effort. For instance, according to Von Hagen and Strauch (2001), success is defined in terms of persistence of the effort, and consolidation is considered to be successful depending on the reduction in the budget deficit achieved at the end of the adjustment period. Alesina and Ardagna (2010) consider consolidation efforts where the cyclically adjusted primary balance ratio to GDP improved by 1.5 percentage points or more. An alternative definition may regard a consolidation effort to be successful if the decrease of gross public debt achieved at the end of the consolidation episode has made the latter either sustainable or substantial lower than it was initially (Heylen and Everaert 2000).[4] Additionally, it can be posited that the successfulness of a fiscal adjustment program is related to the persistence of the consolidation effort: how long could, and should, a government consolidate its balances?

Molnar (2012) analyses the economic environment, political settings and policy measures conducive to fiscal consolidation and debt stabilisation between 1960 and 2009, finding that the existence of fiscal rules and cooperation among different government levels play a crucial role in favour of fiscal adjustment programs. The political framework is also relevant as newly-elected governments seem more likely to start and sustain fiscal consolidation, while non-centrist political parties are less likely to make efforts to stabilise debt than those closer to the centre of the political spectrum.

The composition of the changes in expenditures and revenues seems to play an important role in determining the outcome of the consolidation efforts, although there is no consensus on the exact nature of it. On the one hand, spending-based adjustments are more likely to be successful, as they

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[4] It is not easy to define debt sustainability either. Neck and Sturm (2008, p. 1) explicitly write that "although sustainability of public finance has been discussed for more than a century now, it is still an imprecise concept."

appear to be linked to more long-lasting reductions of deficit over GDP ratios (e.g., Afonso, Nickel, and Rother, 2006; Barrios, Langedijk, and Pench, 2010; Alesina and Ardagna, 2012).[5] At the same time, relying on higher taxes to reduce deficits may damage potential growth by discouraging labour market participation, and by lowering investment and firm profitability due to the distortionary impact of taxes (especially those on income).

On the other hand, revenue-based consolidations may be more effective in terms of fiscal consolidation, particularly if involving the revenues potentially less harmful for growth such as user fees, environmental taxes, property taxes and value-added taxes (Heylen and Everaert, 2000; Tsibouris et al., 2006). In fact, revenue-based consolidations have been carried out in the past[6] and some scholars claim that revenue-based consolidations could be effective especially when initial revenue-to-GDP ratios are relatively low. Moreover, it appears that the *ex post* composition of adjustments often turned out to be different than planned, with expenditure cuts falling short of target and revenue over-performing (Tsibouris et al., 2006; Mauro, 2011; Mauro and Villafuerte, 2013).

In addition to the expenditure/revenue changes' mix, initial conditions also seem to matter in determining the successfulness of fiscal consolidation efforts. In a seminal contribution, Von Hagen and Strauch (2001) investigate when fiscal adjustments are likely to be started and in which circumstances consolidation efforts are likely to be successful on a sample of European countries during the 1990s. The cyclical positions of both the domestic and the international economy, the initial debt level, and the fiscal policy stance all turn out to be important determinants of the likelihood of fiscal consolidations, as well as of their success. Barrios, Langedijk, and Pench (2010) also report that countries facing higher initial levels of government debt have a higher probability of pursuing successful fiscal consolidations.[7] On the other hand, Alesina and Ardagna (2012) find no differences in initial conditions when comparing successful and unsuccessful episodes, and Devries et al. (2011) also show that the role played by initial conditions with respect to fiscal consolidation is at best unclear.

So far we have not mentioned the issue of the duration of the consolidation episodes. Due to its importance, research has been carried out on it, normally using survival analysis techniques. In fact, according to a study by the European Commission (2007), gradual consolidations tend to be more successful than sharp and quicker adjustments, although the latter may be more effective in case of high and rising debt levels. The findings reported below summarise what else has been found in relationship to the duration of past fiscal adjustment efforts.

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[5] Devries et al. (2011) also claim that spending based adjustments have been less contractionary in the past, but only due to accommodative monetary policy.

[6] For instance, in the aftermath of the oil shocks in the early 1980s, countries such as the United States, Japan, Germany, and Canada relied relatively more on tax increases than expenditure cuts (IMF 2013).

[7] Cafiso and Cellini (2014) stress that although a certain debt/GDP ratio may affect the likelihood of consolidation, the opposite is also true, as consolidation affects the debt dynamics. Their analysis on EU countries over the period 1980-2009 suggests that consolidation leads to lower debt/GDP values in the short-run, but not in the medium term.

Illera and Mulas-Granados (2008) study what affects the length of fiscal consolidation episodes defined as the time spells between two fiscal expansions (which are in turn defined on the basis of the dynamics of the cyclically adjusted deficit/surplus) in 15 European countries between 1960 and 2004. They find that the probability of ending a period of fiscal consolidation, what the authors label as 'failure' (the definition comes from the standard survival analysis tools, where hazard functions are used to estimate the probability of a certain event, normally labelled as a 'failure rate'), depends on factors such as the debt level, the magnitude of the adjustment, the relative contribution of spending cuts, and the degree of cabinet fragmentation. It is worth noting that defining consolidation episodes solely on the basis of cyclically adjusted budget balances improvements may constitute too narrow of an approach, since not all periods in which the balance did not improve should be considered as failures (e.g., governments may simply not want to consolidate). To this respect, the data and definition provided by the IMF Devries et al. (2011) seem to be more appropriate to investigate the duration of consolidation efforts: fiscal consolidation episodes are classified using a narrative/historical approach based on the analysis of the policymakers' intentions and actions as described in contemporaneous policy document. Thus, the tax and spending measures taken in such periods are motivated primarily by the desire to reduce the budget deficit and not by a response to prospective economic conditions. This is the type of data used in the empirical analysis of our paper.

A more recent contribution on the duration of consolidations is provided by Lodge and Rodriguez-Vives (2013) where hazard functions are estimated for 20 advanced economies between 1970 and 2010. According to such analysis, the starting fiscal and macroeconomic conditions appear to matter for the ability of governments in sustaining lengthy consolidations. More precisely, high debt and deficits, heavy interest burdens, and high bond yields all facilitate the initiation of consolidation (these are the so-called 'push factors'); then, high private savings, strong external balance, competitiveness (measured by real exchange rate), and stable financial conditions facilitate duration (these are called 'pull factors'). Lodge and Rodriguez-Vives (2013) find that the composition of the fiscal adjustment (i.e. the split between expenditure and revenue measures) does not appear to be a significant determinant of the duration of consolidation.

On the other hand, Agnello, Castro, and Sousa (2013) use annual data for 17 industrial countries over the period 1978-2009 and find a difference between spending-and tax-driven consolidations, with the former spells being shorter than the latter. Moreover, both types of consolidation are longer in Non-European countries than in European countries, while the size of the consolidation program (in percentage of GDP) is not significantly correlated with its duration.[8]

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[8] Studies on the duration of fiscal adjustment episodes have been also performed in a sample of developing countries where, using survival analysis, expenditure composition, the size of the fiscal consolidation, and past performance on fiscal consolidation represent factor affecting the persistence of the adjustment (Gupta et al., 2004).

As recently pointed out by the OECD (Vammalle and Hulbert, 2013), successful national consolidation strategies usually benefit from involving sub-national governments, and they also need to take into account their financial situation in order to preserve the local authorities' capacity to deliver important public services. This is due to the fact that coordination failures between different tiers of government may arise and adversely influence fiscal adjustment actions. Although it has been acknowledged that sub-national governments are certainly important players in fiscal policy-making, few studies on the length of consolidations have properly considered its role by studying fiscal decentralization and intergovernmental fiscal relations. For instance, Schaltegger and Feld (2009) study the experience of Swiss cantons, finding that fiscal centralization significantly decreases the probability of a successful fiscal consolidation, suggesting that competitive fiscal federalism may positively impact fiscal discipline.

The limited empirical evidence (a notable exception is constituted by the article by Darby, Muscatelli, and Roy, 2005) provides support for a constructive participation of sub-national governments in fiscal consolidations in OECD countries, with fiscal consolidations occurring at both levels. There are other articles that have investigated the role of fiscal federalism in the context of fiscal consolidation, although not in relationship with its duration, leaving space for us to carry out original empirical research.

As for emerging economies, Thornton and Adedeji (2010) find that sub-national governments in such countries have contributed in the past to successful general government fiscal adjustments by cutting their capital expenditures and raising their own tax revenues. On the other hand, Baldacci et al. (2006) find no robust effects of fiscal decentralization (measured with simple dummies indicating the authority over fiscal policy of states and provinces) on the success of fiscal consolidation in a panel of 25 emerging market economies (they build on previous research on emerging economies by Adam and Bevan, 2003, and Gupta et al., 2005).[9]

3. Empirical approach

3.1 Data

The data we use in this paper are collected from various sources. First, data on consolidation episodes are provided by the IMF (the paper by Devries et al. 2011 illustrates the historical approach followed to build the data and provides detailed explanations) and are based on an analytical examination of budget policy documents in search for the intention of governments permits to identify consolidation periods (in the dataset, the *consolidation* dummy takes the value 1 in years characterised by the will of the government to consolidate its balances). This approach limits the sample to 17 OECD countries

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[9] As noted by Schaltegger and Feld (2009) the decentralization dummy variable used by Baldacci et al. (2006) does not allow to capture the influence of tax competition and the counteracting impact of grants on fiscal consolidation in such countries.

over the period 1978-2009, but is superior to the identification of consolidation episodes based solely on the basis of changes in the cyclically adjusted primary balance. For instance, the latter method may lead us to consider as consolidation efforts instances in which the budget balance improved due to circumstances different from the will of the government to consolidate its finances. Also, cyclical adjusted series may suffer from measurement errors which are likely to be correlated with economic developments.

Second, we augment the dataset with information over fiscal decentralization, *edec*, which is measured using the proportion of expenditures in the hands of sub-central governments divided by general government's expenditures (source: OECD). This is the standard way to express numerically the degree of fiscal decentralization, although the following shortcoming has to be acknowledged. It is well-known that such measure tends to overstate the degree of sub-central autonomy and responsibility, as some types of expenditures are labelled as sub-central although sub-central governments have little powers over them (Ebel and Yilmaz 2003). Alternative measures trying to account for such feature have been constructed by researchers (most notably, see Stegarescu 2005), but their use would imply a severe loss in terms of missing observations. Moreover, we include in our analysis series accounting for real sub-central autonomy as explained below.

Third, we use some variables to capture the extent of real sub-national autonomy. Those variables measure executive influence of sub-national sectors, fiscal autonomy, and co-determination of policy making between the sub-national and the central level of government. This information is captured by the Regional Authority Index developed by Hooghe, Marks, and Schakel (2010). Executive influence is defined as the extent to which a regional government co-determines national policy in intergovernmental meetings and varies between 0 and 2. Fiscal autonomy is the extent to which a regional government can independently tax its population. The minimum value of 0 is set when the central government sets base and rate of all regional taxes and the maximum of 4 when the regional government has the right to define the base and rate of at least one major tax. Eventually, co-determination is also measured by an indicator which increases if a regional government can exercise authority by co-determining decision making at the national level by either direct participation in the design of national laws, or by sharing executive responsibilities with the national government, or by having an influence on the distribution of tax revenues in the country as a whole. Finally, and most importantly, the indicator which varies between 0 and 12 takes into account if regional government may exercise authority over the constitutional set up in the country.[10]

Last, the rest of the variables employed in the analysis are defined as follows: *debt* is gross public debt divided by GDP (taken from the IMF Historical Debt database); *deficit* is the general government budget balance (source: OECD); *real gdp growth* is the growth rate of real GDP per capita (source: Penn World Tables); *election year* is a dummy carrying information on election years;

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[10] We thank Jaroslaw Kantorowicz for making this point during his discussion at the OECD Fiscal Federalism Network Workshop in Paris.

government type is a categorical variable assuming the following values: 1 for single party majority governments, 2 for minimal winning coalitions, 3 for surplus coalitions, 4 for single party minority governments, 5 for multi party minority governments, and 6 for caretaker governments; *right wing* is a dummy taking the value of 1 for right-wing governments and zero otherwise (source: the Comparative Political Dataset by Armingeon et al. 2012); *interest rate* is the nominal long-term interest rate on government bonds (source: OECD); *interest payments* stands for interest paid on public debt divided by GDP (source: IMF, Mauro et al. 2013); finally, *trans* stands for intergovernmental transfer revenues (source: OECD). Table 1 shows summary statistics for our main variables.

[Table 1 about here]

Figure 1 presents the Kaplan-Meier function for our consolidation's duration data, and it can be seen as the first step of our analysis. The length of the horizontal parts of the line along the horizontal axis represents the survival duration for that interval, which is determined by the end of the consolidation episode. For example, the probability of a consolidation episode to last at least one year is 100%, which is basically due to the yearly frequency of the data and the fact that there is at least one consolidation episode lasting one year only (in total, there are 13 of those in our sample). The probability decreases as the length of the consolidation spells increases, and it reaches zero for spells longer than 14 years (the reason being that in our sample there is one 14-years long episode, Canada between 1984 and 1997, and no episodes longer than that). The vertical distances between the horizontal parts of the line illustrate the change in cumulative probability of ending consolidation as the curve advances. The most notable 'jumps' characterise the consolidation episodes lasting few years, which are also the most numerous in the sample that we consider (for example, there are 15 two-years episodes in the sample, but only five six-years episodes). We devote the rest of the paper to the investigation of the reasons behind the duration of those consolidation episodes, as explained below.

[Figure 1 about here]

3.2 Identification

Our empirical approach is based on three individual steps. First, we perform a duration analysis by following the literature on consolidation in order to estimate the determinants of the duration of fiscal consolidation. The advantage of such an analysis is that it makes use of all the information available in the data, enabling the treatment of the duration of fiscal consolidation as endogenous (Gupta et al., 2004). Thus, we can study *how long* governments have managed to sustain uninterrupted periods of consolidation in the past and what factors affected their ability to do so. However, some caveats

remain as duration analysis does not deal with, among other things, the economic and welfare consequences of consolidation, and it does not directly comment neither on debt sustainability nor the success of fiscal consolidation in achieving a lasting reduction in government debt ratios (Lodge and Rodriguez-Vives, 2013). More importantly for our purposes, we want to fully understand the role of fiscal decentralization and of sub-central autonomy in affecting the duration of the fiscal consolidation episodes. In order to do so, we proceed along the analytical steps illustrated below.

We estimate the determinants of the time h employed by a country to consolidate with a standard duration model such as the following:

$$h(t,Z) = h_0(t) \times (\mathbf{Z}\gamma + \mathbf{X}\beta) \tag{1}$$

In our baseline specification the baseline hazard h_0 follows the Weibull model as this is the most flexible specification of those commonly used in the literature. In this case, the following holds: $h_0(t) = p \times t^{\rho-1}$. The parameter ρ as the baseline hazard will be estimated as an endogenous part of the model.

The vector $\mathbf{Z}$ includes the variables dealing with decentralization and sub-central autonomy which constitute the focus of our analysis. $\mathbf{X}$ is a set of control variables. Regarding $\mathbf{Z}$, we are interested in whether - and how - consolidation at the general level of government is affected by the degree of decentralization and by the sub-national institutional setting. Therefore, in the baseline model we investigate the effect of expenditure decentralization and include only this variable in $\mathbf{Z}$ (in fact, for comparison and robustness purposes, we also report the estimates arising from a parsimonious specification that excludes entirely the vector $\mathbf{Z}$ which conforms more to the analyses of the existing literature).

Later, we estimate three alternative specifications of model (1) obtained by augmenting $\mathbf{Z}$ separately with both one of the indicator variables accounting for sub-national real autonomy and its respective interaction term with expenditure decentralization. We focus on one indicator per specification out of the following three: fiscal autonomy, executive influence, and co-determination to avoid potential multicollinearity issues. The three indicators all aim at capturing a similar dimension, i.e. real sub-central autonomy, therefore they are likely to be correlated with each other. The control variables included in the vector $\mathbf{X}$ and explained in Section 3.1 are selected following previous studies.

Finally, we analyse the effect of consolidation periods on sub-national public finances. At this stage, our aim is not to provide causal estimates, but rather to present correlation-based evidence on whether or not consolidation has been undertaken at the expense of sub-national sectors. In order to do so, we estimate the following equation:

$$\Delta \log(transfers) = \beta \times consolidation_{i,t} \times \Omega + \eta_i + \varepsilon_{i,t}, \qquad (2)$$

where Ω is equal to one of the three variables included in the interactions of the previous step. To analyse the effect we compute the marginal effect of consolidation episodes conditional on the values that the interacted variable can assume.

4. Results

We begin the illustration of our empirical results by discussing the estimates of equation (1), presented in Table 2. The first specification (reported in the first column of Table 2) only includes the control variables taken from the existing literature and not the decentralization variable to allow for comparison with previous analyses. In the second column expenditure decentralization (*edec*) is included as the main variable of interest.

[Table 2 about here]

The negative and significant effect of *edec* indicates that more decentralized countries have a lower hazard rate, i.e. the probability that a consolidation period will last for an additional year is increasing when decentralization is higher. This effect is illustrated in Figure 2 which depicts the survival function for different levels of decentralization.

[Figure 2 about here]

The survival function for countries with a decentralization level of 50%, as represented by the green coloured line, is significantly shifted to the right compared to countries with lower level of decentralization. Therefore, more decentralized countries consolidate on average for longer periods.

The other control variables show the expected signs, but many never gain statistical significance. From the macroeconomic side, it emerges that an increase in the interest payments makes it more likely that a consolidation period will stop earlier. On the political side, we find that right wing governments tend to consolidate longer on average. While the political cycle does not appear to affect the duration of the consolidation episodes (as the coefficient associated with the election year dummy is not statistically significant), the coefficient for the type of government shows a significant and negative impact. Another interesting result is that consolidations based on tax hikes are more likely to end sooner. This effect prevails in both models and highlights the important difference between the spending and revenue policy tools (Alesina and Ardagna, 2010).

Thus, this initial duration analysis suggests that there is a significant effect of fiscal decentralization on the duration of fiscal consolidation. Our aim is to complement this finding by

identifying the channel behind this effect. On the one hand, more decentralized countries may find it easier to consolidate for longer periods simply because central governments can shift the adjustment burden down to sub-national sectors. On the other hand, the positive impact on duration could emerge because sub-national governments contribute substantially to the stabilization function of economies making it simpler to sustain longer-lasting consolidation efforts. The first effect would be the more pronounced the less real legal power is transferred to sub-national sectors: if sub-central governments are responsible for large expenditure shares but do not possess the relative revenue power, it is easy for the central government to cut transfers on the expense of lower governmental layers. We test this hypothesis by augmenting the model with the respective indicators of real autonomy and their interaction terms with decentralization. Results are presented in Table 3.

[Table 3 about here]

As a general result, the negative coefficient of expenditure decentralization holds throughout all specifications. However, the baseline effect only remains significant when legal autonomy is included into the model.[11] Augmenting Model (1) with an interaction term between expenditure decentralization and a real autonomy indicator (any of the three that we use separately in the model) results in a positive and statically significant coefficient associated to the main effect of fiscal autonomy and a negative coefficient on the interaction term. This implies that decentralized countries consolidate longer but larger fiscal autonomy is capable of affecting this. This means that the result is offset if sub-national governments have real autonomy over their fiscal policies. To interpret the negative interaction term and illustrate the overall effect, we plot the survival functions in Figures 3-5 for different combinations of the two variables using the three real autonomy variables separately.

[Figure 3 about here]

Here, the leftmost line represents the effect with high fiscal autonomy at sub-national levels while expenditure decentralization is small (20%). Countries like this tend to consolidate for shorter periods of time. At the same level of decentralization but without fiscal autonomy the consolidation spells last on average slightly longer as the survival curve shifts to the right. This indicates that, in countries which are rather centralized, higher real fiscal autonomy might avoid that the adjustment burden will be shifted to sub-national sectors (if this indeed happens will be analysed in the next step after discussing the other effects on duration). Turning to the countries characterised by high levels of decentralization (around 50%), the curves shift as expected to the right as higher decentralization increases the survival probability, that is, the probability of having lengthy consolidation spells. These

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[11] This might indicate a problem of collinearity as expenditure decentralization might evolve together with the real autonomy variables in some cases.

two right-most survival functions almost overlap. Without fiscal autonomy (red line) the main effect of decentralization prevails, as the interaction term and the main effect of fiscal autonomy are equal to zero. However, if we switch to a high autonomy regime, we would expect a shift to the left as those regimes were found to consolidate shorter. However, this effect is almost offset by the negative interaction term which gains large relative importance.[12] At this level of decentralization, it seems that switching from a high- to low-fiscal autonomy model of decentralization does not change anymore the duration of consolidation spells.

We turn to real legal autonomy defined as *executive influence* in Model (1). Results are in line with those obtained previously with *fiscal autonomy*. This implies that decentralization does not only work together through the interaction term, but also shifts the survival function to the right by itself. This is illustrated in Figure 4. While the ordering of the lines is generally the same as before, the impact of decentralization now more than offsets the reduction in the survival probability due to legal autonomy.

[Figure 4 about here]

Figure 5 completes the analysis with the indicator for legal co-determination (*shared rule*). Results are almost identical to those illustrated above. This indicates that the most important element of such institutional arrangements might be the fiscal part and highlights the importance of the proper design of intergovernmental fiscal institutions.

[Figure 5 about here]

Thus, the results so far suggest that more decentralized countries consolidate for longer periods, but this effect is mitigated by real autonomy in the hands of sub-central government tiers. For relatively high values of decentralization, the first effect dominates that of real autonomy. In other words, if countries are only mildly decentralized central governments can shift the burden of long-lasting consolidations to lower levels of government unless they are effectively shielded by some element of real autonomy. If they have sufficiently high autonomy, consolidation lasts less. However, at high levels of expenditure decentralization real autonomy essentially makes little difference.

Next, and as the final step of the analysis, we estimate Equation (2) in order to check whether the fact that more decentralized economies consolidate longer is driven by cuts in transfers to sub-national sectors. Figure 6 plots the marginal effect of a consolidation period on the log-difference of transfers for all the possible values of the *fiscal autonomy* variable.

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[12] Note that the maximum value of *fiscal autonomy* is equal 2, while we assume *edec* to be equal to 50.

[Figure 6 about here]

The slope of the interaction terms does not turn out to be significant in the regression. Nevertheless, the figure reveals some interesting insights. First, during consolidation periods the transfers to lower levels of government are substantially reduced as the impact of consolidation is negative and different from zero. This suggests that consolidation - at least partially - has been achieved in the past by reducing the transfers to sub-national levels, confirming the stylised facts presented in Vammalle and Hulbert (2013). However, the effect is only different from zero as long as real autonomy, here in terms of fiscal autonomy, is not sufficiently large. Sub-national sectors with higher autonomy on this dimension can use their additional power to prevent central cuts in their transfer revenue.

Similar evidence is offered by repeating the exercise with the other two indicators of real sub-central autonomy, executive influence and co-determination of policy making (*executive influence* and *shared rule*, respectively). Figures 7 and 8 differ from Figure 6 only in terms of the real autonomy variable utilised.

[Figures 7 & 8 about here]

While the slope becomes flatter, the estimated averages are still negative representing transfer cuts during consolidation periods. Once again, sub-national sectors which enjoy substantial influence in policy making do not experience any significantly reductions in transfers during consolidation periods, as for higher values of this indicator consolidation periods are not characterised by significant decreases in transfer to lower levels of governments.

5. Conclusion

The necessity to adjust public finances and address governments' fiscal imbalances has recently animated a lively debate on which fiscal tools (e.g., spending review measures, changes in tax systems) should be used, and how, in order to ensure and maintain sustainable fiscal positions. Existing research has dealt mostly with the analysis of the welfare and economic effects of the various types of austerity measures implemented, as well as with the determinants of successful fiscal adjustment plans.

A relevant issue not yet extensively explored is the duration of such fiscal consolidation processes, and analysing which elements affect it constitutes an interesting research question. The IMF suggested that fiscal institutions may be appropriate tools to sustain fiscal adjustment measures over time (Blanchard and Cottarelli, 2010). Among other institutions, the organisation of the intergovernmental fiscal relations among different tiers of political authorities appears to be a natural

candidate for affecting the length of the consolidation processes. On the one hand, coordination failures and deficit bias issues may arise in the presence of multiple government tiers and agencies but, on the other hand, more efficient and effective fiscal adjustments may result from the combined action of the several political actors in more decentralized systems under a cooperative institutional framework. Thus, we hypothesise that the multi-layered fiscal structure, which characterizes most OECD countries, should be taken into account when assessing the duration of fiscal consolidations.

Our paper investigates the impact of fiscal decentralization on the duration of consolidation episodes occurred in 17 OECD countries between 1978 and 2009, finding that: i) duration is longer in more decentralized countries, but only if sub-national governments have little real autonomy over their budgets; ii) transfers from the central government are reduced during consolidation periods, and this effect is more pronounced if sub-national authorities have little legal power to affect the central government's decisions. As a consequence, the most vulnerable local governments during fiscal retrenchment episodes seem to be those having more spending tasks and responsibilities not accompanied by enough legal power. Indeed, this seems to be a common feature of OECD countries, which are largely characterized by an asymmetry between expenditure and tax decentralization (Blöchliger and Vammalle, 2012).

The fact that central governments reduce their transfers to lower tiers during fiscal adjustment processes may reveal a (possibly short-sighted) strategy of central governments to shift the adjustment burden to lower government levels[13] in order to appear virtuous to the international markets' scrutiny and in the eyes of supranational institutions. Such behaviour goes against the recommendations of the IMF (2013) according to which the best way to achieve credibility is having medium-term fiscal plans with a visible anchor (e.g., either an average pace of adjustment or a fiscal target to be achieved within a certain period) combined with structural and institutional reforms, possibly involving different tiers of government.

Moreover, the central governments' behaviour of reducing their transfers to sub-national units during fiscal consolidation episodes may lead not only to longer consolidation spells, but also to the loss of political consensus at the territorial level that can be reflected on the results of national representative elections. The IMF (2014) suggests in fact a different approach based on the coordination of financial decision-making across different government tiers to grant the success of adjustment strategies.[14]

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[13] Actually, this may be also partly attributable to the fact that while many national governments suspended or abandoned national fiscal rules following the crisis, rules concerning sub-national deficits and debts often remained in force.

[14] Despite their growing importance, intergovernmental fiscal arrangements have not been a focus of the reform over the last years. Among the nine G-20 countries with fiscal objectives covering the general government or wider, only six clearly identify the contribution of each level of government to the targeted balance and debt position in their fiscal plans. Only four countries have taken steps to strengthen the fiscal oversight of their sub-national governments during this period.

Our results call for further research. A possible future step could consist in investigating whether more decentralized countries are actually more successful in their consolidation strategies, as suggested by Schaltegger and Feld (2009) for Swiss cantons. Furthermore, the distributional effects of such policies across governmental levels have to be carefully considered. All in all, given that budget consolidation measures are normally unpopular, the duration of the consolidation episodes is relevant also in light of the political support needed by governments in order to carry out such measures. Our findings suggest that when many institutional actors are involved in the process, as it normally happens in decentralized systems, there are non-negligible effects on the length of consolidation which may affect the prioritisation of the government's policy objectives, their implementation, and, consequently, their successfulness.

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A. Tables

Variables	N	mean	sd	min	max
consolidation	527	0.315	0.465	0.000	1.000
edec	544	36.588	14.008	8.661	65.605
debt	544	57.184	25.844	4.288	134.065
real gdp growth	544	2.487	2.375	-8.354	11.495
government type	544	2.447	1.303	1.000	6.000
election year	544	0.305	0.461	0.000	1.000
deficit(t−1)	527	-0.086	3.195	-10.377	9.011
interest rate	527	0.117	1.847	-15.268	9.211
interest payments	527	0.004	0.512	-2.226	2.286
right wing	544	0.557	0.497	0.000	1.000
fiscal autonomy	498	2.088	1.514	0.000	4.800
executive influence	498	0.528	0.747	0.000	2.000
shared rule	498	3.061	3.352	0.000	12.000
log(trans)	345	10.529	1.295	7.149	13.164

Table 1: summary statistics

Survival Time	(1)	(2)
Decentralization		
edec		-0.074***
		(0.024)
Controls		
deficit(t−1)	-0.067*	-0.056
	(0.036)	(0.036)
debt(t−1)	0.020	0.006
	(0.028)	(0.029)
debt	-0.040	-0.025
	(0.028)	(0.028)
Δ interest payments	0.498***	0.497***
	(0.167)	(0.165)
real gdp growth	-0.188***	-0.139**
	(0.055)	(0.057)
Δ interest rate	0.036	0.000
	(0.051)	(0.052)
election year	0.107	0.119
	(0.163)	(0.165)
right wing	-0.548***	-0.273
	(0.169)	(0.183)
government type	-0.703***	-0.406**
	(0.169)	(0.190)
tax based consolidation	0.248*	0.209**
	(0.131)	(0.088)
Hazard parameters		
Constant	-0.156	0.407
	(0.245)	(0.283)
ln(ρ)	0.667***	0.712***
	(0.051)	(0.052)
Number of observations	166	166

Table 2: baseline results

Notes: Survival time estimation assuming the Weibull survival distribution. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Survival Time	(1)	(2)	(3)
Decentralization			
edec	-0.013	-0.022**	-0.023
	(0.018)	(0.011)	(0.015)
Autonomy			
fiscal autonomy	0.508**		
	(0.241)		
executive influence		2.571***	
		(0.822)	
shared rule			0.142*
			(0.078)
Interaction terms			
fiscal autonomy · edec	-0.011*		
	(0.006)		
executive influence · edec		-0.056***	
		(0.019)	
shared rule · edec			-0.031
			(0.031)
Controls			
deficit(t−1)	-0.077**	-0.151***	-0.078**
	(0.036)	(0.039)	(0.038)
debt(t−1)	0.023	0.033	0.015
	(0.032)	(0.033)	(0.033)
debt	-0.041	-0.052	-0.035
	(0.031)	(0.032)	(0.032)
Δ interest payments	0.553***	0.497***	0.447**
	(0.173)	(0.153)	(0.180)
real gdp growth	-0.145**	-0.145**	-0.146**
	(0.063)	(0.064)	(0.065)
Δ interest rate	-0.016	-0.042	-0.012
	(0.054)	(0.049)	(0.055)
election year	0.109	0.155	0.088
	(0.169)	(0.159)	(0.172)
right wing	-0.110	-0.111	-0.379*
	(0.209)	(0.196)	(0.196)
government type	-0.276	0.035	-0.297
	(0.219)	(0.213)	(0.205)
tax based consolidation	0.204**	0.194**	0.221**
	(0.089)	(0.091)	(0.095)
Hazard parameters			
Constant	-0.652	-0.520	0.069
	(0.691)	(0.425)	(0.381)
ln(ρ)	0.718***	0.751***	0.711***
	(0.051)	(0.058)	(0.051)
Number of observations	162	162	162

Table 3: interaction effects

Notes: Survival time estimation assuming the Weibull survival distribution. Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.10$. All models replicate Model (3) of Table 2 but include the respective interaction terms. Model (1) with fiscal autonomy, Model (2) with executive influence, and Model (3) with co-determination.
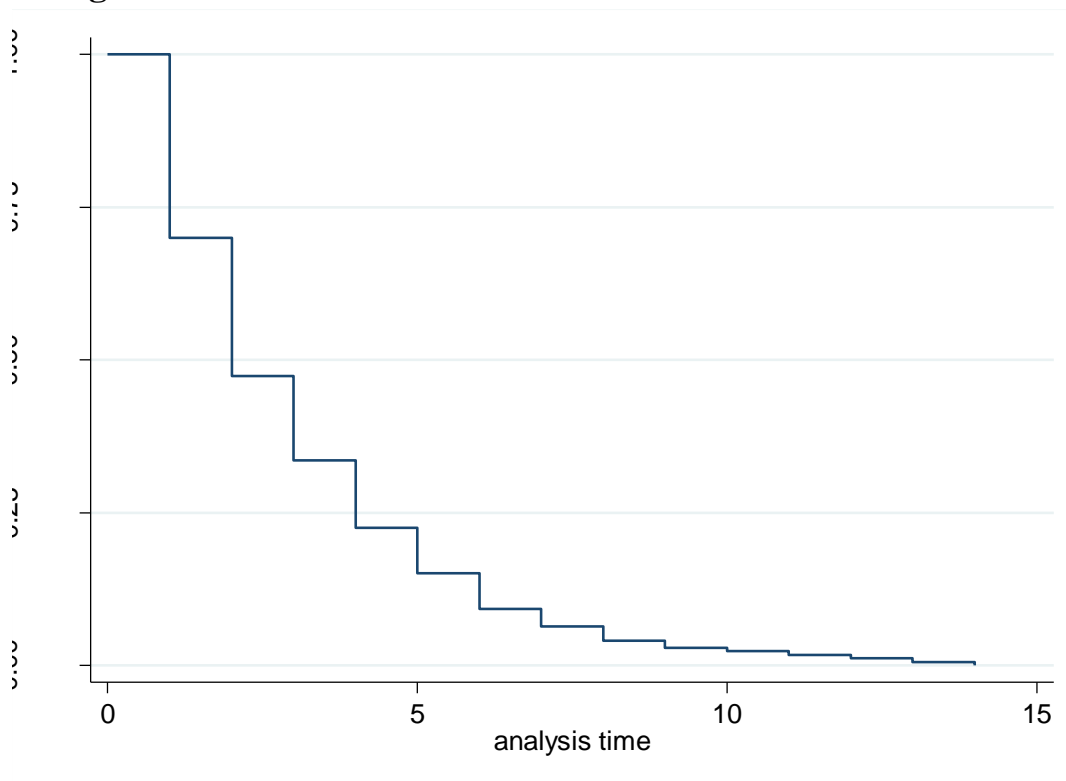
B. Figures
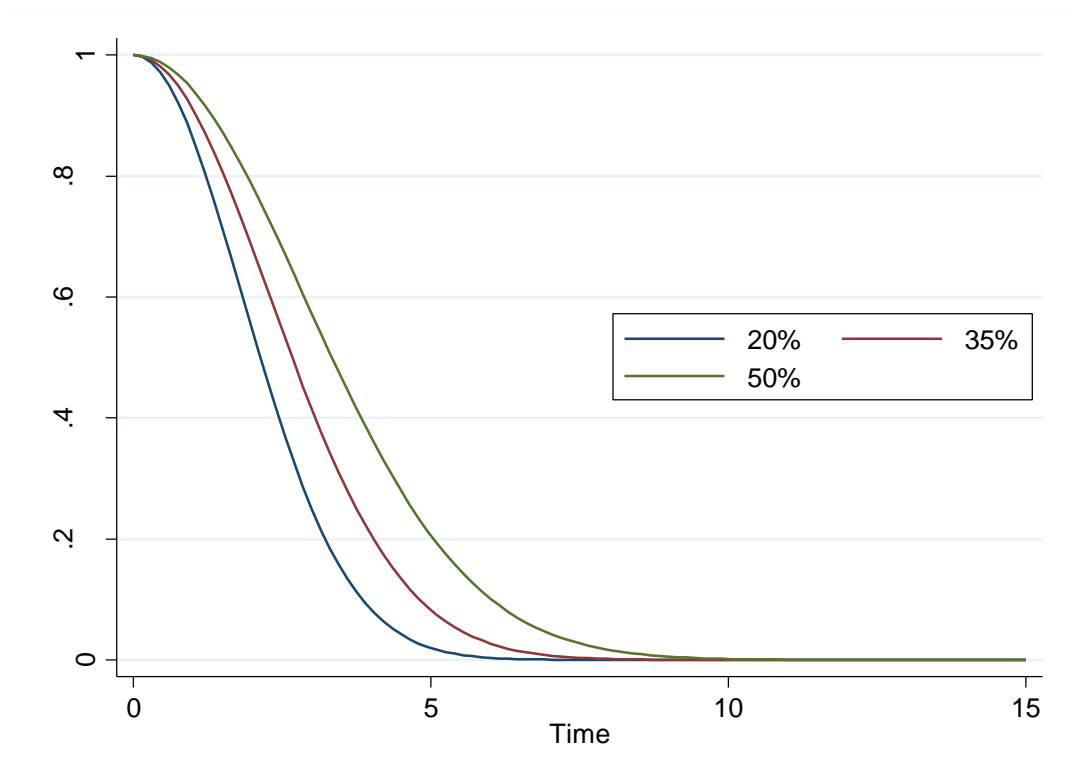

Figure 1: Kaplan-Meier Survival Function

Figure 2: Survival Function: Survival Probability and Decentralization

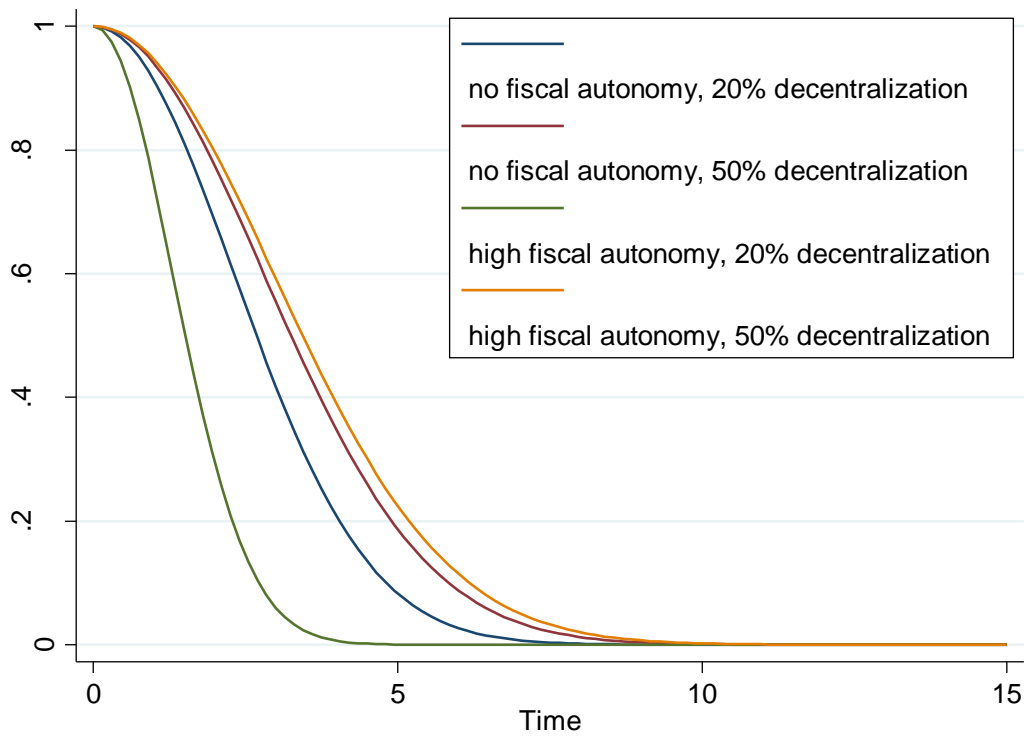Notes: Underlying estimation is Model (2) of Table 2.

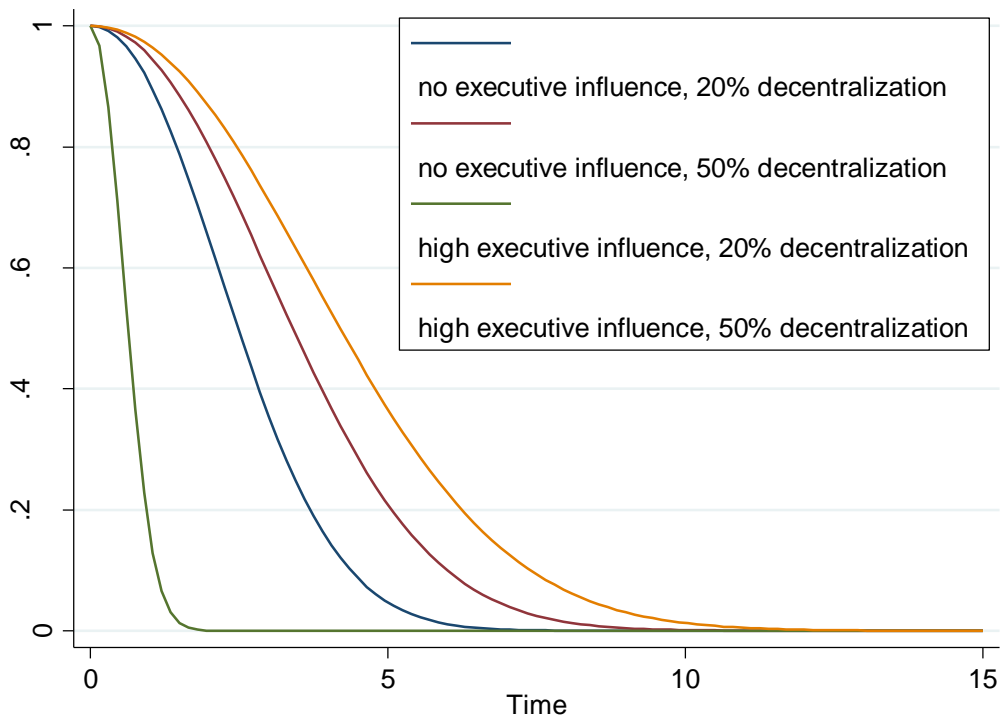Figure 3: Survival Function: Impact of Tax Autonomy

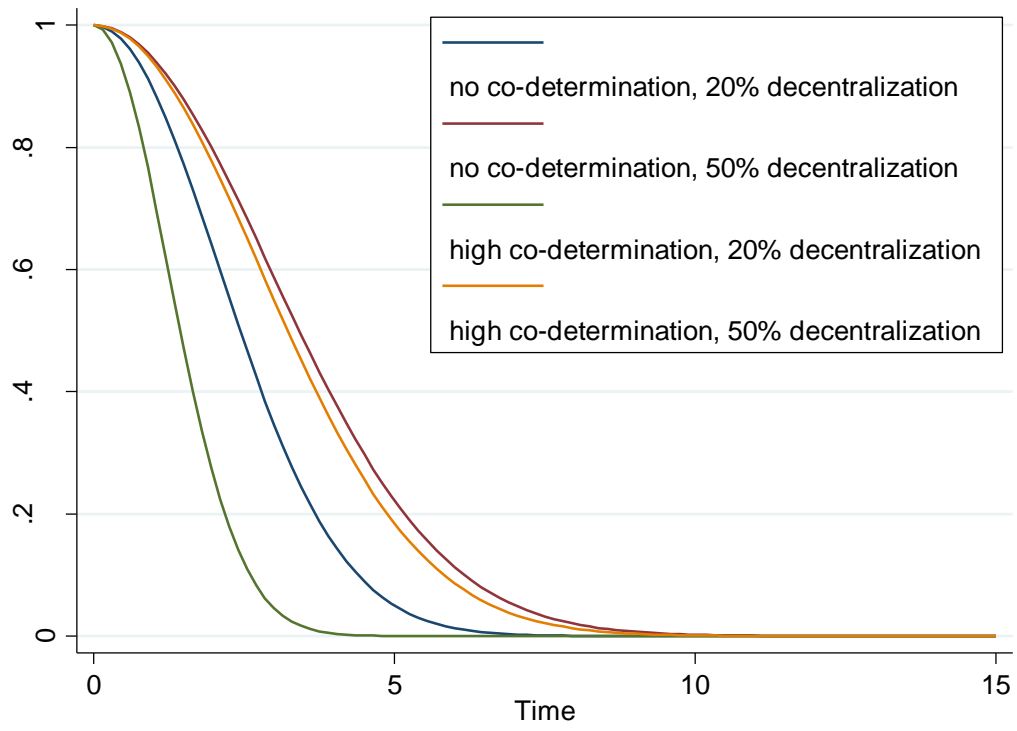Figure 4: Survival Function: Impact of Legal Autonomy

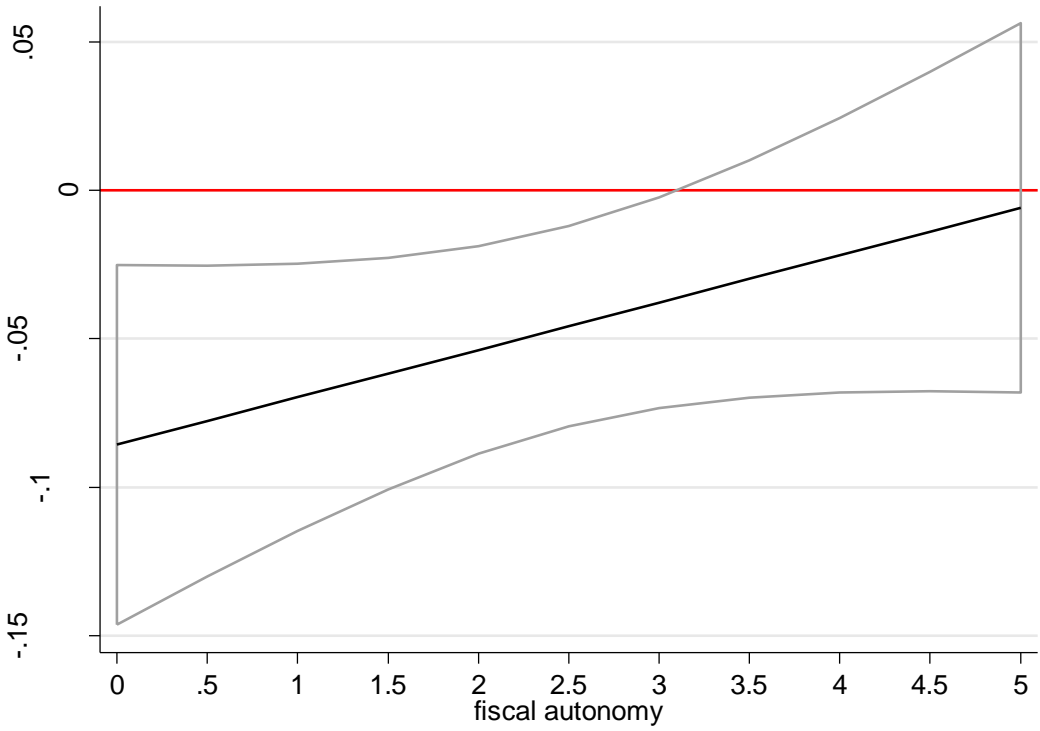Figure 5: Survival Function: Co-determination

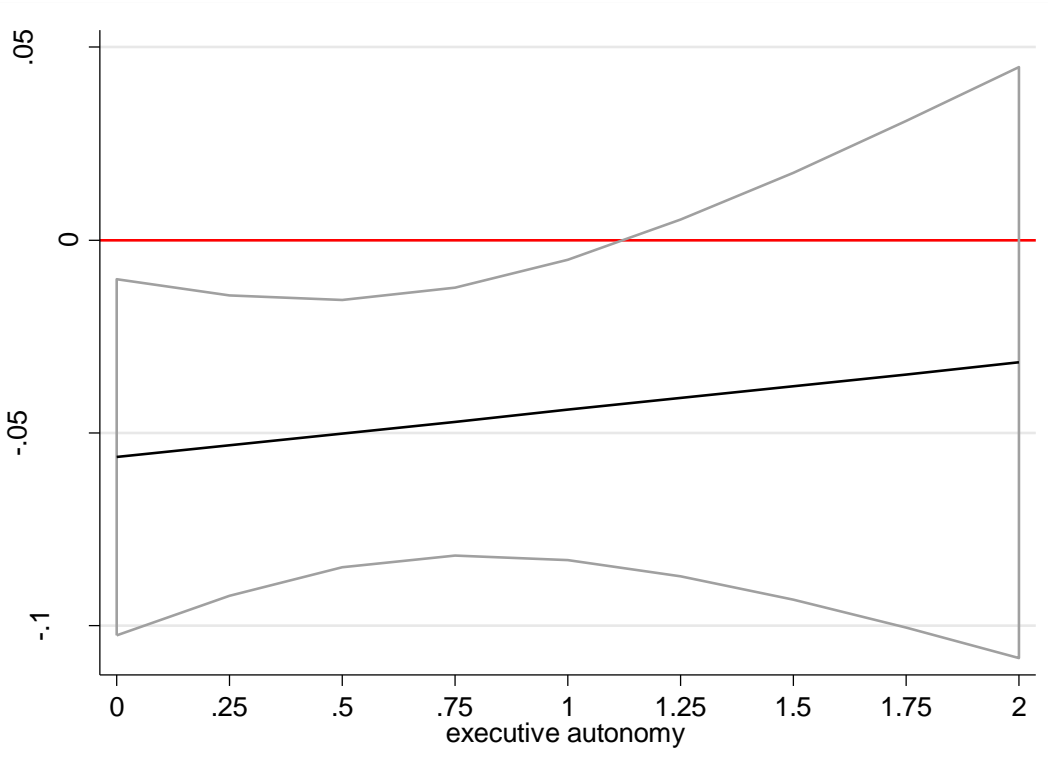Figure 6: Consolidation Burden: Impact of Tax Autonomy
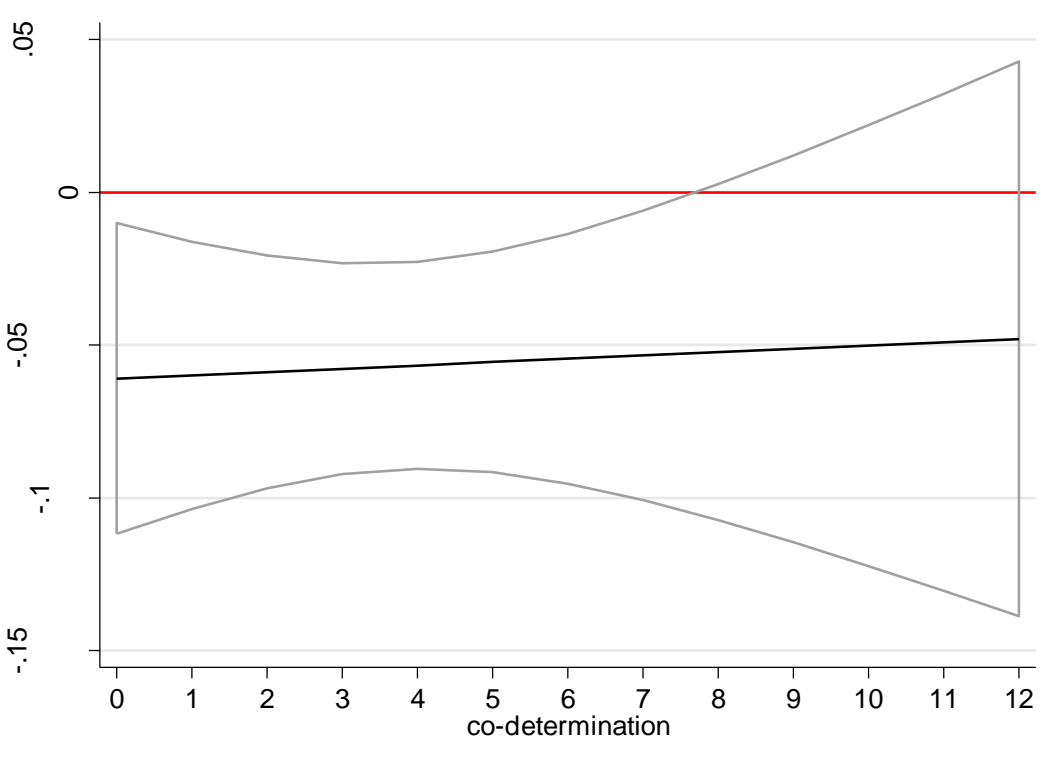
Figure 7: Consolidation Burden: Impact of Legal Autonomy

Figure 8: Consolidation Burden: Impact of co-determination